

DIGITALIZATION OF SURVEY AND MAPPING SERVICE PROCESSES THROUGH THE DEVELOPMENT OF A WEB-BASED SYSTEM

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Abstract

PT. Cakrawala Pilar Nusantara is a private company engaged in survey and mapping consultancy services. Several challenges have been identified in its business processes, one of which is that service delivery for collaboration is still conducted manually. This study adopts a Design Science Research (DSR) approach, focusing on the development of an artifact in the form of a web-based service system for PT. Cakrawala Pilar Nusantara, in accordance with the objectives of the research. The DSR methodology consists of the following stages: Problem Identification and Research Motivation, Definition of Solution Objectives, Design and Development of the Artifact, Demonstration, Evaluation, and Communication. Data collection was carried out through observation and interviews with relevant parties. System design visualization was conducted using UML, represented by use case diagrams and activity diagrams. The programming language used is PHP, implementing the CodeIgniter framework. System testing was performed using the black-box testing method.

The result of this research is a web-based information system that facilitates data entry, quotation submissions, reporting, and improves service processes by transforming manual record-keeping into a computerized system. The presence of this information system provides greater convenience for the company in managing its operational activities.

Keywords: Digitization; Design Science Research (DSR); Service Delivery; Website

Abstrak

PT. Cakrawala Pilar Nusantara merupakan perusahaan swasta yang bergerak dibidang survei dan pemetaan jasa konsultan. Terdapat beberapa kendala yang ditemukan dalam proses bisnisnya salah satunya adalah proses pelayanan jasa untuk melakukan kerjasama masih dilakukan manual. Penelitian ini menggunakan metode Design Science Research (DSR) yang difokuskan pada pengembangan artefak berupa sistem pelayanan jasa berbasis web untuk PT. Cakrawala Pilar Nusantara, sesuai dengan tujuan dari penelitian. DSR memiliki tahapan yaitu Identifikasi Masalah dan Motivasi Penelitian, Penentuan Tujuan Solusi, Design dan Pengembangan Artefak, Demonstrasi, Evaluasi, Komunikasi. Pengumpulan data dilakukan dengan cara observasi dan wawancara dengan piha terkait. Visualisasi rancangan sistem menggunakan UML dengan menggambarkan sistem dengan usecase diagram dan activity diagram. Bahasa pemrograman yang digunakan yaitu PHP dengan menerapkan framework codeigniter. Pengujian dilakukan menggunakan metode blackbox testing. Hasil dari penelitian ini berupa sistem informasi berbasis web yang berguna untuk penginputan data, penginputan penawaran harga, laporan dan memudahkan pelayanan dari sistem pencatatan manual menjadi sistem terkomputerisasi. Dengan adanya sistem informasi memberikan kemudahan untuk perusahaan dalam mengelola aktifitasnya.

Kata kunci: Digitalisasi; Design Science Research (DSR); Pelayanan Jasa; Website

INTRODUCTION

The rapid development of information technology, driven by the advent of the internet, has pushed various fields of life to utilize technology as optimally as possible. The use of technology can support and improve the success of

a business (Farhan & Roroa, 2024) (Abbas, Alamsyah, Herman, Auliyah, & Saleh, 2022), prompting many companies to race to implement technology in order to compete with others. With the rapid pace of technological advancements, companies must keep up with these developments

and strive to be the best among their competitors (Ernawati & Setiawan, 2023). Speed and accuracy are key factors in all processes (Saputra & Borman, 2020) (Ernawati & Gumelar, 2020) particularly in meeting human needs, especially in terms of information. Many companies today require information systems to support their activities in order to provide maximum service to both consumers and business partners. Computerized information systems are crucial for companies, ranging from planning to reporting, for management decision-making. The presence of these information systems is expected to assist companies in obtaining fast and accurate information (Helling, 2018).

