

Reactjs and Expressjs Implementation In PMK ITB STIKOM Bali Activity Management

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Abstract

In the Christian Student Brotherhood Student Activity Unit (PMK) ITB Stikom Bali the management of data, information and documentation is still done conventionally, namely hardcopy printing. These documents are vulnerable to being lost, damaged or difficult to find at a later date. Therefore we need a system to be able to manage data, documentation and other information regarding activities in PMK. In developing this activity management application using ReactJS and ExpressJS. This activity management application is expected to be a means of connecting information on activities carried out and making it easier for administrators to be able to store information from activities carried out. There are 5 stages in this research, namely data collection by direct observation of the object under study, literature study and stakeholder interviews. The second stage is an analysis from the user side, the data needed and the existing processes. The third stage is system design using conceptual database design, context diagrams and web architecture. The fourth stage is system implementation using the Javascript programming language with ReactJS on the frontend and ExpressJS on the backend and MongoDB as the database. The last stage is testing the system using the Blackbox testing method which focuses on testing the functionality of the system. The results of this study resulted in a website-based activity management system with predetermined user access as well as a liaison for activity information in the form of activity galleries and activity articles in UKM PMK using ReactJS and ExpressJS.

Keywords: Student Activity Unit, Information, Management, Website, ReactJS, ExpressJS, MongoDB

1. Introduction

One of the universities in the field of information technology in Bali is the STIKOM Bali Institute of Technology and Business (ITB). Apart from providing formal education in the fields of science, technology, and business, ITB STIKOM Bali also provides a platform for all students to increase their interests, talents and other skills through the Student Activity Unit (UKM). SMEs play an important role as a forum for developing self-potential through various activities in it [1]. One of the many UKMs in ITB STIKOM Bali is the Christian Student Brotherhood UKM (UKM PMK). One of the main focuses of the activities in this UKM is to build spiritual education as well as a place for students to practice organizational skills, adapt, and add insight[2]. As an organization, this UKM routinely carries out various activities, such as. Easter celebration activities, routine monthly services, community service, PMK Simvony competition, Bible Quiz competition, welcoming new students, Christmas celebration services, and various other activities [3][4][5]. All data, information and documentation of these activities are still managed conventionally. Notes from activity planning meetings, activity data, and documentation, as well as activity results and accountability reports are still made only in hardcopy form[6][7]. The document is archived in a folder which is then stored in a cupboard. The stored documents are very vulnerable to damage or loss [8]. What's more, because every year the number of activities always increases, storage media such as folders and filing cabinets can no longer accommodate documents adequately. Softcopies of data and



documents are usually only owned by the activity committee while the management or activity committee can change each period, which causes not all members or administrators to have documentation of activities from the previous period[9]. In addition, announcements and publications of activities are still carried out by attaching leaflets or flyers to bulletin boards and are limited to social media. This causes information about activities not to be conveyed widely and immediately [10][11][12]. In the previous study entitled "Web-Based Application of Student Activity Management at STIKI Indonesia" written by Ni Luh Wiwik Sri Rahayu Ginantra and Ketut Jaya Atmaja in 2018 [14][15]. This research has problems that are relevant to what the author is facing, namely reviewing the process of recording student activities and the use of the room is still using the manual method, causing problems using the room that is not on schedule.

The system produced in this study has features for recording various information and managing activities, the room is computerized so that it is more structured and produces more informative information. The system is built based on a website so that it can be accessed more easily via the internet network [16]. The programming language used in the development of the system is PHP which has the advantage that the MVC method used can provide benefits and convenience in development and the database is MySql [17][18]. Another study entitled "Design and Build a Web-based Event Management Information System" written by Faesal Herlamban and Nurudin Santoso in 2021. This second research has relevance in the field of the use of programming languages and the databases used. Focusing on developing a centralized system to manage event data and information that utilizes Dare media to prevent miscommunication[19]. The system was developed using the Javascript programming language with the famous ReactJS library because it has high performance and uses NoSQL, namely MongoDB as its database. Based on the results of white-box testing and blackbox testing from this study, the system built using ReactJS as a library has functioned according to the functionality plan of the author [20]. Unlike the two previous studies, this research will develop a website-based system using ReactJS and ExpressJS technology. ReactJS is a JavaScript library that is open source and has functions for building user interfaces on the frontend side[21]. ReactJS is also one of the most widely used JavaScript frameworks in the programming world[22]. ExpressJS is a development of NodeJS JavaScript which is used for the backend server side[23][24]. ExpressJS has advantages in the areas of integration and scalability. Besides having complete documentation and libraries, ReactJS and ExpressJS also have good performance and security levels. As well as using NoSQL namely MongoDB[25]. The stages in this research include data collection, analysis, design, implementation, testing.

