Research Article

Revolutionizing B2B procurement: Digital transformation at PT Sadang Jaya

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Abstract: The rapid pace of digital transformation presents both challenges and opportunities for businesses globally, especially in the realm of Business-to-Business (B2B) order management. Many Indonesian companies continue to rely on outdated, manual processes, leading to inefficiencies and scalability issues. This study explores how PT Sadang Jaya, a food production company in the Indonesian market, tackled these challenges through the strategic implementation of a custom-built B2B order management system using Angular, Express.js, PostgreSQL, and Agile methodology. PT Sadang Jaya, despite its strong market reputation, encountered difficulties in managing orders efficiently as the company grew and the number of distributors increased. The manual order management process, conducted through WhatsApp or phone calls, became increasingly inefficient and prone to errors, resulting in irregular order queues and increased risk of recording errors. To overcome these challenges, the company recognized the need for a B2B eCommerce system that could streamline transactions between PT Sadang Jaya and its distributors. This thesis aims to design and develop a web-based online ordering application that not only reduces recording errors but also accelerates the order fulfillment process and strengthens business relationships with distributors. The results of User Acceptance Testing (UAT) demonstrate the successful completion of all test cases without any blocking issues, comprehensively verifying the system's functionality, including order management and distributor interaction. The implementation of this system is anticipated to capitalize on the immense potential of B2B eCommerce, enabling PT Sadang Jaya to broaden its market reach and elevate distributor satisfaction through more integrated and responsive services.

Keywords: Business to Business, Website, Online Ordering, E-Commerce Platform, Company

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1. Introduction

Business-to-business (B2B) order management is a vital function that supports the efficient flow of goods and services between businesses. It ensures that orders are accurately processed, inventory is updated in real-time, and customer relationships are managed effectively. However, many businesses, particularly in emerging markets like Indonesia, still rely on outdated, manual systems that create significant inefficiencies and operational bottlenecks. PT Sadang Jaya, a well-established Indonesian company operating in the industrial sector, faced these exact challenges. The company's legacy order management system, based on manual data entry and fragmented processes, led to frequent errors, delays in order fulfillment, and a lack of real-time visibility into order status and inventory levels. Employees spent substantial time on routine tasks such as entering orders, reconciling inventory data, and manually tracking customer requests. As a result, PT Sadang Jaya struggled to scale its operations effectively to meet the increasing demand from both existing and new customers. This operational inefficiency became a critical challenge that required immediate attention.

In the context of Indonesia's rapidly evolving digital landscape, businesses are under increasing pressure to modernize their systems and processes to remain competitive. The nation, as one of Southeast Asia's largest economies, is experiencing a surge in digital adoption across various sectors, from finance to logistics and manufacturing. This digital shift offers significant opportunities for companies to streamline operations, enhance decision-making, and improve customer satisfaction. However, for many Indonesian companies, particularly small and medium-sized enterprises (SMEs), the transition from traditional, manual systems to digital solutions remains a significant challenge. This challenge is particularly pronounced in industries like manufacturing and distribution, where the complexity of operations and the need for accuracy in order processing are paramount. [1]

PT Sadang Jaya found itself at a crossroads, needing to embrace technological innovation not only to overcome operational inefficiencies but also to align with broader digital transformation trends in Indonesia. According to studies by Hidayati et al in 2019 [2], SMEs in Indonesia are often hesitant to adopt new technologies due to financial constraints, a lack of digital literacy, and resistance to change. However, companies like PT Sadang Jaya have realized that failure to modernize could severely hamper growth, particularly in an increasingly competitive market where customers demand faster, more accurate services.

In response to these operational inefficiencies and the broader digital transformation imperatives, PT Sadang Jaya decided to implement a custom-built B2B order management system. The system, developed using a modern technology stack, incorporated Angular for the front end, PostgreSQL for database management, and Agile methodology for iterative development. Angular was chosen for its ability to create dynamic, responsive web applications, while PostgreSQL, an open-source relational database, was selected for its robustness, scalability, and high data integrity—essential for managing transactional data in an order management system [3]. Agile methodology, known for its adaptability and customer-centric approach, was adopted to ensure that the system could evolve in line with the company's business needs and stakeholder feedback, a crucial feature for organizations undergoing digital transformation [4].

The decision to adopt this technology stack was not only a technical solution to PT Sadang Jaya's operational challenges but also a strategic move to enhance the company's overall business agility and long-term growth potential. By integrating various functions such as order processing, inventory management, and customer relationship management (CRM) into one unified platform, the company sought to create a more streamlined, efficient, and scalable operation. This integration would allow for real-time order tracking, reduce errors caused by manual data entry, and enable better decision-making across departments. The adoption of a digital solution was expected to improve operational transparency, boost productivity, and enhance customer satisfaction—key factors in the competitive business environment of Indonesia.

This study explores the decision-making process that led to the selection of these technologies, examining how the integration of Angular, PostgreSQL, and Agile methodology served as a strategic innovation for PT Sadang Jaya. By analyzing the challenges faced, the solution implemented, and the outcomes achieved, this research aims to provide valuable insights into how Indonesian businesses can leverage technological innovation to overcome traditional operational challenges and unlock the benefits of digital transformation. The paper also contributes to the broader understanding of how B2B companies in emerging markets can navigate the complexities of adopting new technologies while aligning with global digitalization trends [5].

Moreover, the case of PT Sadang Jaya is particularly relevant in light of the increasing interest in the role of digitalization in Southeast Asia's growing markets. Research has shown that the adoption of digital technologies such as cloud computing, machine learning, and integrated enterprise systems can offer businesses a competitive edge by improving process efficiency, reducing costs, and enabling more personalized customer interactions [6]. The implementation of a robust B2B order management system at PT Sadang Jaya serves as an example of how traditional industries can leverage modern technologies to drive business performance, enhance customer engagement, and achieve sustainable growth in a digital-first economy.

2. Theory

2.1 Website

A website, also known as a website, is a collection of web pages that are interconnected and can be accessed via the internet using a web browser. The website functions as a media provider of information in various forms, including text, images, videos, and other media [7]. The use of websites is quite diverse, ranging from news, education, commerce, and entertainment, to social media. In the context of PT Sadang Jaya's B2B order management system, a website serves as the primary interface for distributors to place orders, track order status, and interact with the company seamlessly.