Based on observations and interviews conducted at PT. Cakrawala Pilar Nusantara, located in Depok, a private company engaged in survey and mapping consultancy services for needs in mapping, geotechnical engineering exploration, and construction, as well as land, sea, and aerial surveys, it is evident that excellent service is crucial for maintaining customer satisfaction. High-quality service can attract customer attention, and well-managed service can meet customer expectations. The quality of service is influenced by several factors considered important by customers when using services (Maulana, Purnamasari, & Maulana, 2024) (Riyadin, 2019). However, in its business service processes, PT. Cakrawala Pilar Nusantara has not yet utilized information technology, leading to several issues, such as the use of manual record-keeping in service delivery (Arafat, Trimarsiah, & Susantho, 2022) (Sari, Syahputra, Zaky, Sibuea, & Zakhir, 2022) (Riskiono & Reginal, 2018) including recording partner identities, payment transactions, and reports stored in physical archives, which can lead to data entry errors, damaged data, and even lost data. The current business process involves initial communication via WhatsApp, followed by an in-person meeting with partners, after which the company prepares and sends a proposal for the service, waiting for a response (up to 7 days). After negotiations via WhatsApp, if a deal is reached, the company conducts an internal meeting to finalize the price, contract, work schedule, and 50% down payment. The experts then proceed with the project, which includes data processing, presentation, and reporting. The company then sends the report to the partner, and the partner makes the final payment.

The aim of this research is to design and develop a web-based service system that can speed up the consultation and service order processes, while also improving documentation

systems to enhance operational efficiency and service quality.

This research adopts the Design Science Research (DSR) method. The choice of this method is based on the goal of developing technology-based solutions that are not only innovative but also have practical contributions to solving real-world problems. DSR allows the creation of technology artifacts (Lawrence, Tuunanen, & Myers, 2020) (Ernawati, Frieyadie, & Yulia, 2024), such as web-based systems, that can address issues in service delivery processes (Anwara & Sulistiyan, 2024) (Mira Orisa, Ahmad Faisol, & Mochammad Ibrahim Ashari, 2023). Furthermore, DSR provides a structured approach through systematic stages, including Problem Identification and Research Motivation, Definition of Solution Objectives, Design and Development of Artifacts, Demonstration, Evaluation, and Communication (Venable, Pries-heje, & Baskerville, 2017) (Subagyo, Budi Utami, & Suparyanto, 2023). Therefore, DSR is highly relevant for producing measurable, practical, and implementable solutions in real-world contexts, such as the one needed by PT. Cakrawala Pilar Nusantara in improving its service system.

RESEARCH METHODS

This research adopts the Design Science Research (DSR) method, which aims to develop a web-based service system for PT. Cakrawala Pilar Nusantara, a private company engaged in survey and mapping consultancy services. The DSR model was chosen as it aligns with the need to produce an artifact in the form of an information system that can address issues in the service delivery process, which has been carried out manually so far. The DSR methodology involves six stages, as shown in Figure 1 below.

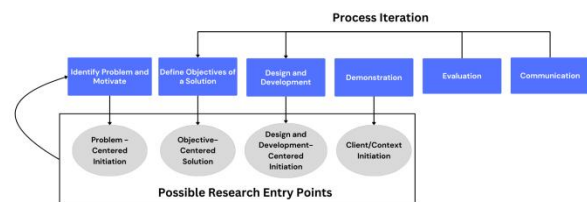


Figure 1. Stage of Design Science and Research

The following is an explanation of each stage involved:

Problem Identification and Research Motivation

This initial stage aims to understand the main issues faced by PT. Cakrawala Pilar Nusantara, such as inefficiency in service delivery to clients, slow consultation processes, and the lack of integrated service documentation. These issues form the basis for driving the need for technology-based innovation.

Solution Objectives Definition

Based on the identified issues, the goal of this research is to develop a web-based system that can accelerate the consultation process, service ordering, and project reporting, while prioritizing ease of access and operational efficiency.

Design and Development of Artifacts

In this stage, the design of the web-based service system is carried out, including the design of the user interface (UI), database design, and the development of service modules, such as adding partner identities, creating work orders, entering price lists, inputting price offers, submitting proposals, and generating reports.

Demonstration

The developed system is then internally tested with user involvement. This demonstration aims to show that the system can be used according to the company's needs.

Evaluation

Evaluation is conducted to assess how well the system meets the established objectives. It includes testing the system's functionality and collecting feedback from users regarding service speed and ease of use.

Communication

All research results, including the development process, evaluation outcomes, and recommendations for further development, are documented in this scientific article for dissemination to the academic community and practitioners in the field of information systems.

web-based service system at PT. Cakrawala Pilar Nusantara:

- 1) **Admin**
 - a. Add Partner Identity
 - b. Create Work Order
 - c. Service Price List
 - d. Price Offer
 - e. Reports
- 2) **Partner**
 - a. Account Registration
 - b. Service Price List
 - c. Submit Price Proposal
 - d. Reports

The system design process for the built information system uses Unified Modeling Language (UML) by creating use case diagrams and activity diagrams. The use case diagram is a diagram used to illustrate the behavior of each actor and its relationship to objects (Homaidi & Ibad, 2019). The use case diagram of the involved actors can be seen in the figure below. Figure 2 shows the use case diagram from the admin's perspective, and Figure 3 shows the use case diagram from the partner's perspective.