2. Research Method



Figure 1. Stages of Research Methods

2.1. Data collection

In this research method, there are several techniques used in the data collection process as follows:

1. Observation The observation method is a method that is carried out by direct observation of the object under study [26]. The object referred to in this sense is the management of activities at UKM PMK STIKOM Bali.
2. Literature Study The literature study method is a method that is carried out by recording and reviewing the literature which is useful for exploring knowledge which can come from books, scientific works, journals and other reliable sources [27]. With the aim of supporting the creation of an activity management system for UKM PMK STIKOM Bali regarding ReactJS, ExpressJS, MongoDB and Blackbox testing.
3. Interview The interview method is a method used to find out information directly

through relevant informants. This activity is carried out by preparing questions that are given to resource persons [28]. In this stage, the researcher conducted interviews with administrators, commissioners, and PMK members regarding the needs needed to be a reference for designing this system.

2.2. System Analysis

System analysis is the stage of problem identification to find and determine the limits of the system to be designed in fulfilling the objectives. There are several analyzes such as user analysis, data analysis and process analysis.

2.3. System Design

The system design phase is the blue print phase, which is to provide an overview of the system prior to implementation. The stages in the design of this system include: context diagrams, conceptual database design and system architecture.

2.4. System Implementation

At the system implementation stage, it is a process of transforming the results of the analysis and the system into a website that can be used. This process uses several Visual Studio Code tools as the media for the text editor, the JavaScript programming language with ReactJS on the frontend and ExpressJS as the backend and MongoDB as the database.

2.5. System Testing

The testing phase has the goal of ensuring the system that has been made is in accordance with the existing design and objectives. The test used is Blackbox testing which focuses on functionality without testing the program code. Black box testing tests software against functional specifications without testing the design and program code to determine whether the software's functionality, input, and output meet the required specifications. This test is an easy-to-use method that only requires a data set to be tested in the entry field and validation rules that must be met.

3. Results and Discussion

3.1 System Analysis

System analysis is a process of identifying existing components in a system with the aim of designing a new system as needed. There are 3 analyses, namely:

- 1) User Analysis

The following is an analysis of users who will use this system, namely admins, UKM PMK administrators, and students. An explanation of the role of each user will be explained in Table I.

Tabel I User Analysis

No	User Analysis	
	User	Description
1	Admin	Is a user who can manage data such as galleries and articles on the dashboard page.
2	Manager PMK SMEs	Is a user who can only see information related to gallery and article data on the dashboard page.
3	Student	Is a user who can view information related to the gallery of activities being held as well as articles on the landing page.

2) User Analysis

The results of this data analysis are used as a reference in designing data storage in the system which will be described in Table II.

Tabel II. User Analysis

No	User Analysis	
	User	Description
1	User	Contains data about users such as id, username, email, role, password, confirm password, token.
2	Article	Contains data about existing article details such as id, image, article title, hashtag, period, date, status, description which can make it easier to search for articles.
3	Gallery	Contains data about the details of the gallery being organized, such as containing id, image, activity title, start date, end date, location, status, link, description so that users can clearly understand the contents of the activity gallery.

3) Process Analysis

In this system there are 4 processes. This process is a general description that is owned by the system in processing various data. The description of the process can be seen in Table III.

Tabel III. Process Analysis

No	Process Analysis		
	User	Description	User
1	Register	Is the process of creating a new account to be able to access the dashboard.	Admin
2	Login	Is a verification process using email and also a password to be able to enter the dashboard page.	Admin, Manager PMK SMEs
3	Manag e Data on Articles	Is the process of managing the data in the article.	Admin
4	Manag e Data on Gallery	Is the process of managing data in the gallery.	Admin

3.2 System Design

System design is a process of planning or describing the system being built. There are 3 system designs, namely:

- Context Diagrams

A context diagram is a diagram that contains an overview of the existing processes and the scope of the system to be built in outline [29]. There are 3 entities, namely: Admin, Management and students who can access the system according to predetermined access rights.

