

## Web Engineering to Develop Service Systems in Online Bookstores

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### Abstract

The use of software-based information technology has become a trend and a core need in various fields including the administrative and transactional fields, especially in an online-based business. In the process, the product introduction, distribution, and marketing are executed online. Web engineering that is tailored to the needs supports the business continuity. This research is to describe ABC Bookstore Yogyakarta deals with their transactions. Mostly the transactions occur at the store. There are still few buyers outside the area due to limited access to purchases. It requires them to come directly to the store. For this reason, it is necessary to develop a web-based system to improve and increase services regardless of distance. Therefore, buyers don't need to come directly to the store. The stages of research are carried out in a systematic and sequential approach to the development of software or systems to be built. The stages include requirements specification, planning, modeling, construction, and delivery of the system. As a result of network engineering, buyers can view data collection, book inventory, and transact (to buy books) in the store without coming to the store. This way makes the admins easy to manage book products that are sold and monitor book sales transactions.

**Keywords:** Web Engineering, Service, Bookstore

### I. INTRODUCTION

Utilizing software-based information technology has become a trend and a core requirement in various fields including administrative and transactional fields, especially in online-based businesses. In the process of introducing products, distribution, and marketing are handled online. Web engineering that is tailored to the needs supports the continuity of the business.

The object of discussion as research material here is the ABC Bookstore in Yogyakarta. Currently, the store transactions only occur in-store directly. There are still few buyers outside the area due to limited access to purchases. It requires them to come directly to the store. For this reason, it is necessary to develop a web-based system to improve and maximize services regardless of distance. Buyers do not need to come directly to the store.

Previous research by N. Mulyani and J. Hutahaean [1] developed a website design on e-commerce online bookstores. It explains that by utilizing the e-commerce system, business owners can increase productivity, and speed up access to information quickly. The products can be spread more widely, and they may save paper usage. Then, Nilmawati, Assidiq M, and Syarli [2] with the topic of a web-based book sales information system explained that the resulting sales system helps managing sales data and makes sales transactions easier. Research [3] entitled Website-Based Islamic Book Sales Information System at Mardiah Stores

explained that the system can help employees for data management purposes and purchase transactions at bookstores. It also reduces errors in data recording and the risk of data loss. Then the system makes consumer easier to access any information of the goods that they need anytime and anywhere.

Furthermore, M. R. Huda [4] explained that the resulting web-based sales system makes consumers easier to buy books without having to come to the store and it reduces customer queues. The web system can also be used by buyers as a medium for obtaining book information and as a promotional medium for bookstores to help introducing the products that have been sold so that it has an impact on increasing sales. Research [5] developed a web-based used book for buying and selling marketplace application that can handle buying and selling activities between sellers and buyers.

Research conducted by Januhari, N. [6] discussed the website-based information system for selling Islamic religious books at the Al-Barkah Bookstore. The resulting system can be accessed from anywhere and anytime. The system can reduce errors that are considered human errors. There is no duplication of data because it is centralized in one database and increases the efficiency and effectiveness of the sales management process. Panuntun A. B., Sanjaya M. B., and Ananda D. [7] developed a web-based book for selling application at Zahra Book that include features for managing onsite sales transactions and viewing

reports to assist cashiers, branch store admins, and main store admins in viewing reports, managing and recording of book sales data so that there are no delays in making reports, recording errors or missing data.

Research [8] discussed web-based applications for managing merchandise inventory and consignment sales at Galaxy Bookstores, Bandung. It produced applications that can assist users in managing sales transactions, and sales of products that are not completely sold or returned. The applications can assist in managing the availability of merchandise and can assist in presenting accounting records in the form of journals, ledgers, purchase reports, sales reports, and stock cards.

## II. METHOD

The design and development of the system in this study use the waterfall model method with a systematic and sequential approach to software development, as follows [9]:

### A. Communication

Conduct discussions with potential users to find out what system will be made, and it will assist in gathering information related to the development or creation of the system.

### B. Planning

This step is useful for better managing the software engineer's work. It is to know what risks they will face, what resources will be required, what will be produced, and most importantly, the system build schedule.

### C. Modeling

This step creates a model to better understand which system will be produced. Beyond the modeling phase, software engineers can learn more about what it means to design a system to solve today's problems. In this study, the information system is modeled using flowcharts and activity diagrams.