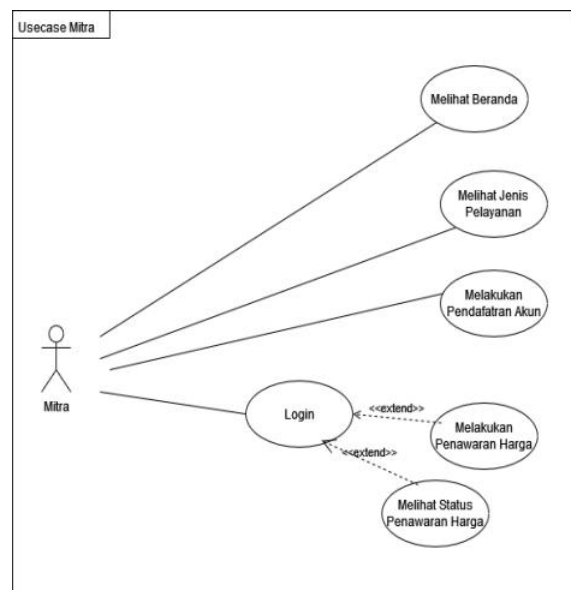


Figure 2. Admin Usecase Diagram

RESULTS AND DISCUSSION

In the developed web-based service system, there are two users who can access the system: Administrator and Partner. The Admin can input partner identities, create work orders, set service prices, while the Partner can fill in their identity and display service prices. The following are the system requirements specifications for the

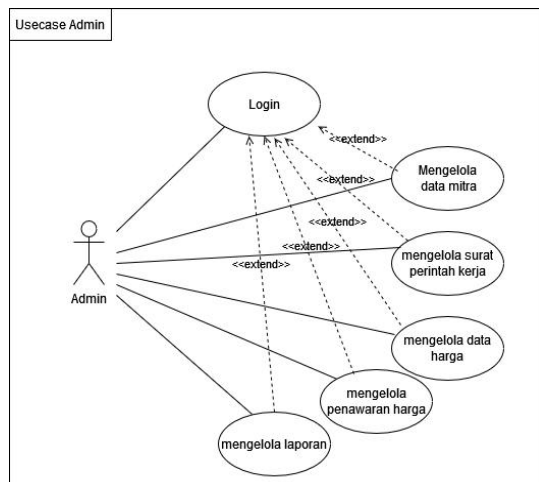


Figure 3. Partner Usecase Diagram

An activity diagram illustrates activities by displaying the logical procedures and business processes of an information system (Fatmasari & Sauda, 2020). Figure 4 is an activity diagram that shows the activities when a partner registers an account on the website.

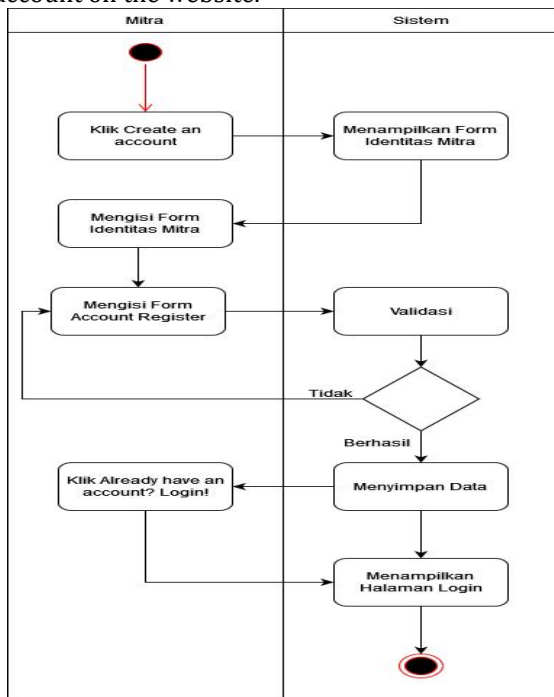


Figure 4. Partner Account Registration Activity Diagram

Figure 5 is an activity diagram that illustrates the activities when a partner submits a price offer in the system.