There are two types of websites, including static and dynamic websites [8]. A static website is a website whose content does not change automatically because it is not connected to a database. Static websites are generally built using programming that runs only on the client side (Client Side Programming) such as HTML, CSS, and Javascript. In contrast, dynamic websites are websites whose content can change based on user interaction or regularly updated data [9]. This can happen because dynamic websites are connected to a database. Dynamic websites are generally built using programming languages that operate on the client side as well as the server (Server Side Programming), such as PHP, JSP, Python, ASP, and others.

2.2 Supply Chain, Manufacturing, and Distribution in a B2B Context

The supply chain is the flow of products from the manufacturing unit to the end customer. This process starts at the front line, which is manufacturing. Manufacturing or what is often referred to as manufacturers is the party that produces goods or finished products. After the product is finished, the product from the manufacturer is generally handed over to a distributor or wholesaler who acts as an intermediary between the manufacturer and the retailer or end consumer [10]. PT Sadang Jaya, as a food production company, operates within this supply chain framework, with distributors playing a crucial role in the distribution of their products to retailers and end consumers.

Moreover, in a Business-to-Business (B2B) context, the supply chain involves transactions between companies, rather than directly with end consumers. B2B includes business relationships that occur between manufacturers and distributors, where manufacturers not only focus on production but also on optimizing the distribution of products to distributors efficiently. Distributors in B2B then sell the products to retailers or other parties in the supply chain, who then distribute them to end consumers.

2.3 E-Commerce

E-commerce (electronic commerce) is the buying and selling of goods and services conducted over the Internet. In the context of Information Technology and Systems, e-commerce relies heavily on technology infrastructure and systems to facilitate online transactions, manage inventory, process payments, and ensure a seamless customer experience [11]. PT Sadang Jaya's B2B order management system is a form of e-commerce, specifically tailored to the needs of B2B transactions between the company and its distributors.

2.4 Digital Transformation in Business-to-Business (B2B) Context

Digital transformation has been a key trend in the B2B sector, where companies are increasingly adopting digital tools to optimize processes, enhance customer experience, and improve operational efficiency. Studies indicate that digital transformation in B2B can help businesses streamline supply chains, enhance real-time data processing, and foster better collaboration across different stakeholders [12]. In particular, industries such as manufacturing, retail, and logistics are undergoing rapid digitalization to improve their competitive position.

2.5 Order Management Systems (OMS) and Their Role in B2B Operations

Order Management Systems (OMS) are fundamental to B2B operations, especially in managing the flow of orders between businesses. OMS integrates order processing, inventory management, and shipping logistics. These systems, when properly integrated, streamline operations, improve customer satisfaction, and reduce costs [13]. Additionally, OMS solutions enable real-time visibility of inventory, improving decision-making and optimizing the entire supply chain.

2.6 Angular

Angular is a powerful, open-source front-end framework developed by Google. It is widely used for building dynamic single-page applications (SPAs), allowing developers to easily create rich user interfaces. Angular provides a two-way data binding feature, a modular architecture, and an extensive set of built-in services for managing common tasks such as routing, form validation, and HTTP communication. One of Angular's key advantages is its component-based architecture, which facilitates scalable, maintainable applications. The framework's use of TypeScript allows developers to write more robust and error-free code [14].

2.7 Express.js

Express.js is a minimal and flexible web application framework for Node.js, designed to simplify the development of server-side applications and RESTful APIs. It offers powerful features like routing, middleware support, template engines, and error handling, which makes it an excellent choice for building scalable, high-performance web applications. Express.js integrates well with other technologies and libraries, such as Angular and PostgreSQL, to enable full-stack development. It is particularly popular for creating REST APIs and single-page applications (SPAs), providing the backbone for the server-side operations of web applications [15].

2.8 PostgreSQL

PostgreSQL is an advanced open-source relational database management system (RDBMS) known for its high performance, scalability, and standards compliance. It supports a wide range of data types, indexing techniques, and powerful querying capabilities. PostgreSQL is ideal for applications that require complex transactions and advanced data operations, making it a common choice for enterprise applications. It is ACID-compliant, ensuring data integrity, and supports both SQL and NoSQL-style queries, including JSON data handling [16].

2.9 User Acceptance Testing

User Acceptance Testing (UAT) is the final phase of software testing, conducted by the end users to ensure that the software meets the required business needs and specifications. UAT helps identify user experience, functionality, and workflow issues that may not have been detected during earlier testing phases. By involving end users in the testing process, businesses can ensure that the system meets real-world expectations and that it is ready for deployment. UAT is particularly important for customer-facing applications with significant user interaction [17].

3. Method

3.1 SDLC

In developing this information system, the methodology used integrates the principles of the Software Development Life Cycle (Fig. 1) with the Agile approach. The software development life cycle (SDLC) is a process that specifies how software applications move incrementally from concept to creation [18]. The first stage in the SDLC is planning, which involves identifying business and user needs and drafting a project plan that includes the schedule and resources required. Next, the analysis stage analyzes the system's needs in-depth, ensuring all functional and non-functional requirements are identified. The outcome of this stage is usually a system requirement specification (SRS) document.

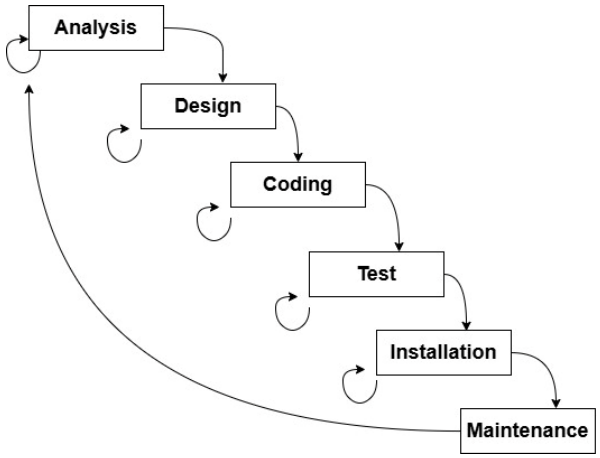

Figure 1. Stages of the SDLC Method [19]

After the analysis stage, the design stage begins with the design of the system architecture, database design, and user interface (UI) design. At this stage, prototypes or wireframes can also be designed to get initial feedback from users. Then, the implementation stage is conducted, where the software is developed based on the design that has been made. This includes frontend, backend, and database integration development. Testing is the next stage involves unit testing, integration testing, and system testing to ensure that the software functions according to specifications and is free of bugs. Finally, the maintenance stage is performed after the software is implemented, to fix bugs found after launch, add new features, and ensure the software continues to function properly over time.

