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UI/UX Design of a Web-Based Bag Sales Information System Using the Waterfall Method and Usability Evaluation with SUS: A Case Study of Carrefour Bag MSME

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Abstract

The growing adoption of information technology has pushed many Micro, Small, and Medium Enterprises (MSMEs) to shift from manual to digital-based sales management. Despite this trend, a considerable number of MSMEs continue to rely on manual recording systems, which often lead to transaction errors, inaccurate data, and limited capacity for product information display. This study aims to design the UI/UX of a web-based bag sales information system for Carrefour Bag MSME to improve sales management efficiency and user experience. The system was developed using the Waterfall method, covering four stages: requirements analysis, system design, implementation, and evaluation. Key features include user authentication, dashboard, product management, shopping cart, checkout, sales transactions, and sales reporting. The interface was designed to be simple, modern, and accessible for both administrators and customers. Usability was evaluated using the System Usability Scale (SUS) involving 30 respondents, yielding a mean SUS score of 86.6, which falls within the Excellent category. These results indicate that the system meets acceptable usability standards and is suitable for implementation at Carrefour Bag MSME to support more efficient and effective sales operations.

Keywords: Sales Information System; UI/UX; Website; Waterfall; System Usability Scale (SUS); MSMEs.

Abstrak

Meningkatnya pemanfaatan teknologi informasi mendorong banyak Usaha Mikro, Kecil, dan Menengah (UMKM) untuk beralih dari pencatatan manual ke sistem penjualan berbasis digital. Meski demikian, tidak sedikit UMKM yang masih mengandalkan pencatatan konvensional, sehingga rentan terhadap kesalahan transaksi, ketidakakuratan data, dan keterbatasan dalam penyajian informasi produk. Penelitian ini bertujuan merancang UI/UX sistem informasi penjualan tas berbasis web pada UMKM Carrefour Bag guna meningkatkan efisiensi pengelolaan penjualan dan kenyamanan pengguna. Pengembangan sistem dilakukan menggunakan metode *Waterfall* yang mencakup empat tahap: analisis kebutuhan, perancangan sistem, implementasi, dan evaluasi. Fitur utama sistem meliputi autentikasi pengguna, *dashboard*, pengelolaan produk, keranjang belanja, *checkout*, transaksi penjualan, dan laporan penjualan. Antarmuka dirancang dengan tampilan sederhana, modern, dan mudah digunakan oleh administrator maupun pelanggan. Pengujian *usability* dilakukan menggunakan *System Usability Scale* (SUS) dengan melibatkan 30 responden, menghasilkan skor rata-rata sebesar 86,6 yang termasuk dalam kategori *Excellent*. Hasil ini menunjukkan bahwa sistem memenuhi standar kelayakan penggunaan dan layak diterapkan di UMKM Carrefour Bag untuk mendukung proses penjualan yang lebih efisien dan terorganisasi.

Kata Kunci: Sistem Informasi Penjualan; UI/UX; Website; Waterfall; System Usability Scale (SUS); UMKM.



1. Introduction

The advancement of information technology has brought significant changes across various sectors, including small-scale business and commerce. In the context of Micro, Small, and Medium Enterprises (MSMEs), technology adoption plays a critical role in improving operational efficiency and the quality of data management. According to Turban *et al.* (2018), information technology enables organizations to process and distribute information more accurately, which in turn supports better decision-making. One practical application of this is the use of web-based information systems for managing sales activities. A sales information system allows businesses to handle product data, purchase transactions, and reporting in a more structured and integrated manner (Kadir, 2014). Jogyanto (2017) further argues that an effective information system not only stores data but also transforms it into meaningful information that supports business processes — a benefit that is particularly relevant for MSMEs, which form a substantial part of the Indonesian economy and are increasingly expected to adapt to digital business practices.

Despite the availability of digital tools, many MSMEs still manage their sales activities manually, which leads to a range of operational problems including errors in transaction recording, difficulty retrieving historical sales data, and delays in generating business reports (Saputra & Wibowo, 2021). Andini and Putra (2023) also note that manual sales recording in MSME contexts frequently results in data inconsistencies that hinder business monitoring and growth. Carrefour Bag MSME, a small business operating in the bag retail sector, faces these same challenges. The business currently relies on a simple manual recording system, which limits the owner's ability to monitor stock availability, track sales performance, and produce timely reports. These conditions reduce the overall effectiveness and efficiency of the business's data management process, and point to a clear need for a more systematic, technology-supported approach to sales management (Pratama, 2020).