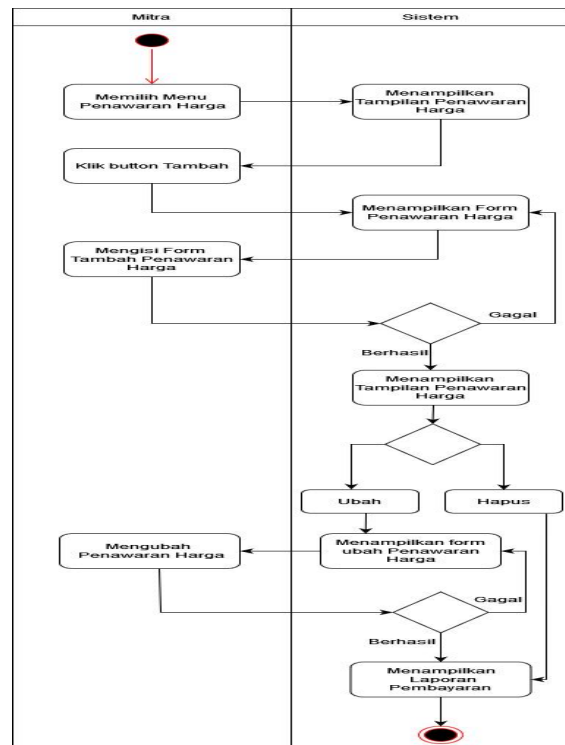


Figure 5. Price Offer Activity Diagram

An Entity Relationship Diagram is a database design process that starts with identifying data, referred to as entities, and the relationships between these entities, which are depicted in a model (Christian, Hesinto, & Agustina, 2018). In the information system being developed, the Entity Relationship Diagram used can be seen in Figure 6 below.

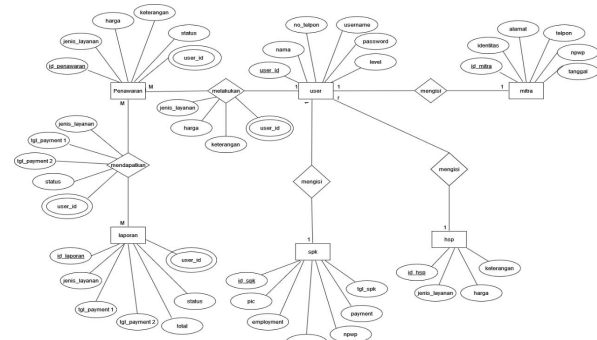


Figure 6. Entity Relationship Diagram of the Service Information System

The interface implementation of the built information system can be seen in the figures below. Figure 7 shows the homepage of PT. Cakrawala Pilar Nusantara. The homepage displays information about the types of services and details of the services offered.

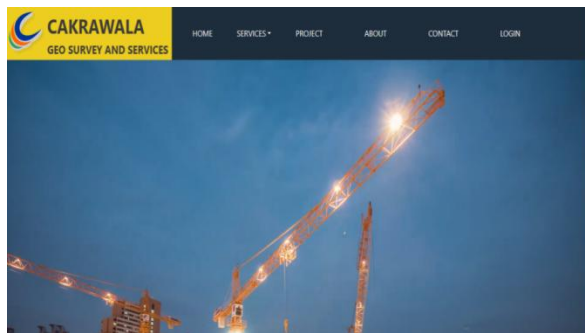
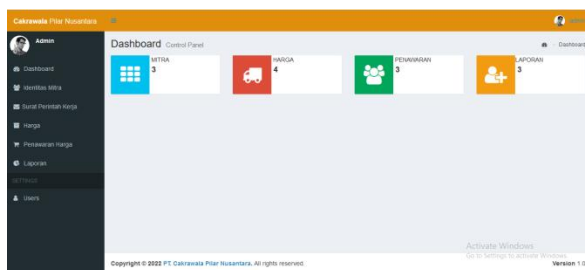


Figure 7. Homepage

Figure 8 shows the admin dashboard page, which functions to manage the services provided to partners. This page contains menus for partner identities, work orders, prices, price offers, and reports.



Gambar 8. Admin Dashboard Page

Figure 9 shows the work order form, which is used to input employee data as the person responsible for the project to be executed, along with the total payment to be made by the partner.

Gambar 9. Work Order Form

Figure 10 is the partner account registration page for PT. Cakrawala Pilar Nusantara's web-based system. It is required for partners who wish to collaborate with the company to register first so that the administrative department can verify the information.

Gambar 10. Partner Account Registration Page

Figure 11 is the partner page, which is used to submit a price offer to PT. Cakrawala Pilar Nusantara.