### D. Construction

This step combines code generation for coding (can be manual or automated) with the necessary tests to identify bugs in the system. In this study, web-safe pages were created using HTML scripts and [10] CSS, as well as JavaScript with its libraries (jQuery) [11] and Bootstrap frameworks to make the display more attractive and interactive. The application will be made using PHP programming language [12] and MySQL database system [13].

### E. Deployment

The last stage is deployed, where the finished system is delivered to the user. Because, when there is a change in the system, the system must adapt to the new environment (device or operating system) or the user requires functional development.

## III. RESULT AND DISCUSSION

### A. System Planning

#### 1. Flowchart

A diagram showing the steps (processes in the program) as shown in Figure 1.

#### 2. Activity Diagram

It is to describe the sequence of activities in a business process in the system. The activity diagram of the login process can be seen in Figure 2 and the order process is shown in Figure 3.

#### 3. Table Relations

Table relations show the relationships among tables that interrelate the objects in the tables as shown in Figure 4.

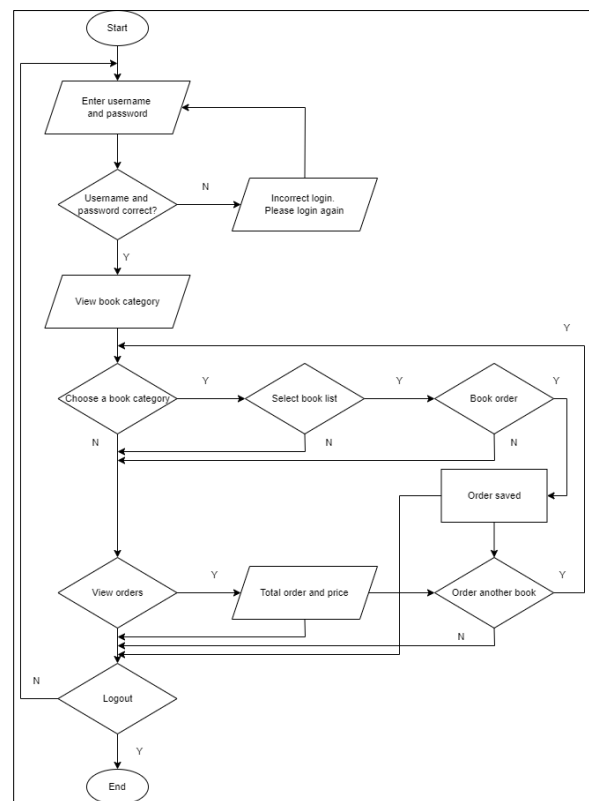


Figure 1. Flowchart

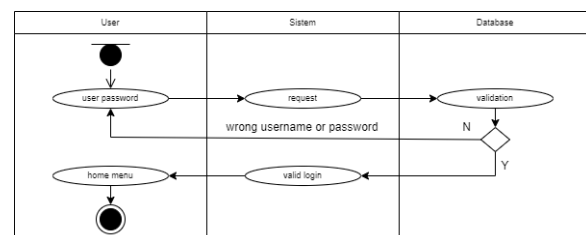


Figure 2. Login Activity Diagram

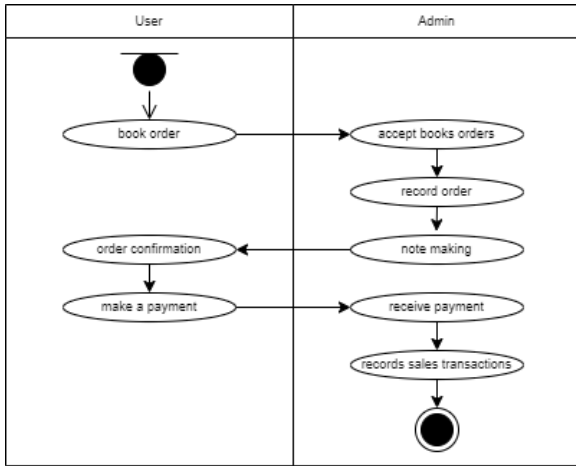


Figure 3. Order Activity Diagram

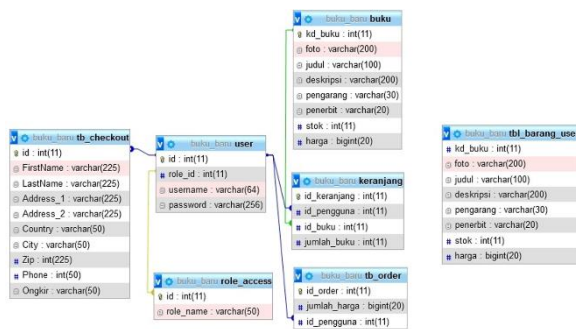


Figure 4. Table Relation

**B. Interface Design**

As a way of communication between users and computer programs/systems, it needs to be planned to make user interaction as simple and efficient as possible in achieving user goals. The login page design can be seen in Figure 5. The homepage design is shown in Figure 6. The product detail page design is shown in Figure 7. The shopping cart page design is shown in Figure 8, and the checkout page design can be seen in Figure 9.