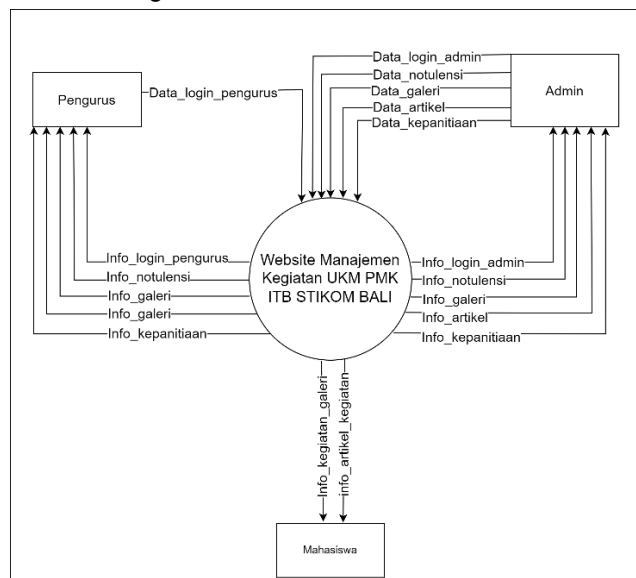


Figure 2. Context diagrams

- Conceptual Database

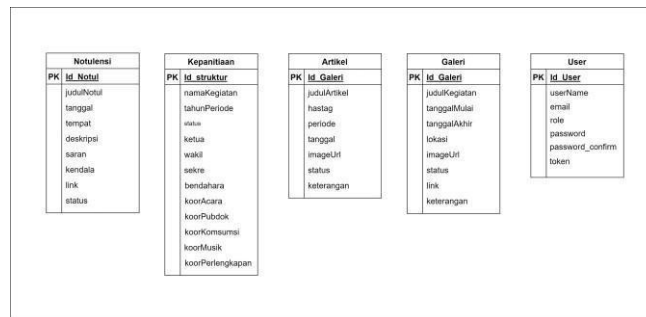


Figure 3. Conceptual Database

The conceptual database is a process for building a data model based on needs, which is also the first process in database design. In the conceptual database section there are 5 main entities namely minutes, committees, articles, galleries and users with attribute descriptions[30][31]. The absence of relationships between entities is caused by the construction of databases using the NoSQL type which has the characteristics of not having a schema and not being structured because of its flexible implementation[32]. Additionally, NoSQL data can be stored in a variety of ways: graphically based, document-oriented, column-oriented, or organized like KeyValues. MongoDB takes the concept in the form of a JSON document (JavaScript Object Notation) besides that each entity can flexibly relate to one another. Can be seen in figure 3.

- Web Architecture

The web service architecture used is REST. It is based on RESTful Web services and only adds JSON format data exchange[33][34][35]. The process that occurs is that the client will request a data request using the API which is forwarded to the web server which will then make a data request to the MongoDB database which will then be responded to with the requested data and finally will be displayed to the user according to the requested request[36].

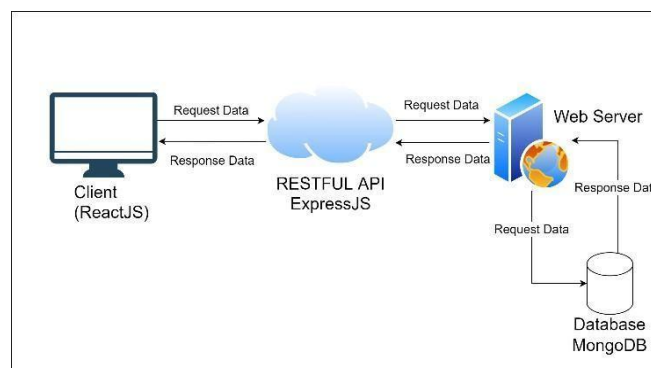


Figure 4. Web Architecture

3.3 System Implementation

This system uses ReactJS and ExpressJS in its development and uses MongoDB as its database. On the backend it uses ExpressJS which is divided into several folders with special functions such as: controller which contains code to manage data on the system. Middleware that contains code to check user roles using email and password authentication. Models which contain the code for the database schema and connect to mongoDB. The router that contains the code to manage the input in the form of a URL request, and process it

according to the final destination URL. Can be seen in figure 5.