Gambar 11. Price Offer Page

The testing of the built information system was conducted using the black box testing method. The testing was performed on the forms available in the information system. This test was carried out to ensure that the system meets the user's requirements. **Table 1** shows the results of black box testing on the price offer form.

Table 1. Black Box Testing Results for the Price Offer Form

Test Scenario	Test Case	Expected Result	Test Result
Leaving the form empty and clicking save	Service Type: (empty) Price: (empty) Description: (empty)	The system will display a form error	As expected
Filling out only 1 field and clicking save	Service Type: Aerial Photo Price: (empty) Description: (empty)	The system will display a form error	As expected
Filling out all the data	Service Type: Aerial Photo Price: 3.5 Million Description:	The system will process and save	As expected

Test Scenario	Test Case	Expected Result	Test Result
	Flat and open land	the data and redirect to the price offer display	

CONCLUSIONS AND SUGGESTIONS

Conclusion

After observing the issues at PT. Cakrawala Pilar Nusantara, it was found that the data storage system was still conventional, using manual methods for recording both partner data and transactions. The data stored in the archives is vulnerable to loss or damage. Therefore, the solution to this problem is to transition to a computerized system to make it easier for users, especially in terms of data storage that is prone to loss. The implementation of this information system can improve performance and service quality, leading to optimal results. According to the results of the testing conducted using black box testing, it was proven that the system developed meets the user's needs.

Suggestion

Based on the findings and the implementation of the computerized system, several recommendations can be made to further improve the service system at PT. Cakrawala Pilar Nusantara:

1. Ongoing Training for Users: To ensure that the transition from a manual to a computerized system is smooth, it is recommended to provide continuous training for both administrators and partners. This will help them to better understand the new system and its features, improving the overall efficiency and user experience.
2. Data Backup and Security: Since the new system stores crucial data, it is essential to implement regular data backup protocols to prevent potential data loss. Additionally, investing in cybersecurity measures will protect the data from unauthorized access and breaches.
3. System Maintenance and Updates: To maintain the system's efficiency and adaptability to changing business needs, regular system maintenance and updates should be scheduled. This will ensure the system stays up to date with the latest technology and remains functional in the long term.

4. User Feedback Integration: Continuously gather feedback from both administrators and partners to identify any areas of improvement. This will allow for iterative updates to the system, making it more aligned with user needs and ensuring greater satisfaction.
5. Expansion of Features: In the future, additional features such as mobile compatibility, real-time tracking, or automated reporting could be integrated into the system to enhance service delivery further and offer more convenience to both the company and its partners.

REFERENCES

- Abbas, S. A., Alamsyah, A., Herman, B., Auliyah, I., & Saleh, W. (2022). Dampak Inovasi Teknologi Dalam Mendorong Kinerja Pegawai Pada Kantor Dinas Kependudukan Dan Pencatatan Sipil Kabupaten Soppeng Indonesia. *Jurnal Maneksi*, 11(2), 332-341. <https://doi.org/10.31959/jm.v11i2.1177>
- Anwara, M. S., & Sulistiyani, E. (2024). Pengembangan Sistem Informasi LSP Indohusada Berbasis Web Menggunakan Design Science Research (DSR). *Journal of Information System, Graphics, Hospitality and Technology*, 06(02), 92-101. <https://doi.org/10.37823/insight.v6i2.396>
- Arafat, M., Trimarsiah, Y., & Susantho, H. (2022). Rancang Bangun Sistem Informasi Pemesanan Online Percetakan Sriwijaya Multi Grafika Berbasis Website. *Informatika Dan Teknologi (Intech)*, 3(2), 6-11. <https://doi.org/10.54895/intech.v3i2.1691>
- Christian, A., Hesinto, S., & Agustina. (2018). Rancang Bangun Website Sekolah Dengan Menggunakan Framework Bootstrap (Studi Kasus SMP Negeri 6 Prabumulih). *Jurnal SISFOKOM*, 7(1), 22-27.
- Ernawati, S., Frieyadi, & Yulia, E. R. (2024). Cybersentinel: The Cyberbullying Detection Application Based on Machine Learning and VADER Lexicon with GridSearchCV Optimization. *Journal of Electronics, Electromedical Engineering, and Medical Informatics*, 6(4), 533-542. <https://doi.org/https://doi.org/10.35882/jeemi.v6i4.580>
- Ernawati, S., & Gumelar, R. (2020). Analisa Pieces Untuk Rancang Bangun Sistem Informasi Monitoring Persediaan Barang Berbasis Web Pada Koperasi Sartika Bogor. *EVOLUSI: Jurnal Sains Dan Manajemen*, 8(1). <https://doi.org/10.31294/evolusi.v8i1.7386>