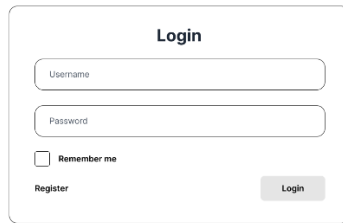


Figure 5. Login Page Design

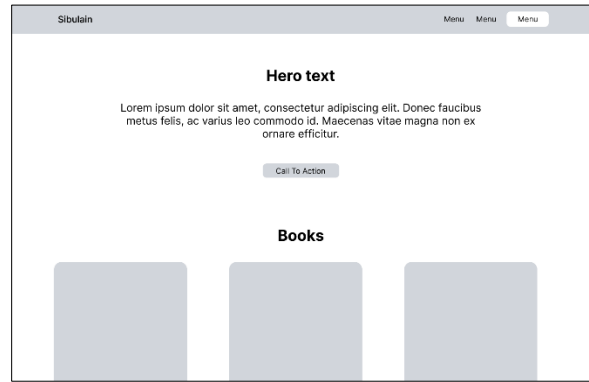


Figure 6. Homepage Design

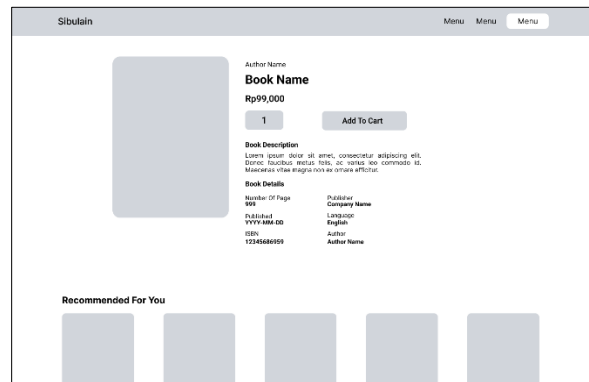


Figure 7. Product Detail Page Design

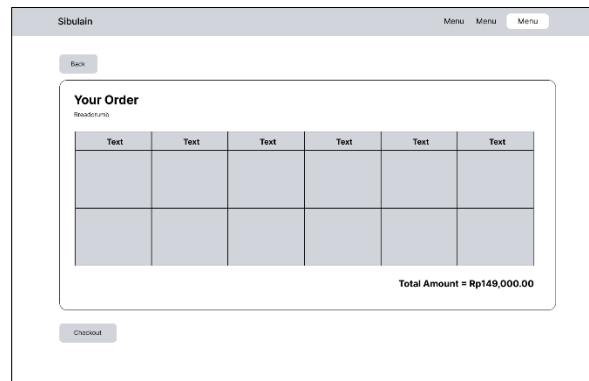


Figure 8. Shopping Cart Page Design

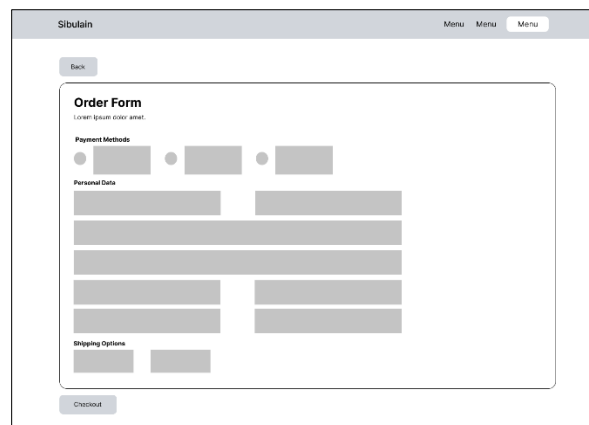


Figure 9. Checkout Page Design

### C. System Implementation

After the system design is continued with the system implementation, the display of supporting services for the ABC Online Bookstore starts from the home page. Then, for further access click login to open access rights. If you log in with an admin account, you can control book product data and transactions. If you log in with a user account, you can select a book, add the book to be purchased to the shopping cart, and confirm your purchase by going to the checkout page.