3.2 Agile

The Agile methodology, which is an enhanced version of the Software Development Life Cycle (SDLC), was introduced in 2001. Agile means fast, active, agile, and light [20]. This methodology emphasizes flexibility, collaboration, and iteration in software development.

In Agile, projects are divided into short cycles called sprints. Each sprint produces a working version of the software that can be tested and evaluated by stakeholders. The main principles of Agile are iterative and incremental, and each iteration covers all stages of development, from planning to testing.

Agile encourages close user involvement, ensuring the software developed matches their needs and expectations. Flexibility and adaptability allow for changes throughout the development process, allowing teams to respond quickly to business needs. Continuous testing is also an important principle that is conducted throughout the development cycle to ensure quality and identify issues early.

The benefits of implementing Agile methodologies include responsiveness to changing user needs, better collaboration between developers and end users, and faster delivery of new features. However, Agile also has disadvantages, such as high user involvement requirements, uncertainty in schedules and budgets, and often lack of documentation compared to traditional SDLC, which can be problematic in long-term maintenance.

3.3 Planning and Design

The process of designing this application involves two types of websites: the admin website, which is used for purposes such as data input and order processing, and the distributor website, which is used by distributors to place orders and view product catalogs.

3.3.1 Planning and Analysis

At this stage, the problems of the current system were identified. To achieve this, the entire ordering process is explored in detail, starting from information about the product, delivery, and payment, to the entire order flow. This process was carried out through interviews with the company director of PT Sadang Jaya Makmur and employees. After obtaining information about the flow of business processes, potential solutions were identified, mainly related to web development. The feature requirements and specifications of the application to be developed were also discussed.

3.3.2 Design

Designing application infrastructure, both for online ordering applications and admin. This design process includes process design such as a use case diagram (Fig. 2 and Fig. 3), use case scenario, activity diagram, sequence diagram, and class diagram. In addition, database design is also designed using several diagrams such as table specifications, conceptual diagrams, and logical diagrams (Fig. 4). For website flow documentation, the B2B e-commerce website follows the structured flow illustrated in Fig. 5.