Beyond functional capabilities, the design of a system's interface plays an equally important role in determining whether a system will actually be adopted and used consistently. User Interface (UI) refers to the visual and interactive elements through which users engage with a system, while User Experience (UX) encompasses the overall quality of the user's interaction and satisfaction (Rahmawati, 2021). ISO 9241-11 (2018) defines *usability* as the extent to which a system can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a given context of use. In MSME settings, where users may not be technically proficient, a well-designed UI/UX is essential to ensure that the system is not only functional but also intuitive and comfortable to use. To measure this, the study employs the System Usability Scale (SUS), a widely validated instrument developed by Brooke (1996) that assesses user perceptions of a system's ease of use through a standardized ten-item questionnaire. Previous studies have confirmed the effectiveness of SUS in evaluating web-based systems, including *e-commerce* platforms (Hidayat & Nugroho, 2022) and online sales systems (Rahmawati, 2021), while Nielsen (2012) emphasizes that usability evaluation is an essential step to ensure the final product meets user needs.

This study aims to design the UI/UX of a web-based bag sales information system for Carrefour Bag MSME using the *Waterfall* development method, and to evaluate its usability using the SUS instrument. The system is expected to reduce manual recording errors, improve the efficiency of sales management, and provide a more accessible experience for both administrators and customers.

2. Method

This study employs a combined qualitative and quantitative research approach within a software engineering framework. The qualitative component was used to identify and analyze system requirements through direct observation and interviews with the business owner and prospective users, while the quantitative component was applied to measure the system's usability level using a standardized questionnaire instrument (Sugiyono, 2019). This combination was chosen because it allows the research to produce a system that is grounded in actual user needs while also providing an objective, measurable evaluation of the resulting design. System development was carried out using the *Waterfall* model, a sequential software development approach in which each phase must be completed before the next begins (Pressman, 2015). The *Waterfall* model was selected for this study due to its structured and systematic nature, which is well-suited to projects with clearly defined requirements. As described by Sommerville (2016), the *Waterfall* model consists of four main stages. The first stage is requirements analysis, in which user needs were identified through observation and interviews

with the business owner and system users. The second stage is system design, in which the UI/UX prototype was developed using Figma based on the requirements gathered in the previous stage. The third stage is implementation, in which the design was translated into a functional web-based system. The fourth stage is evaluation, in which the system was tested for usability using the System Usability Scale (SUS). Each stage was carried out sequentially to ensure that the resulting system aligned with the identified requirements and met acceptable usability standards (Rosa & Shalahuddin, 2018).

Data collection was conducted through three techniques: observation, interviews, and questionnaires. Observation was carried out to understand the existing manual sales process at Carrefour Bag MSME and to identify operational inefficiencies. Interviews were conducted with the business owner and selected users to gather information about their needs, expectations, and complaints regarding the current system. Questionnaires were distributed to 30 respondents consisting of the business owner, staff, and prospective customers who interacted with the system prototype, in order to obtain quantitative data on user perceptions of the system's usability. Usability evaluation was performed using the System Usability Scale (SUS), an instrument originally developed by Brooke (1996) that has been widely adopted in usability research due to its simplicity and reliability. The SUS questionnaire consists of ten items rated on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Scores are calculated by converting each item response according to standard SUS scoring rules — subtracting 1 from odd-numbered items and subtracting the response from 5 for even-numbered items — then summing all converted scores and multiplying by 2.5 to obtain a final score on a scale of 0 to 100 (Brooke, 1996). A higher SUS score indicates a higher level of perceived usability, with scores above 80 generally considered to fall within the *Excellent* category (Hidayat & Nugroho, 2022).

3. Results and Discussion

3.1 Results

This study produced a UI/UX design for a web-based bag sales information system at Carrefour Bag MSME, developed using the *Waterfall* method and evaluated through the System Usability Scale (SUS). The design process prioritized user requirements to ensure that the resulting system is intuitive, operates efficiently, and effectively supports sales processes that were previously managed manually. The final output of this study is an interactive *website* prototype designed using the Figma application, which was subsequently implemented into a functional web-based system tailored to the operational needs of Carrefour Bag MSME.

3.1.1 User Requirements Analysis

The requirements analysis stage involved identifying the system's prospective users and determining the main functional needs related to sales management. Based on observations and interviews, two main user groups were identified as directly involved in system use, as presented in Table 1.