- Ernawati, S., & Setiawan, R. (2023). Rancang Bangun Sistem Informasi Delivery Food Berbasis Web Pada Epa Cafe & Resto. *Jurnal Sains Dan Informatika*, X(November 2020), 56–66.
<https://doi.org/10.34128/jsi.v9i1.498>
- Farhan, A., & Roroa, N. A. F. (2024). Strategi Maksimalisasi Teknologi E-Commerce Dalam Meningkatkan Kinerja Bisnis di Era Digital. *Innovative: Journal Of Social Science Research*, 4(1), 10110–10119. Retrieved from <https://j-innovative.org/index.php/Innovative/article/view/9066>
- Fatmasari, & Sauda, S. (2020). Pemodelan Unified Modeling Language Sistem Informasi Enterprise Resource Planning. *Jurnal Media Informatika Budidarma*, 4(2), 429–436.
- Helling, L. S. (2018). Perancangan Sistem Informasi Pelayanan Pelanggan Pada Citra Laundry Bogor. *Jurnal INTENSIF*, 2(1), 68–78.
- Homaidi, A., & Ibad, S. (2019). nalisis Pemodelan Sistem Pengaduan Kasus Menggunakan Object Oriented Method (Unified Modelling Language). *Jurnal Ilmiah Informatika*, 4(1), 47–52.
- Lawrence, C., Tuunanen, T., & Myers, M. D. (2020). Extending Design Science Research Methodology for a Multicultural World. *IFIP Advances in Information and Communication Technology*, (March), 112–126.
<https://doi.org/10.1007/978-3-642-12113-5>
- Maulana, A., Purnamasari, I., & Maulana, I. (2024). Rancang Bangun Website Layanan Jasa Reparasi Alat Elektronik Rumah Tangga Menggunakan Framework Laravel (Studi Kasus: Cv. Xyz). *Jurnal Informatika Dan Teknik Elektro Terapan*, 12(3).
<https://doi.org/10.23960/jitet.v12i3.4859>
- Mira Orisa, Ahmad Faisol, & Mochammad Ibrahim Ashari. (2023). Perancangan Website Company Profile Menggunakan Design Science Research Methodology (DSRM). *Jurnal Informatika Teknologi Dan Sains*, 5(1), 160–164.
<https://doi.org/10.51401/jinteks.v5i1.2576>
- Riskiono, S. D., & Reginal, U. (2018). SISTEM INFORMASI PELAYANAN JASA TOUR DAN TRAVEL BERBASIS WEB (STUDI KASUS SMART TOUR). *Jurnal Informasi Dan Komputer*, 6(2), 51–62.
- Riyadin. (2019). Pengaruh Kualitas Pelayanan Terhadap Kepuasan Masyarakat Keluarga Berencana di Kecamatan Pekalongan Kabupaten Lampung (Studi Kasus Pada Desa Pekalongan). *Jurnal Simplex*, 2(1), 41–50.
- Saputra, A. D., & Borman, R. I. (2020). SISTEM INFORMASI PELAYANAN JASA FOTO BERBASIS ANDROID (STUDI KASUS: ACE PHOTOGRAPHY WAY KANAN). *Jurnal Teknologi Dan Sistem Informasi (JTSI)*, 1(2), 87–94.
- Sari, I. P., Syahputra, A., Zaky, N., Sibuea, R. U., & Zakhir, Z. (2022). Perancangan Sistem Aplikasi Penjualan dan Layanan Jasa Laundry Sepatu Berbasis Website. *Blend Sains Jurnal Teknik*, 1(1), 31–37.
<https://doi.org/10.56211/blendsains.v1i1.67>
- Subagyo, U., Budi Utami, A., & Suparyanto, S. (2023). Prototype Sistem Informasi Keuangan Terintegrasi dengan Sistem Informasi Akademik. *Journal Automation Computer Information System*, 3(1), 44–52.
<https://doi.org/10.47134/jacis.v3i1.55>
- Venable, J. R., Pries-heje, J., & Baskerville, R. L. (2017). Choosing a Design Science Research Methodology. *Australasian Conference on Information Systems 2017*, 1–11. Hobart, Australia.