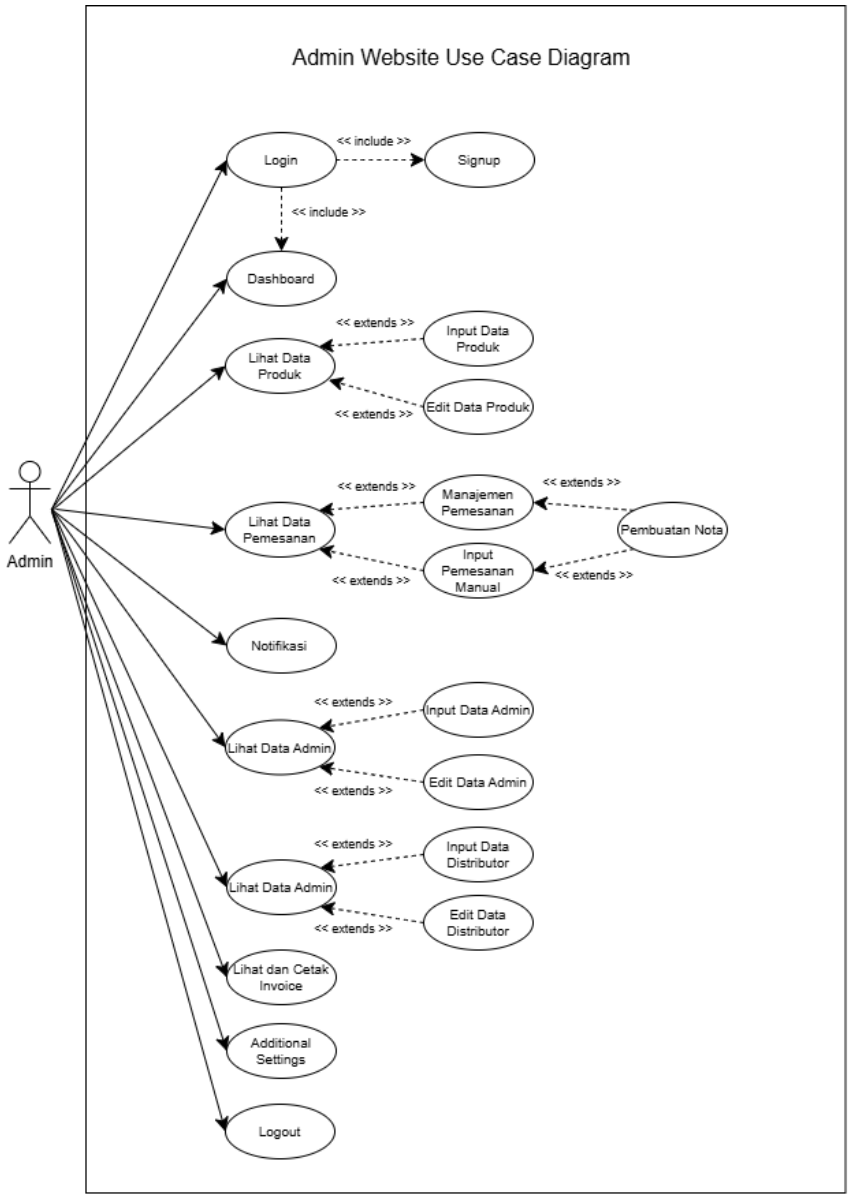

Figure 2. Admin Use Case Diagram

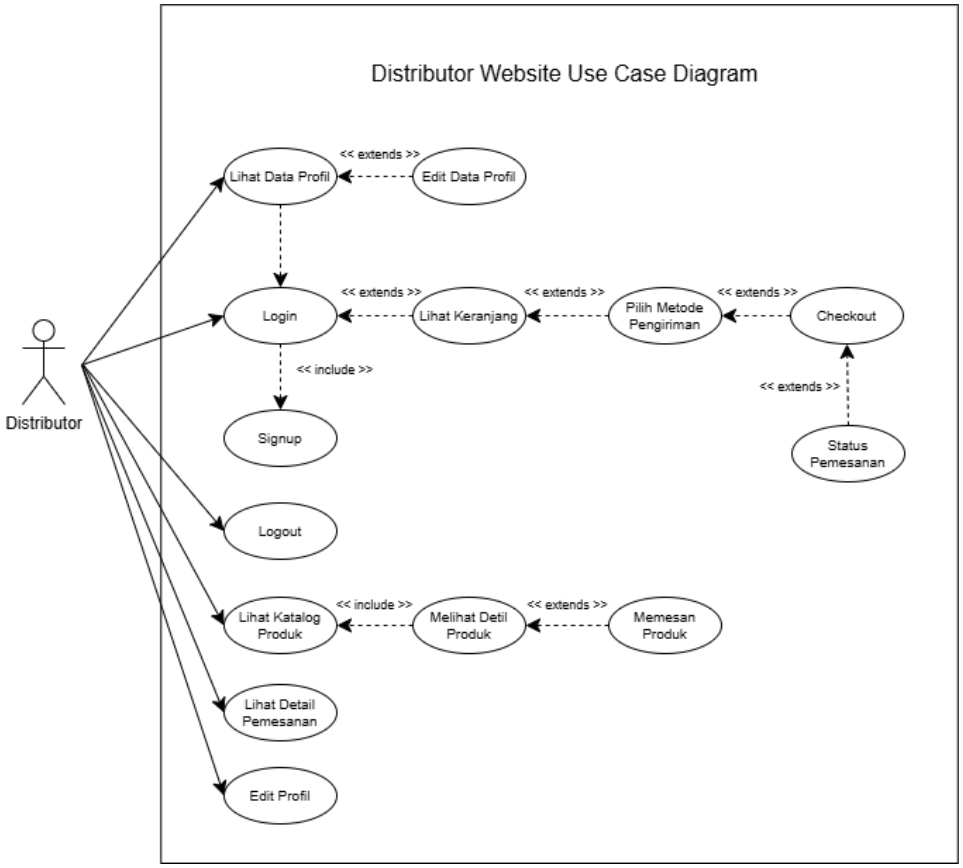

Figure 3. Distributor Use Case Diagram

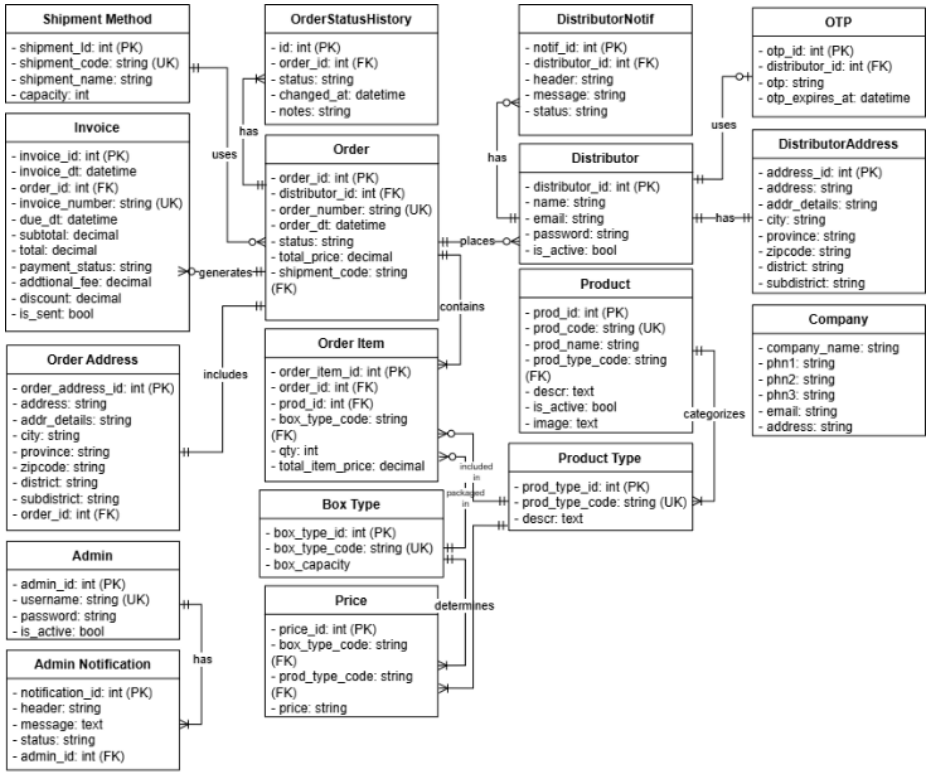

Figure 4. Logical Database Design

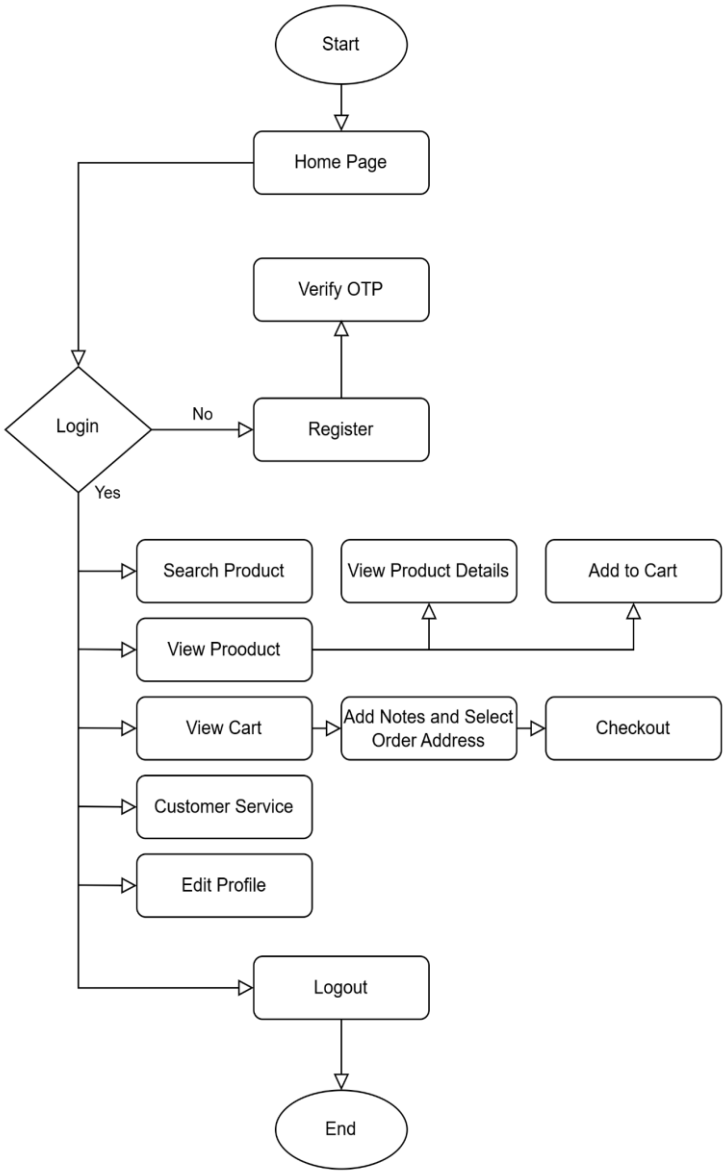

Figure 5. SJM B2B E-Commerce Website Flowchart

4. Result and Discussion

After those designs are completed, navigation diagrams and wireframe designs are made. Here are some views of the main pages in the SJM admin and distributor applications:

4.1 Dashboard

Dashboard (Fig. 6) is the main page after admin login. This page serves to show important company statistics such as the number of orders, total revenue, current order status, and notifications for the admin. This page provides an overview of business performance in real-time. The