Table 1. Prospective System Users

Actor	Description
Administrator	Responsible for managing product data, recording sales transactions, and generating reports.
Consumer	Users who browse the <i>website</i> , select products, and place orders.

To gather more detailed requirements, interviews were conducted with the business owner and prospective users. The interviews aimed to identify problems in the existing system and to understand user expectations for the new system. Questions covered topics such as the current sales recording process, frequency of transaction errors, methods for tracking stock availability, difficulties in generating sales reports, and the need for specific features such as automatic reporting and a simple interface. These interviews revealed that the current manual process was prone to errors and inefficiencies, providing a clear basis for the system requirements to be addressed in the design stage. Based on the results of the observation and interview process, user requirements were identified from two perspectives. From the consumer side, users require a simple and accessible *website* interface, particularly for those with limited technical experience. They also expect clear product information, easy navigation, a fast ordering process, and the availability of search and filter features to help locate products according to their preferences. From the business owner's perspective, Carrefour Bag MSME requires a system that simplifies product

catalog management — including the ability to add, edit, and delete product data — as well as a feature for automatically recording incoming orders to reduce manual workload. In addition to these requirements, several user complaints were identified through the observation and interview process. The existing system lacked the ability to store transaction history automatically, making it difficult to retrieve past records. Stock availability was difficult to monitor in real time, and sales report generation was time-consuming due to manual calculations. Transaction data was often scattered and inconsistent, and the absence of an integrated system meant that business owners could not effectively track sales performance on an ongoing basis. These findings are consistent with those reported by Saputra and Wibowo (2021), who identified similar operational constraints in MSME sales management contexts.

3.1.2 System Solution Design

The proposed system was designed as a prototype using Figma, with a simple, modern, and user-friendly interface concept suited to MSME users. The system begins with a login page that serves as an authentication gateway before users can access the main features. Upon successful login, users are directed to a *dashboard* that displays key information summaries, including product listings, pricing, and stock status. The administrator section includes three main functional pages: the product management page for adding, editing, deleting, and searching product data; the transaction page for processing sales with automatic total price calculations; and the report page for viewing and printing sales data for specified time periods. On the consumer side, the system provides a product catalog, *shopping cart*, and *checkout* feature that allows customers to browse and place orders independently. The system flow for each user type is illustrated through flowchart diagrams. The admin flowchart describes the sequence of processes carried out by the administrator, starting from the login process, followed by access to the *dashboard*, and continuing to product management, transaction processing, and report generation. The consumer flowchart describes the steps taken by customers, beginning with browsing the product catalog, adding items to the *shopping cart*, proceeding to *checkout*, and completing the order. Both flowcharts are presented in Figure 1 and Figure 2 below.