#### 1. Homepage

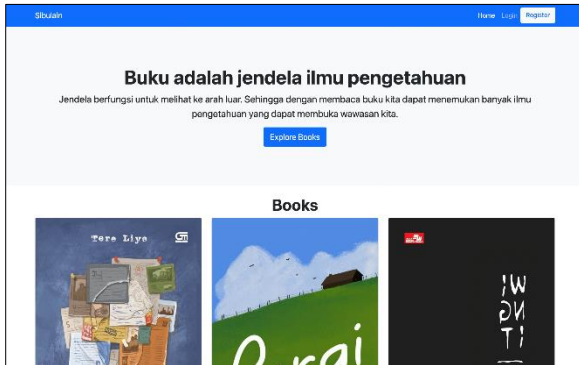


Figure 10. Homepage

Product Search can only be accessed after a successful login. To start browsing, we may start from the front page, click the "Explore Books" button, and then it will be redirected to the book browsing page. Product searches can be done by including name searching and sort. Search names can be done by typing in the "Search Books", inputting field, and then clicking the "Submit" button. Sorting can be done by clicking the sort of option, which is to the right of the search, inputting field and then clicking the "Submit" button.

#### 2. Login Page

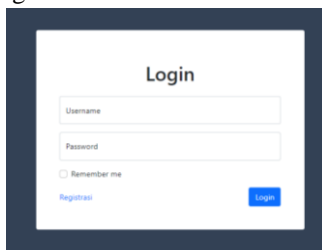


Figure 11. Login

#### 3. Manage Books Page

It is on the admin front page. To change the price, stock, description, and product details, click the image on the left on the "Aksi" line. Then it will be redirected to the page of changing product description, readjust it, and then click "Simpan". To delete a product, click the image to the right of the "Aksi" row. To add a product, click the drop-down navigation at the top left of the screen, and select add a book. After being redirected to

a new page, adjust the data for the book you want to add in the input and click "Simpan" to confirm the addition.

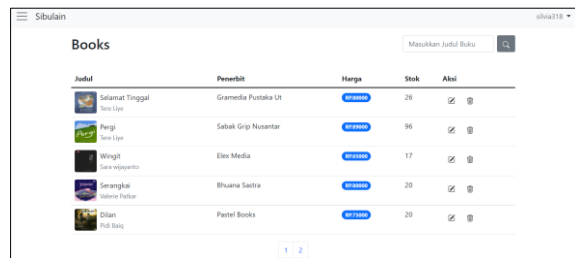


Figure 12. Manage Books

#### 4. Book Details Page

Product descriptions and details can be accessed by clicking on the product image on the product search page and front page. Once redirected to a new page, the description and details can be seen here. To add to the cart, hover over the quantity column under the product name, adjust the order quantity, then click the "Add to cart" button. Adding product orders to the cart can only be done by registered users.

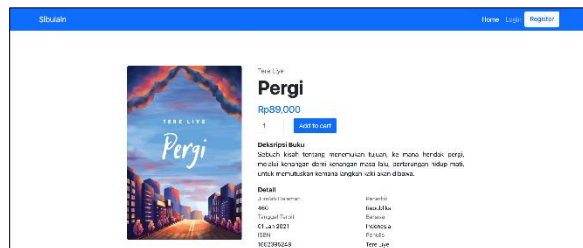


Figure 13. Book Details

#### 5. Shopping Cart Page

The cart can be accessed by clicking on the basket image on the navigation bar/drop-down at the top right of the screen. The cart page can show product order details, and the number of orders for each product can be changed by re-entering the order number in the "Jumlah" line and then clicking the image on the left in the "action" column. Product orders can be deleted by clicking on the image to the right of the "action" line.

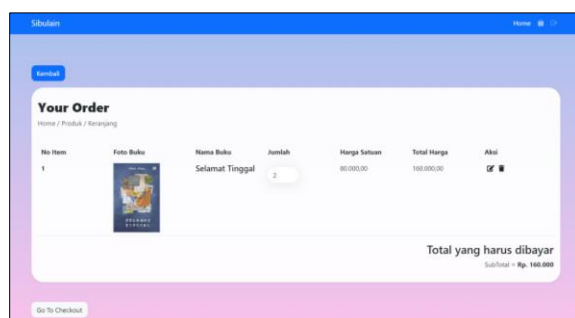


Figure 14. Shopping Cart

## 6. Checkout Page

Starting from the cart page, firstly you make sure a list of products you want to buy. To start the confirmation, click the "Go to Checkout" button which is at the bottom right of the cart field. After being redirected to the checkout page, select a payment method and then fill in the data according to the column description, select a shipping method. Finally, you may confirm the purchase by clicking the "Checkout" button.