main purpose of the dashboard is to make it easier for admins to monitor and analyze overall business activities in one informative display.

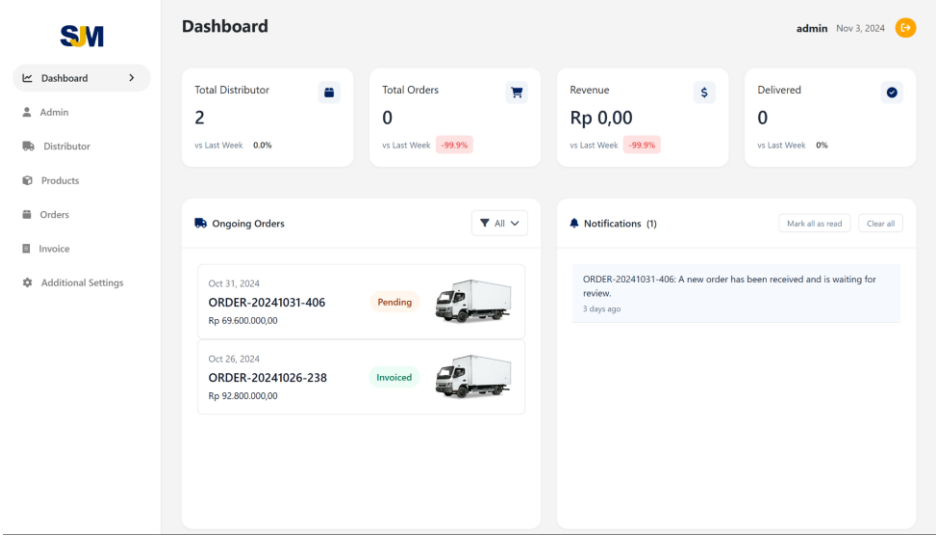

Figure 6. Dashboard page

4.2 Pagination

The Pagination Template (Fig. 7) displays table data from the database in various forms. This page is equipped with a sort feature to sort the results and a filter and search feature to make it easier for users to find specific data.

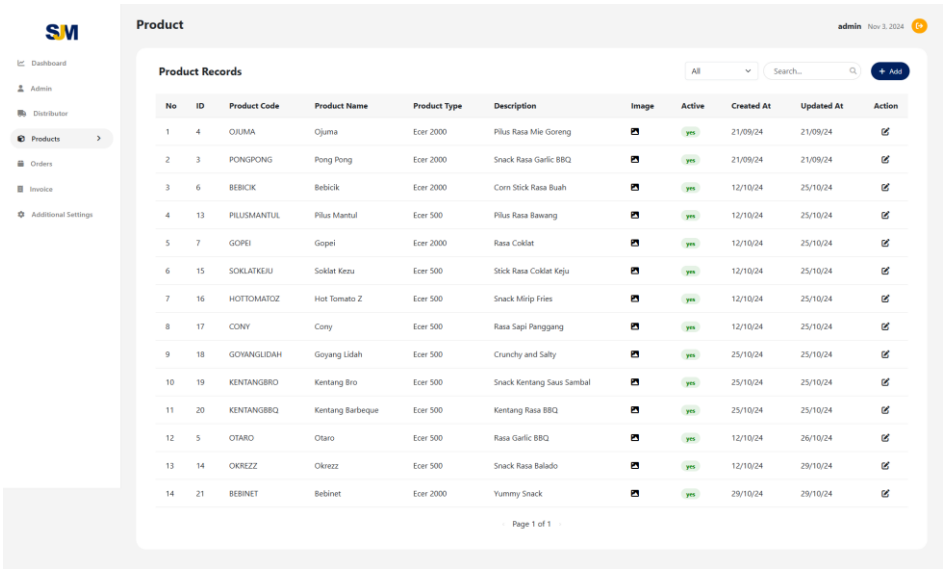

Figure 7. Example of Pagination Page

4.3 Forms

Forms (Fig. 8) are used to add and edit data. In edit mode, the form will be automatically populated with pre-filled data. Forms can also be conFig.d for special actions such as input validation, automatic calculations, and sending data to multiple endpoints.