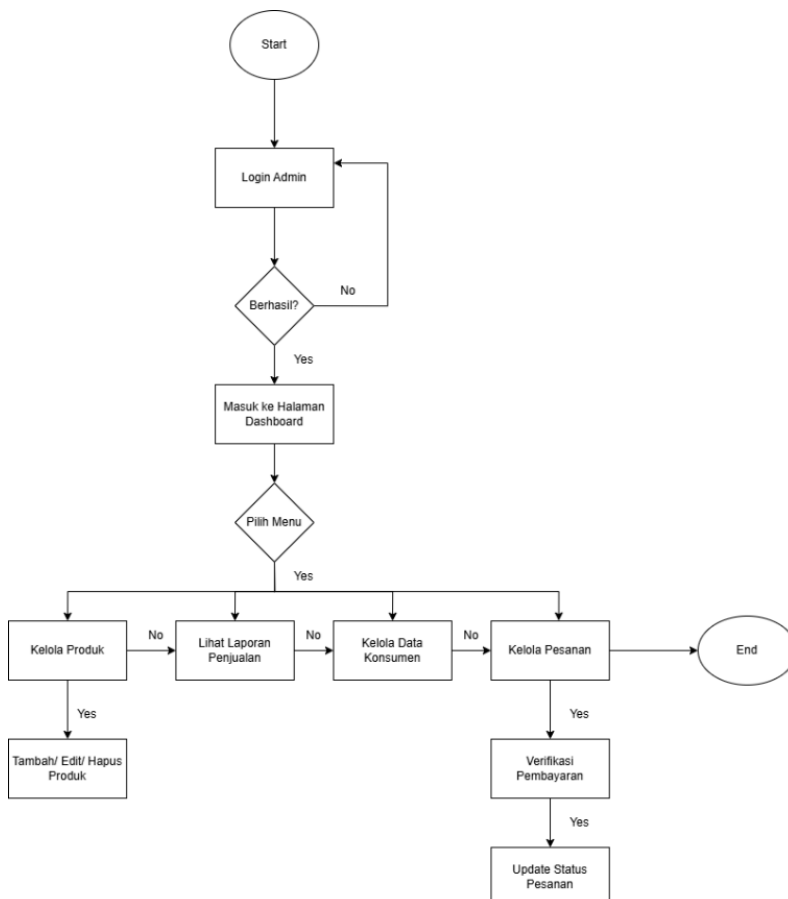


Figure 1. Admin Flowchart

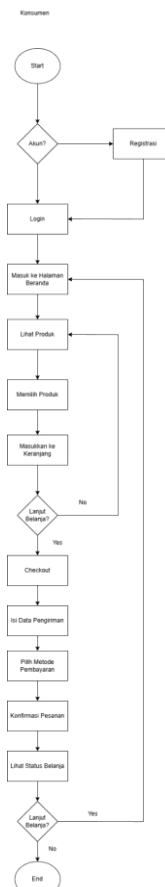


Figure 2. Consumer Flowchart

The UI/UX prototype was developed based on the flowchart logic described above, translated into visual interface designs using Figma. The consumer-facing interface was designed to prioritize ease of navigation and clarity of product information, ensuring that users with varying levels of technical familiarity can complete the purchasing process without difficulty. The admin interface was designed to support efficient data management, with clearly labeled menus and a structured layout that minimizes the steps required to complete each administrative task.



Figure 3. Consumer Login Page



Figure 4. Home Page

On the consumer side, the system provides a login page (Figure 3) that allows users to authenticate using their registered email and password, with an additional option to sign in via Google or Facebook for convenience. Upon successful login, users are directed to the home page (Figure 4), which displays a promotional banner, a product search bar, category filters, and a ranked product listing complete with ratings and prices. The product detail page (Figure 5) presents comprehensive information for each item, including product name, price, customer rating, material description, and key features, alongside an *Add to Cart* button. The shopping cart and payment page (Figure 6) provides a structured order summary displaying selected items, service fees, shipping costs, and total payment amount before checkout. Upon successful transaction, the system displays an order confirmation page (Figure 7) containing the order number, estimated delivery date, delivery address, and options to track the order or continue shopping.



Figure 5. Product Detail Page

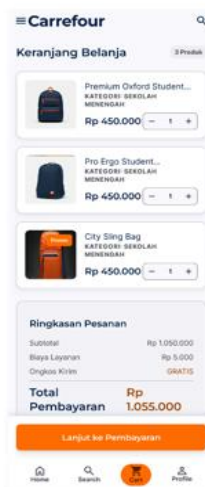


Figure 6. Shopping Cart and Payment Page



Figure 7. Order Confirmation Page

On the administrator side, the admin login page (Figure 8) provides a secure entry point for system managers. The dashboard page (Figure 9) presents a real-time overview of key business metrics, including sales charts and performance summaries. The product ordering page (Figure 10) allows

administrators to manage incoming orders efficiently.



Figuria 8. Admin Login Page



Figure 9. Dashboard Page



Figure 10. Product Ordering Page

The product management page (Figure 11) enables administrators to add, edit, and delete product listings including names, categories, stock quantities, prices, and status. Finally, the sales report page (Figure 12) automatically generates sales data in structured tabular and graphical formats, supporting accurate business decision-making.



Figure 11. Product Management Page



Figure 12. Sales Report Page

3.1.3 Usability Testing Using the System Usability Scale (SUS)

The usability of the system was evaluated using the System Usability Scale (SUS), involving 30 respondents who interacted with the system prototype and completed a ten-item questionnaire using a five-point Likert scale, where 1 indicates Strongly Disagree and 5 indicates Strongly Agree. The SUS questionnaire items used in this study are presented in Table 2.