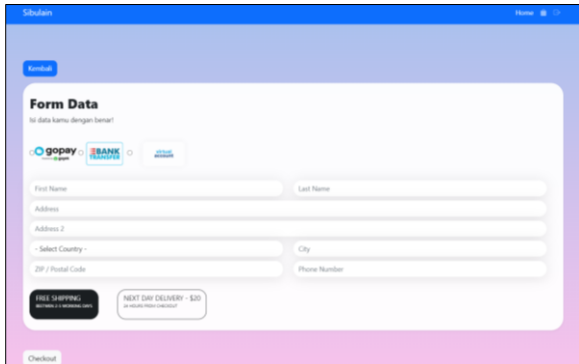


Figure 15. Checkout

## 7. Invoice



Figure 16. Invoice

## D. System Testing

Before finalizing the system, the program was tested using the BlackBox method. Testing is done with an emphasis on behavioral systems. Tests will be carried out on interactions on each existing page. The test results of component usability can be seen in Table 1. Then, the login page is shown in Table 2. The register page is as presented in Table 3, and the homepage is shown in Table 4. The book catalog page is as shown in Table 5. and the managing books is shown in Table 6. Then, the input of books to the shopping cart can be seen in Table 7. The checkout process is shown in Table 8., and the notification of payment confirmations (invoices) are presented in Table 9.

### 1. Component usability testing

Table 1. Component usability BlackBox testing results

No	Interaction	Expectation	Result
1	Click the available options in the navigation pane	Redirected to the appropriate page	Valid
2	Click the available options in the footer	Redirected to the appropriate page/section	Valid

3	Click Login	Redirected to login page	Valid
4	Click Register	Redirected to register page	Valid
5	Click Logout	Logged out and redirected to the home page	Valid
6	Click Cart	Shown for an authorized user and redirected to the cart page	Valid
7	Session Login	Successful session authorized login, otherwise redirected to login page	Valid
8	A highlight event on an element	Input, data in the list and clickable elements have highlighted the event	Valid

### 2. Login page testing

Table 2. Login page BlackBox testing results

No	Interaction	Expectation	Result
1	Input username and password	Prevent any event and adds an error information element above the input form	Valid
2	Check "Remember me"	Remember username on the next login in the same cookies-enabled devices	Valid
3	Click "Login"	Successful appropriate login and redirected to home page (buyer) / product management page (admin)	Valid

### 3. Register page testing

Table 3. Register page BlackBox testing results

No	Interaction	Expectation	Result
1	Input username, password, and confirm password	Prevent any event and Pop up an error	Valid
2	Click "Registrasi"	Login-able account and redirected to login page	Valid
3	Click Login	Redirected to login page	Valid

### 4. Homepage testing

Table 4. Homepage page BlackBox testing results

No	Interaction	Expectation	Result
1	Click "Explore Books"	Redirected to product feed page if authorized, otherwise to login page	Valid
2	Click a product	Redirected to the appropriate product detail page	Valid

### 5. Book catalog page testing

Table 5. Book catalog page BlackBox testing results

No	Interaction	Expectation	Result
1	Search product by name bits	Shows appropriate result	Valid
2	Sort product	Shows appropriate result	Valid
3	Click a product	Redirected to the appropriate product detail page	Valid

### 6. Book management testing

Table 6. Book management BlackBox testing results

No	Interaction	Expectation	Result
1	Add a book	A new book is added and able to show in the product list feed	Valid
2	Modify a book details	Shows appropriate data update	Valid
3	Delete a book	Book deleted	Valid
4	Search product by name bits	Shows appropriate result	Valid



7. Book input process to shopping cart testing

Table 7. Shopping cart BlackBox testing results

No	Interaction	Expectation	Result
1	Set and increase the number of orders, and click "add to chart"	Numbers are set correctly and the order registered in the cart	Valid
2	Click any similar product	Redirected to the appropriate page	Valid
3	Modify order numbers and click the update button	New numbers are set correctly	Valid
4	Delete an order by clicking the delete button	Order deleted	Valid
5	Click "Go To Checkout"	Redirected to the checkout page	Valid