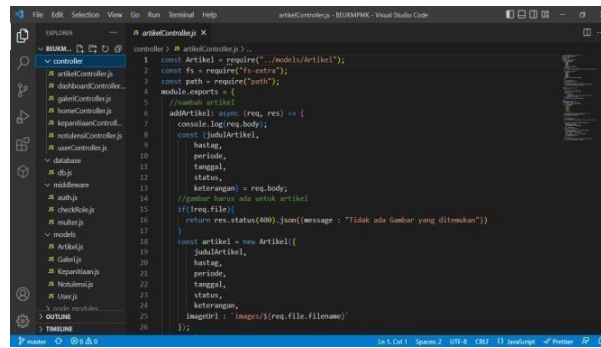


Figure 5. Backend Section Screenshot

The Frontend uses ReactJS which is divided into several folders with special functions such as: Containers which contain code for the navigation bar section. Service that contains code to fetch the API to connect to the frontend. Views that contain code for each component used. Can be seen in figure 6.

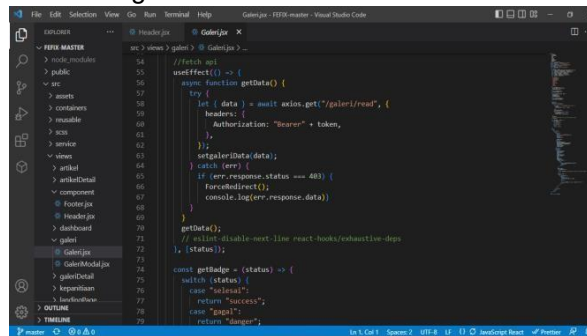


Figure 6. Frontend Section Screenshot

The Database section uses MongoDB Cloud with a data structure in the form of a JSON document. It can be seen in Figure 7.

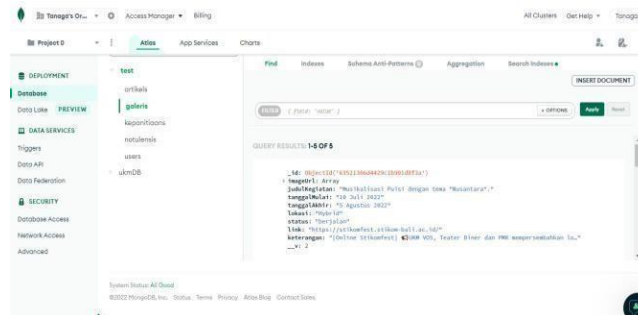


Figure 7. MongoDB Section Screenshot

In the website implementation section, there is a landing page as the main page that can be accessed by all parties. There is section 1 containing the vision and mission profile of UKM PMK as well as a snippet video of PMK UKM's profile on Youtube. Can be seen in figure 8.

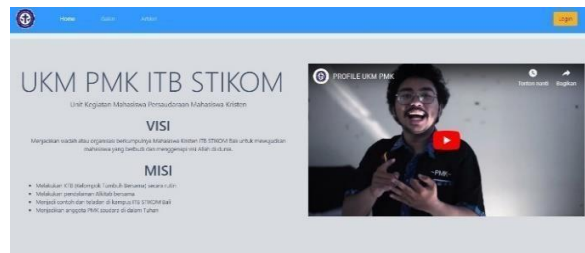


Figure 8. Implementation of Landing Pages

Section 2 contains a gallery of activities held with a description of the title, images and related links. Can be seen in figure 9.

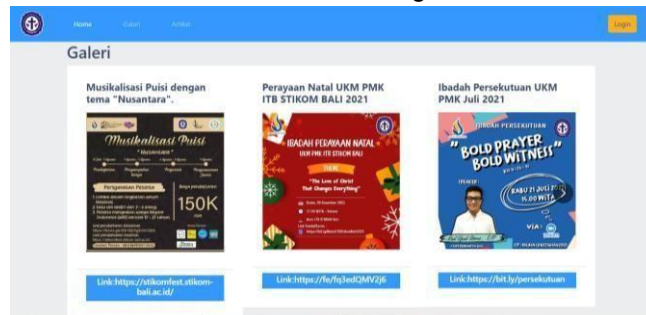


Figure 9. Gallery Implementation

Section 3 contains articles from ongoing activities with a description of the title, image, year period and description of the activity. Can be seen in figure 10.