Table 2. SUS Questionnaire Items

No	Question
Q1	I feel this system can help in carrying out the process of purchasing or selling bags more easily
Q2	I feel the appearance of the menus, pages, etc. in the system is good
Q3	I feel this system is easy to use
Q4	I think the available functions are running according to expectations
Q5	I feel the features in the system work properly
Q6	I feel there are many inconsistencies in this system
Q7	I feel most people can learn this system quickly
Q8	I feel this system is confusing to use
Q9	I feel confident when using this system
Q10	I need to get used to the system first before using it

After all responses were collected, SUS scores were calculated for each respondent following the standard scoring procedure established by Brooke (1996). For odd-numbered items, the score contribution is the scale position minus 1. For even-numbered items, the score contribution is 5 minus the scale position. The sum of all converted scores is then multiplied by 2.5 to produce a final score on a scale of 0 to 100. The individual calculation results for all 30 respondents are presented in Table 3.

Table 3. SUS Score Calculation Results

Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	Score (Total × 2.5)
R1	4	3	4	3	4	3	4	4	4	3	36	90.0
R2	4	4	4	4	4	4	4	4	4	4	40	100.0
R3	3	4	4	3	4	3	4	4	4	3	36	90.0
R4	4	4	4	3	4	3	3	4	4	3	35	87.5
R5	3	3	3	3	3	3	3	3	3	3	30	75.0
R6	4	3	4	3	4	3	3	4	4	3	34	85.0
R7	3	4	4	3	4	3	4	4	4	3	35	87.5
R8	4	4	4	4	4	4	4	4	4	3	35	87.5
R9	3	3	4	3	4	3	3	4	4	3	34	85.0
R10	4	4	4	4	4	4	4	4	4	4	40	100.0
R11	3	4	4	4	3	3	3	4	3	3	33	82.5
R12	3	3	4	3	4	3	4	4	4	3	35	87.5
R13	3	4	4	3	4	4	4	4	4	3	37	92.5
R14	3	3	4	3	4	3	4	4	4	3	35	87.5
R15	4	3	3	4	4	3	4	4	3	3	35	87.5
R16	3	4	4	3	3	3	4	3	3	3	33	82.5
R17	3	3	4	4	3	3	4	4	3	3	34	85.0
R18	3	4	4	4	4	3	4	4	3	3	33	82.5
R19	3	3	3	4	3	3	4	3	3	3	31	77.5
R20	3	4	3	3	3	3	4	3	4	3	33	82.5
R21	3	3	4	3	3	3	4	4	4	3	32	80.0
R22	3	3	4	4	3	3	4	4	4	3	37	92.5
R23	3	3	3	3	3	3	3	3	3	3	30	75.0
R24	3	3	3	4	3	3	3	4	3	3	32	80.0
R25	3	3	3	3	3	3	3	3	3	3	30	75.0
R26	3	3	3	3	3	3	3	3	3	3	30	75.0
R27	4	4	3	3	3	4	3	4	3	3	34	85.0
R28	3	4	3	3	3	3	3	4	4	3	34	85.0
R29	4	4	3	4	4	4	4	4	4	4	39	97.5
R30	4	4	4	4	4	4	4	4	4	4	40	100.0
Mean												86.67

The mean SUS score was derived using the following formula:

$$\text{Mean SUS Score} = \frac{\sum \text{Individual SUS Scores}}{\text{Total Respondents}}$$

The calculation yielded a mean SUS score of 86.6, indicating that the system falls within the *Excellent* category of usability. This result suggests that the system interface is easy to understand, the available features function as expected, and users feel comfortable and confident when operating the system.

3.2 Discussion

The mean SUS score of 86.6 obtained in this study confirms that the web-based bag sales information system designed for Carrefour Bag MSME meets a high standard of usability. This result is consistent with the findings of Hidayat and Nugroho (2022), who reported that well-structured web-based systems evaluated using SUS tend to score above 80 when the interface is designed with user simplicity as a primary consideration. A comparable result was also reported by Melvin *et al.* (2023), whose web-based Point of Sale system for an MSME in the automotive components industry achieved an identical SUS score of 86.6, categorized as very good. Similarly, Rahmah *et al.* (2026) reported an even higher SUS score of 89.4 for a web-based management information system implemented in an MSME context, further reinforcing the notion that well-designed web-based systems are capable of achieving excellent usability among non-technical users. According to Brooke (1996), scores in this range reflect a system that users find easy to learn and comfortable to operate without extensive prior training — a characteristic that is particularly important in MSME contexts where users may have limited technical backgrounds. This is further supported by Andarwati *et al.* (2024), who developed a web-based e-Mudharabah system for

MSME actors using the *Waterfall* method and obtained a SUS score of 81.125, also classified as *Excellent*, demonstrating that the combination of structured development methods and user-centered design consistently yields high usability outcomes.