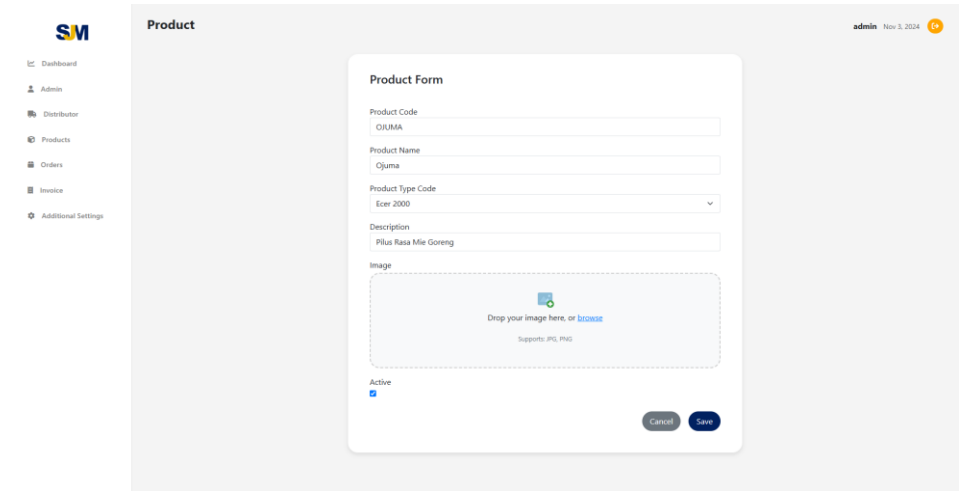

Figure 8. Example of Forms Page

4.4 Home

The default and main page of the distributor application displays the PT Sadang Jaya product catalog. This Home Page (Fig. 9) displays a list of products complete with images, descriptions, and prices. Distributors can easily view product information and add it to the shopping cart. There are also filtering and search bar features that will assist in finding the desired product. To view more detailed product information, users simply tap on the desired product, and a popup will appear with a more detailed product description.

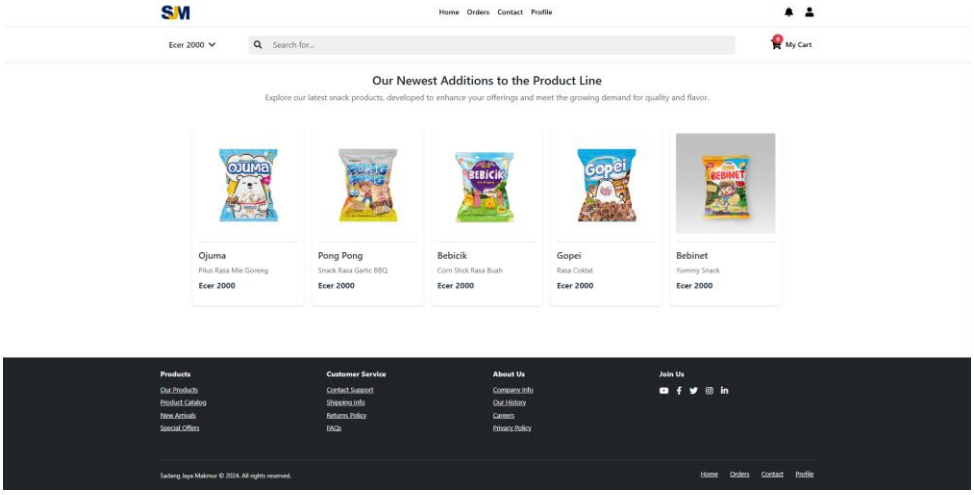

Figure 9. Home Page

4.5 Shopping Cart

The shopping cart page (Fig. 10) allows distributors to manage the items to be ordered. The user can set the quantity of items for each item and the system will automatically calculate the total price based on the changes. Before proceeding to the checkout process, the distributor can select a shipping address from the list of saved addresses or add a new address. The system also provides available shipping method options, according to the number of products ordered. To facilitate order management, there is also a feature to delete items that were not ordered.

4.6 Order Details

The Order Details page (Fig. 11) presents information about each order in one organized view. At the top, distributor information including company name,

address, and contact information is displayed. Order details include a complete list of items ordered along with specifications such as quantity, unit price, and subtotal for each item.

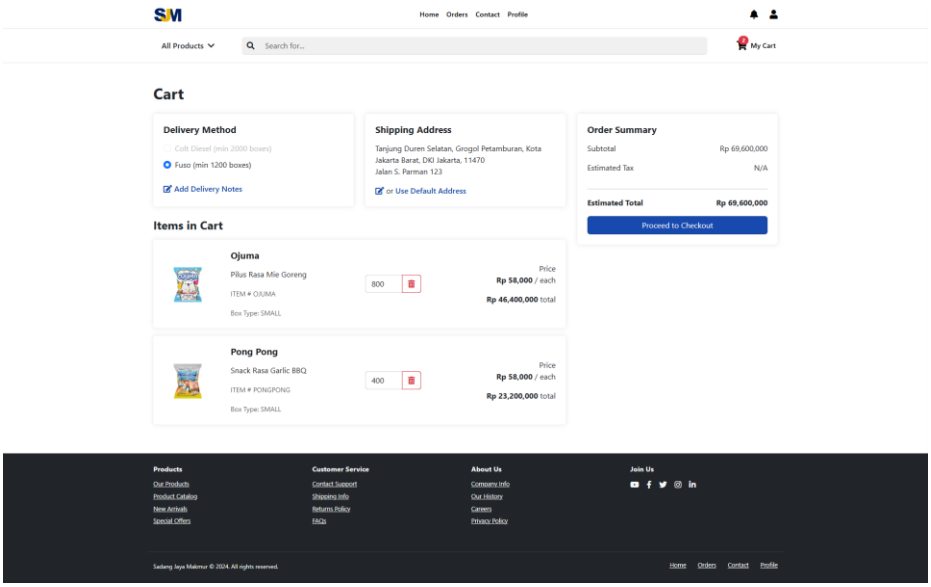

Figure 10. Shopping cart page

The order status is displayed prominently and comes with a status change history that records every stage of the order process, from confirmation to shipment. Shipping information includes the destination address and the shipping method chosen. Payment details list the payment method, status, and cost details including subtotal, shipping, and total cost.