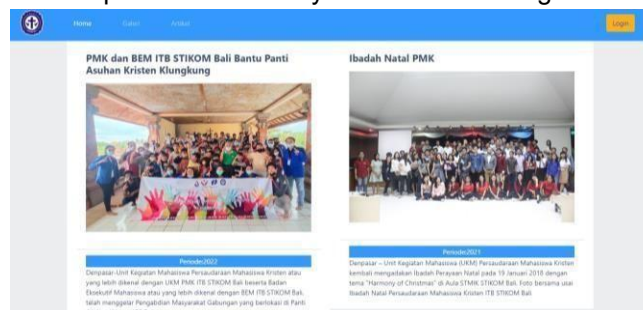


Figure 10. Implementation of Landing Pages

On the dashboard, before accessing existing information, a login step is required by entering the previously registered email and password. Can be seen in figure 11.



Figure 11. Dashboard Implementation

3.4 System Testing

Testing on this system focuses on the management side of the dashboard data with the final result that the 6 existing processes are declared appropriate and running well. The indicators and the testing process are listed in Table IV.

Tabel IV. System Testing Results

No	System Testing Results			
	Test Class	Expected results	Test result	Description
1	Admin logs in	Admin redirected to the dashboard page	Admin successfully entered the dashboard page	Success
2	The admin adds administrator users so they can log in	Administrators can have an account to be able to log in	The administrator has successfully entered the dashboard page	Success
3	Admin input data on the article	Article successfully added	Added article logged in successfully	Success
4	Admin updates the data on the article	Article updated successfully	The selected article was successfully updated	Success
5	Admin input data in the gallery	Gallery successfully added	Gallery added successfully logged in	Success
6	Admin updates the data in the Gallery	Gallery updated successfully	The selected gallery was successfully updated	Success

4. Conclusion

Based on the results of research on the Implementation of ReactJS and ExpressJS in PMK ITB STIKOM BALI UKM Activity Management, the following conclusions can be drawn:

1. The functionality in this system has been running well, according to the existing process indicators.
2. This system already has access to data management in accordance with the admin and administrator roles.
3. Overall this system has included minutes, articles, committees and galleries that can help administrators store and provide information related to existing activities at UKM PMK ITB Stikom Bali.
4. In its development, this system has been responsive so that it can be accessed via mobile phones, tablets and desktops.
5. As a suggestion for future research, improvements can be made in terms of security in access to the admin dashboard, such as adding two-factor authentication using an OTP code so that security is maintained