From a functional standpoint, the system addresses the core operational problems identified during the requirements analysis stage. The automation of transaction recording and stock management reduces the risk of manual errors that were previously common in Carrefour Bag MSME's operations. Rahmah *et al.* (2026) demonstrated a concrete example of such efficiency gains, reporting that automated transaction recording reduced processing time from 4–5 minutes to 1–2 minutes per transaction in a comparable MSME setting. The automatic report generation feature further supports the business owner in monitoring sales performance without time-consuming manual calculations, which aligns with the benefits of web-based sales systems described by Andini and Putra (2023). Effendy *et al.* (2026) similarly confirmed that automated features including sales transactions, stock updates, low-stock detection, and report generation significantly improved transaction recording accuracy and inventory management in an MSME web-based system. Rakhmadi *et al.* (2025) further validated this finding by demonstrating that a *Waterfall*-developed e-commerce system for a small business achieved 100% functionality across core modules — including catalog management, order processing, and buyer transactions — through Black Box Testing, confirming the reliability of automated features in small-scale system implementations.

From the consumer perspective, the availability of an online product catalog, *shopping cart*, and *checkout* feature simplifies the purchasing process and expands the business's potential reach beyond walk-in customers. This is consistent with the observation made by Irawan and Sanusi (2026), who found that integrating customer-facing features into a centralized web-based platform effectively addressed issues of fragmented data and operational delays in an SME context. Rahadjeng *et al.* (2026) also noted that a well-structured web-based information system not only improves usability but also directly supports managerial decision-making, a benefit that is equally applicable to the sales monitoring and reporting capabilities of the system developed in this study.

The successful application of the *Waterfall* development method in this study also demonstrates its continued relevance for small-scale system development projects with well-defined requirements. As noted by Pressman (2015), the *Waterfall* model is particularly effective when project requirements are stable and clearly understood from the outset. Rakhmadi *et al.* (2025) corroborated this by applying the *Waterfall* model systematically to develop a web-based e-commerce system for a small business, concluding that its structured methodology is practical and well-suited to small-scale development contexts. Rahadjeng *et al.* (2026) similarly employed the *Waterfall* model in developing a web-based information system for an SME and reported a SUS score of 82.5, further affirming the compatibility of this method with MSME system development. In contrast, Candra *et al.* (2026) suggested that agile approaches such as Extreme Programming may offer greater adaptability for projects with evolving requirements, implying that the *Waterfall* method remains most appropriate when, as in this study, the scope and requirements are clearly bounded from the beginning. The results indicate that the proposed system is both technically feasible and practically suitable for implementation. The convergence of a high SUS score, confirmed functional automation, and a structured development approach collectively demonstrate that the web-based bag sales information system has strong potential to improve the efficiency and effectiveness of sales management at Carrefour Bag MSME, and contributes to the growing body of evidence supporting the adoption of web-based information systems as digital transformation tools for MSMEs.

4. Conclusion and Future Work

This study successfully produced a UI/UX design for a web-based bag sales information system at Carrefour Bag MSME through the application of the *Waterfall* development method. The system was developed in accordance with the user requirements identified during the analysis stage, encompassing features for product catalog management, sales transaction recording, and automatic report generation. The structured and sequential nature of the *Waterfall* method proved effective in ensuring that each development stage was completed systematically before proceeding to the next, resulting in a system that is well-aligned with the operational needs of the business.

The interface design was developed with a simple, modern, and user-friendly appearance to accommodate users with varying levels of technical familiarity. Key features including the product catalog,

shopping cart, *checkout*, administrator *dashboard*, and sales report module collectively support more organized and efficient business operations for Carrefour Bag MSME. The usability of the system was evaluated using the System Usability Scale (SUS), which yielded a mean score of 86.6 — placing the system within the *Excellent* category and confirming that it meets acceptable user acceptance criteria. These results indicate that the system is both technically feasible and practically suitable for full implementation as a digital solution to improve the effectiveness of the sales process and the quality of customer service at Carrefour Bag MSME.

For future research, it is recommended that the system be further developed to include additional features such as real-time stock notifications, multi-payment gateway integration, and sales analytics based on historical transaction data. Further usability testing with a larger and more diverse respondent group is also suggested to validate the findings of this study and to identify potential areas for interface improvement.

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