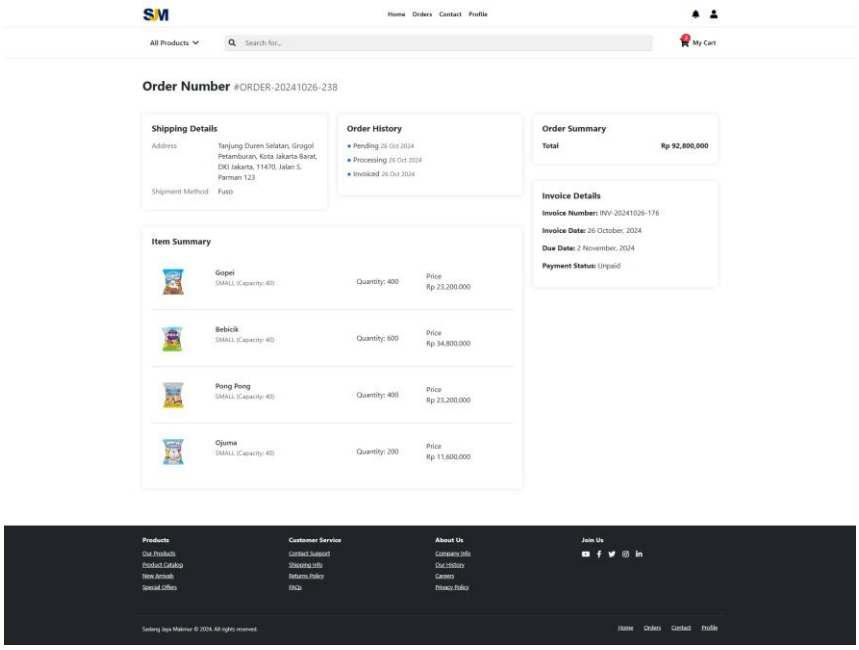

Figure 11. Order Details page

4.7 Email

The system is equipped with an automatic email-sending feature for various purposes. One of the main implementations is the OTP (One-Time Password)

verification system that uses an HTML/CSS template, as shown in Fig. 12. This email template is designed with corporate branding and user experience in mind, clearly displaying the OTP code and easy-to-understand usage instructions. In addition to OTP, the system sends emails for distributor notification, customer support, and invoice delivery.

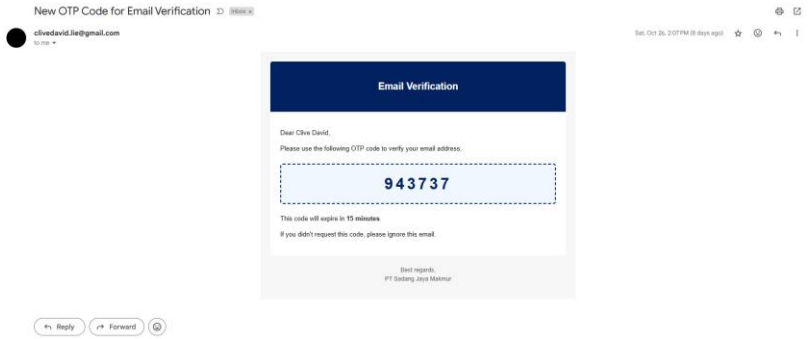

Figure 12. OTP email

4.8 PDF

The system can also generate a receipt in a standardized PDF format (Fig. 13). This note includes complete information such as order number, item details, price, and shipping information, which can be directly used for documentation and shipping purposes. The generated PDF can then be printed or emailed to the distributor.

NOTA TITIPAN BARANG

PT Sadang Jaya Makmur
Jl. Raya Sadang No.99, Balongbiru, Sepanjang, Kec. Taman, Kabupaten Sidoarjo, Jawa Timur 61257
0317883096 | sjm@gmail.com

DITUJUKAN KEPADA:
Clive David
Tanjung Duren Selatan, Grogol Petamburan, Kota Jakarta Barat, DKI Jakarta, 11470, Jalan S. Parman 123

Metode Pengiriman: Fuso

Nomor: INV-20241026-176
Tanggal: 26 Oktober 2024
Jatuh Tempo: 2 November 2024

Nomor	Nama Produk	Jumlah	Tipe Box	Harga Satuan	Total Harga
1	Ojuma	200	SMALL	Rp 58,000.00	Rp 11,600,000.00
2	Pong Pong	400	SMALL	Rp 58,000.00	Rp 23,200,000.00
3	Bebicik	600	SMALL	Rp 58,000.00	Rp 34,800,000.00
4	Gopei	400	SMALL	Rp 58,000.00	Rp 23,200,000.00

Subtotal	Rp 92,800,000.00
Biaya Tambahan	Rp 100,000.00
Diskon	Rp 0.00
Total	**Rp 92,900,000.00**

Catatan:
-

Pembayaran harus diselesaikan dalam waktu 7 hari. Terima kasih atas kerja sama Anda.

Figure 13. PDF Invoice Generation

4.9 Implementation

The implementation of the online ordering application system and web admin for PT Sadang Jaya Makmur was carried out according to the design specifications, focusing on both backend and frontend development. For the backend, Express.js was used as the framework to build the Application Programming Interface (API), while PostgreSQL served as the database management system. In the backend development process, Sequelize was utilized as an ORM (Object-Relational Mapping) tool to define models and synchronize them with the PostgreSQL database. By using Sequelize, the models were easily mapped to tables in the database, and the synchronization process ensured that any changes in the model definitions were reflected in the database. The API was built using Express.js to handle HTTP requests, providing the necessary endpoints for the front end to interact with the backend. Additionally, Swagger (Fig. 14) was implemented to document the API, enabling easy testing and clear communication between the frontend and backend teams.

In the backend, Puppeteer is used to generate PDFs by converting dynamically filled HTML templates into PDF documents. The process begins with designing an HTML template styled with CSS, which includes placeholders for dynamic data such as order details and customer information. Using Sequelize, this data is retrieved from the PostgreSQL database and injected into the template. Puppeteer then launches a headless browser to render the HTML content and convert it into a PDF file. This PDF is then available for download or can be sent via SMTP as an email attachment, such as for invoices, receipts, or order confirmations.