References

- [1] Hongsuchon, T., Rahardja, U., Khan, A., Wu, T. H., Hung, C. W., Chang, R. H., ... & Chen, S. C., "Brand Experience on Brand Attachment: The Role of Interpersonal Interaction, Feedback, and Advocacy", *Emerging Science Journal*, vol. 7, no.4, 2023, pp. 1232-1246, 2023.
- [2] I. Sadewa and K. Siahaan, "Analisis Dan Perancangan Sistem Informasi Unit Kegiatan Mahasiswa (UKM) Berbasis Web Pada Universitas Batanghari," *J. Manaj. Sist. Inf.*, vol. 2, no. 1, pp. 135–146, 2016, [Online]. Available: <http://ejournal.stikom-db.ac.id/index.php/manajemensisteminformasi/article/download/516/385>
- [3] A. R. Hidayat, T. Listyorini, and T. Khotimah, "Aplikasi Manajemen Unit Kegiatan Mahasiswa Pada Universitas Muria Kudus Berbasis Web," *Pros. SNATIF*, vol. 11, no. 2, pp. 50–57, 2015.
- [4] A. Gunanto and E. Sudarmilah, "Pengembangan Website E-Arsip di Kantor Kelurahan Pabelan," *Emit. J. Tek. Elektro*, vol. 20, no. 2, pp. 90–96, 2020, doi: 10.23917/emit.v20i02.10976.
- [5] N. L. W. S. R. Ginantra and K. J. Atmaja, "Aplikasi Manajemen Kegiatan Kemahasiswaan Stiki Indonesia Berbasis Web," *J. Ilm. Teknol. Inf. Asia*, vol. 12, no. 1, p. 1, 2018, doi: 10.32815/jitika.v12i1.209.
- [6] B. Sudrajat, "Rancang bangun Sistem Informasi Manajemen Asset berbasis WEB," *J. Inov. Inform.*, vol. 5, no. 2, pp. 100–109, 2020, doi: 10.51170/jii.v5i2.92.
- [7] F. Muhammad, I. Fitri, and R. Nuraini, "Implementasi Customer Relationship Management (CRM) pada Sistem Informasi Pemasaran dengan Menggunakan Framework React.JS Berbasis Website," *J. JTik (Jurnal Teknol. Inf. dan Komunikasi)*, vol. 6, no. 1, pp. 93–101, 2022, doi: 10.35870/jtik.v6i1.392.
- [8] Z. Dinku, "React.js vs. Next.js," no. May, 2022.
- [9] D. Aldo, R. Richo, and Z. Munir, "Aplikasi Pelayanan Pada Klinik Kemina Dental Care Berbasis React. Js dan Database NoSQL," *Inform. Mulawarman J. ...*, vol. 16, no. 2, 2021, [Online]. Available: <http://ejournals.unmul.ac.id/index.php/JIM/article/view/6532>
- [10] Tri Sulistyorini, E. Sova, and R. Ramadhan, "Pemantauan Kasus Penyebaran Covid-19 Berbasis Website Menggunakan Framework React Js Dan Api," *J. Ilm. Multidisiplin*, vol. 1, no. 04, pp. 01–13, 2022, doi: 10.56127/jukim.v1i04.137.
- [11] J. Panjaitan and A. F. Pakpahan, "Perancangan Sistem E-Reporting Menggunakan ReactJS dan Firebase," *J. Tek. Inform. dan Sist. Inf.*, vol. 7, no. 1, pp. 20–34, 2021, doi: 10.28932/jutisi.v7i1.3098.
- [12] M. R. Anwar, S. N. Sari, S. Maesaroh, Haryanto, and S. Widada, "Implementation design in the creation of companies in the 4.0 technology era," *att*, vol. 4, no. 1, pp. 87–106, 2022.
- [13] M. Y. Effendy, E. Nurninawati, and A. Ari Setiyawan, "Design and build A web-based asset management information system at pt Thamrin Telekomunikasi Network," *att*, vol. 4, no. 1, pp. 48–58, 2022.
- [14] Febrianto Widoutomo, Hamidillah Ajie, and Widodo, "Pengembangan Web Service Modul Mahasiswa Pada Sistem Informasi Akademik Universitas Negeri Jakarta," *PINTER J. Pendidik. Tek. Inform. dan Komput.*, vol. 5, no. 1, pp. 68–75, 2021, doi: 10.21009/pinter.5.1.9.
- [15] Nasution, "Implementasi Mongo Db, Express Js, React Js, Dan Node Js (Mern) Pada Pengembangan Aplikasi Formulir, Kuis, Dan Survei Online," 2021.
- [16] L. Meria, Saukani, D. Prastyani, and A. Dudhat, "The influence of transformational leadership, self-efficiency on readiness to change with work engagement mediation," *att*, vol. 4, no. 1, pp. 75–86, 2022.
- [17] F. Zaleha, H. Bambang Herawan, M. Lista, and H. Ananda Uswatun, "Start up digital business: Knowing business opportunities and tips for beginners," *Startuppreneur*