8. Checkout process testing

Table 8. Checkout process BlackBox testing results

No	Interaction	Expectation	Result
1	Click and set the value in the input form	Set correctly	Valid
2	Click "Kembali"	Redirected to the previous page (Cart page)	Valid
3	Click "Checkout"	Redirected to the payment/invoice confirmation page	Valid

9. Invoice confirmation testing

Table 9. Invoice confirmation BlackBox testing results

No	Interaction	Expectation	Result
1	Click "ok"	Invoice registered, cart orders cleared, redirected to the product feed page	Valid
2	Click "ubah metode pembayaran"	Redirected to the checkout page	Valid

IV. CONCLUSION

Based on the results of web engineering that has been carried out at the ABC Bookstore in Yogyakarta, the following conclusions are obtained:

1. Buyers can see the collected data and stock of books available in the store without having to come directly to the store.
2. Buyers can make transactions (to buy books) through the system.
3. It is easier for admins to manage book products that are sold.

4. The admin does not need to manually calculate the total payment for the book purchased by the buyer, because the system does it automatically, so the admin only needs to monitor it.

REFERENCES

- [1] N. Mulyani and J. Hutahaean, "Rancang Bangun Website E-Commerce Toko Buku Online (Ol Book)," *Semin. Nas. Teknol. Komput. Sains*, pp. 373–382, 2020, [Online]. Available: <http://prosiding.seminar-id.com/index.php/sainteks/article/view/465>.
- [2] Nilmawati, M. Assidiq, and Syarli, "Sistem Informasi Penjualan Buku Berbasis Web Pada Toko Buku Monster Book Kabupaten Mamuju," *J. Pegguruang Conf. Ser.*, vol. 2, no. 1, p. 289, 2020, doi: 10.35329/jp.v2i1.1060.
- [3] N. Pratama, S. Geovani, and Yulhan, "Sistem Informasi Penjualan Buku Islami Berbasis Website pada Toko Mardiah," *J. Sains Dan Inform.*, vol. 6, no. 11, pp. 48–54, 2020, [Online]. Available: <http://ejournal.kopertis10.or.id/index.php/sainshttp://doi.org/10.22216/jsi.v6i1.5248>.
- [4] M. R. Huda, "Sistem Penjualan Buku Online Berbasis Web Pada Toko Buku Stadion Book Sales System Online Web-Based on Stadion Book Stores Tugas Akhir Final Project," Semarang, 2019.
- [5] I. Fahrurrozi, S. F. S. Gumilang, and F. M. Al Anshary, "Pengembangan Aplikasi Marketplace Jual Beli Buku Bekas Berbasis Website Pada Startup 'gebbuk' Modul Bisnis," *eProceedings Eng.*, vol. 5, no. 2, pp. 3288–3296, 2018.
- [6] E. Saputra and S. Hamdani, "Sistem Informasi Penjualan Buku Agama Islam Berbasis Website Pada Toko Buku Al-Barkah," *Pros. Semin. Nas. Sist. Inf. dan Teknol.*, pp. 263–269, 2020.
- [7] A. B. Panuntun, M. B. Sanjaya, and D. Ananda, "Aplikasi Penjualan Buku Di Zahra Book," *e-Proceeding Appl. Sci.*, vol. 4, no. 3, pp. 1722–1729, 2018.
- [8] V. N. Vuzza, Rochmawati, and I. Yuniar, "Aplikasi Berbasis Web untuk Pengelolaan Persediaan Barang Dagang dan Penjualan Konsinyasi (Studi Kasus di Toko Buku Galaxy, Bandung)," *eProceedings Appl. Sci.*, vol. 6, no. 2, pp. 3635–3639, 2020.
- [9] R. S. Pressman, *Rekayasa Perangkat Lunak: Pendekatan Praktisi (Edisi 7)*. Yogyakarta: Andi, 2012.
- [10] A. Kadir, *From Zero to A Pro: CSS Tip dan Trik untuk Menyertakan Cascading Style Sheet dalam Halaman Web*. Yogyakarta: Andi, 2011.
- [11] L. Hakim, *Trik Dahsyat Menguasai AJAX dengan jQuery*. Yogyakarta: Lokomedia, 2011.
- [12] B. Sidik, *Pemrograman Web dengan PHP*. Bandung: Informatika, 2012.
- [13] S. Achmad, *MySQL 5: Dari Pemula Hingga Mahir*. Achmatim.net, 2010.