The backend also handles email communication using SMTP for various purposes. For example, emails are sent for One-Time Passwords (OTPs) during user authentication, notifications to alert users about order status updates, and customer support messages. These functionalities are powered by Nodemailer, which is integrated with the backend via an SMTP server, ensuring reliable delivery of emails to users.

On the front end, Angular was used to develop the user interface, with Bootstrap integrated to provide a responsive and user-friendly design. The admin website was built with Angular, where several shared components were developed to promote reusability and maintain consistency across the application. Components such as pagination, forms, and detailed views were created as Angular components with corresponding HTML, TypeScript (TS), and CSS files. These shared components were then used across multiple pages, ensuring a consistent user experience. However, some pages were still developed manually due to specific business logic or unique requirements that could not be addressed by the shared components alone.

For security, auth guards were implemented in Angular to control access to different parts of the application based on user roles, ensuring that only authorized users could access certain routes, such as the distributor's edit profile panel. This was done by checking if the user was authenticated and had the necessary permissions to access specific sections of the application.

The front end and back end were integrated through the API developed in Express.js. The front end makes HTTP requests to the backend to interact with the database, retrieve or submit data, and process business logic. For example, when a user places an order or updates their information, the frontend sends requests to the backend API, which then communicates with the database to store or retrieve data. This communication is done using standard HTTP methods, such as GET, POST, PUT, and DELETE, and is facilitated by Angular's HttpClientModule. Additionally, the front end utilizes API responses to update the UI in real-time, ensuring that users receive immediate feedback on their actions, such as order confirmations or updates on their order status.

The entire development process used Visual Studio Code (VS Code) as the Integrated Development Environment (IDE), which provided a robust platform for writing, debugging, and testing the code. The dependency management for both the Angular front end and the Express.js backend was handled by Node Package Manager (NPM), ensuring that all necessary packages and libraries were correctly

installed and managed. This included dependencies for Angular modules, Bootstrap, Sequelize for database interaction, and Nodemailer for email functionality, ensuring a smooth development workflow.

In summary, the implementation of PT Sadang Jaya's online ordering system was carried out using a structured development approach, leveraging Express.js, Sequelize, PostgreSQL, Angular, and Bootstrap to create a scalable, efficient, and user-friendly system. The backend and front end were carefully integrated, and security measures such as auth guards were put in place to ensure the system's integrity and protect sensitive data.

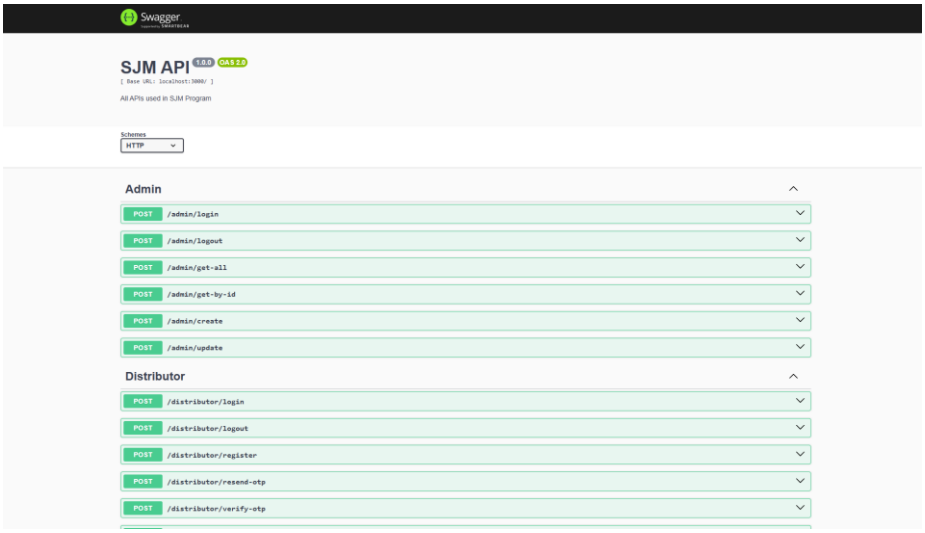

Figure 14. Swagger API documentation

4.10Testing

Application testing is carried out using the User Acceptance Testing (UAT) method to ensure the system functions according to user needs. Black box testing focuses on testing system functionality without looking at the internal code structure, ensuring each feature runs according to predetermined specifications. UAT was carried out on November 08, 2024, at the PT Sadang Jaya main office and also at the factory located in Sidoarjo involving three key stakeholders: the director of PT Sadang Jaya for validation of business and management aspects, one operational staff to verify daily workflows, and one subscription distributor located in Surabaya as a system tester from an end-user perspective. The whole testing covered the entire business process flow from start to finish, including account registration, catalog management, ordering, payment, and order status tracking. This approach enabled a thorough evaluation of the system's functionality in the context of real use.

4.11Deployment and Maintenance

Finally, the deployment process is carried out after testing is complete and everything is correct. The application is launched to the server, then PT Sadang Jaya Makmur can start using the web. The program is also submitted for continued maintenance and further development.

5. Conclusion

The successful implementation of a modern B2B order management system at PT Sadang Jaya has significantly improved the company's operational efficiency, reduced errors, and enhanced overall scalability. By strategically adopting Angular, PostgreSQL, and Agile methodology, the company not only addressed immediate operational challenges but also positioned itself for future growth in the digital era. This case study offers valuable insights for businesses in Indonesia and beyond,

showing how technology, when aligned with strategic business objectives, can be a powerful enabler of digital transformation and long-term success.

Looking ahead, there are several key areas for improvement to further enhance the system's effectiveness. First, integrating the SJM system with third-party logistics platforms would streamline operations by enabling real-time shipment tracking, automatic inventory updates, and optimized delivery routes, which would improve accuracy and customer satisfaction. Additionally, developing a more comprehensive analytics dashboard could provide deeper insights into business performance by visualizing sales trends, distributor profiles, and demand forecasting, allowing for better decision-making and more agile responses to market changes. Finally, strengthening the security of the system should be a top priority as the company expands its digital operations. By implementing multi-factor authentication, end-to-end encryption, and conducting regular penetration testing, PT Sadang Jaya can ensure its data remains secure and foster greater trust with its clients. Together, these improvements will help the company maintain its competitive edge and continue its successful digital transformation journey in the future.

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