- Business Digital (SABDA Journal), vol. 1, no. 1, pp. 97–106, 2022.
- [18] R. Renaldi, B. Cahyo Santoso, Y. Natasya, S. Willian, and F. Alfando, "Tinjauan Pustaka Sistematis terhadap Basis Data MongoDB," *J. Inov. Inform.*, vol. 5, no. 2, pp. 132–142, 2020, doi: 10.51170/jii.v5i2.79.
- [19] T. Hariguna, U. Rahardja, and Sarmini, "The role of E-government ambidexterity as the impact of current technology and public value: An empirical study," *Informatics (MDPI)*, vol. 9, no. 3, p. 67, 2022.
- [20] D. Damodaran B, S. Salim, and S. M. Vargese, "Performance Evaluation of MySQL and MongoDB Databases," *Int. J. Cybern. Informatics*, vol. 5, no. 2, pp. 387–394, 2016, doi: 10.5121/ijci.2016.5241.
- [21] D. P. Lazirkha, J. Hom, and V. Melinda, "Quality analysis of digital business services in improving customer satisfaction," *Startupreneur Business Digital (SABDA Journal)*, vol. 1, no. 2, pp. 156–166, 2022.
- [22] G. W. Setiawan, "Pengujian Perangkat Lunak Menggunakan Metode Black Box Studi Kasus Exelsa," *J. Inform.*, vol. 3, p. 286, 2011, [Online]. Available: https://repository.usd.ac.id/32377/2/055314010_Full.pdf
- [23] A. Fathoni, "Metodologi penelitian dan teknik penyusunan skripsi," p. 149, 2006.
- [24] U. Rahardja, C. T. Sigalingging, P. O. H. Putra, A. Nizar Hidayanto, and K. Phusavat, "The impact of mobile payment application design and performance attributes on consumer emotions and continuance intention," *SAGE Open*, vol. 13, no. 1, p. 215824402311519, 2023.
- [25] D. Surani, "Studi literatur: Peran teknolog pendidikan dalam pendidikan 4.0," *Pros. Semin. Nas. Pendidik. FKIP*, vol. 2, no. 1, pp. 456–469, 2019.
- [26] T. Rachmawati, "Metode Pengumpulan Data dalam Penelitian Kualitatif," *UNPAR Press*, no. 1, pp. 1–29, 2017.
- [27] V. Sihombing, "Aplikasi Simade (Sistem Informasi Manajemen Desa) Dalam Meningkatkan Pelayanan Administrasi Di Kepenghuluan Bakti Makmur Kecamatan Bagan Sinembah Kab. Rokan Hilir Riau," *Sistemasi*, vol. 7, no. 3, p. 292, 2018, doi: 10.32520/stmsi.v7i3.384.
- [28] U. Rahardja, I. D. Hapsari, P. O. H. Putra, and A. N. Hidayanto, "Technological readiness and its impact on mobile payment usage: A case study of go-pay," *Cogent Eng.*, vol. 10, no. 1, 2023.
- [29] J. Artanti, P. M. Agustini, A. Saptono, G. Kartika Hanum, and Regina, "Analysis of virtual product marketing strategies to increase Customer Satisfaction (case study on Bukalapak Partners)," *itsdi*, vol. 3, no. 2, pp. 86–109, 2022.
- [30] R. Rizal and A. Rahmatulloh, "Restful Web Service Untuk Integrasi Sistem Akademik Dan Perpustakaan Universitas Perjuangan," *J. Ilm. Inform.*, vol. 7, no. 01, p. 54, 2019.
- [31] A. Ruangkanjanes, A. Khan, O. Sivarak, U. Rahardja, S.-W. Chien, and S.-C. Chen, "The magic of brand experience: A value co-creation perspective of brand equity on short-form video platforms," *Emerg. Sci. J.*, vol. 7, no. 5, pp. 1588–1601, 2023.
- [32] I. M. Nasution, B. P. K. Bintaro, C. S. Kesumawati, M. Zahrudin, and E. A. Nabila, "Implementation technology for development of a brand communication in company PT. XYZ," *att*, vol. 4, no. 1, pp. 17–25, 2021.
- [33] M. Azmi, M. S. Shihab, D. Rustiana, Indra, and D. P. Lazirkha, "The effect of advertising, sales promotion, and brand image on repurchasing intention (study on Shopee users)," *itsdi*, vol. 3, no. 2, pp. 76–85, 2021.
- [34] D. S. B. Goyal, E. P. Harahap, and N. A. Santoso, "Analysis of financial technology implementation on the quality of banking services in Indonesia: SWOT analysis," *itsdi*, vol. 4, no. 1, pp. 77–82, 2022.
- [35] F. Alfiana et al., "Apply the search engine optimization (SEO) method to determine website ranking on search engines," *International Journal of Cyber and IT Service Management*, vol. 3, no. 1, pp. 65–73, 2023.
- [36] L. Ninda and M. Lista, "Utilization of big data in educational technology research," *International Transactions on Education Technology (ITEE)*, vol. 1, no. 1, pp. 73–83, 2022.