



Application of Rapid Application Development Method to Design E-Commerce Systems in National Expedition Company to Increase Marketing Effectiveness

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Abstract

This research aims to find out how to design a B2C, online-based e-commerce reservation system for companies. In this research, the data collection methods applied include observation, interviews, and a literature study. The system development process uses the RAD (Rapid Application Development) model and UML modeling tools. The development stages consist of requirement planning, design workshops, and implementation. Based on the research results, it was found that the existence of this B2C e-commerce system can help the public find out information about hotels in real time, find out the condition of room availability, and make room reservations online anytime and anywhere via the web. This system consists of customer registration, room reservations, payments, expense input, and viewing monthly income and expense reports. This e-commerce system makes it easier for customers to make room reservations and helps managers monitor the occupancy rate in the form of the ratio of the number of customers who make room reservations to the total number of rooms in the company through the visitor list view menu, which displays a list of the number of rooms and the number of visitors who are staying overnight. This system makes it easier for managers to view reports on total monthly income and total expenses by selecting the menu to view report data on total income and total monthly expenses.

Keywords: Design, E-Commerce Systems, Rapid Application Development.

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1. Introduction

In the current era of globalization, the world of technology and information is developing very rapidly, especially the world of the internet. The internet is currently a human need for carrying out various activities, coupled with information technology, which is increasingly playing a role in the world of marketing. In business, the internet is often used as a tool for exchanging information, promotional media, product catalogs, and so on. Apart from this, the internet is also used for discussions and consultations with consumers who need information, so that customers can be involved interactively in designing, developing, marketing, and selling products [1]. Business companies can directly contact suppliers, business partners, or individuals at a low cost, even though they are located geographically far away. Likewise, entrepreneurs can offer their company's products or services more widely because the internet facilitates cross-border transactions, so information flows more quickly. In addition, the internet also provides a low-cost medium for global alliances and cyber organizations [2]. Users of internet services increase every year; this proves that the internet is now something that is a necessity for Indonesian people on a daily basis. In line with increasingly modern technological developments, many companies operating in the hospitality sector use internet facilities in their marketing and business systems. This information system has an important role in increasing room occupancy in a hotel. This method has several advantages compared to a direct room booking marketing system, which influences the behavior of the company in terms of management, bookings, and information services provided [3].

Currently, the company lacks a system that allows it to market its business globally, communicate with customers, and prepare income and expense reports. By utilizing website services, tourists who will travel to an area, both tourist destination areas and other areas, will first plan by making reservations [4]. The World Wide Web (WWW), also known as the web, is a service that is widely used on the internet and consists of a collection of electronic documents from all countries. Websites are chosen because of their effectiveness in marketing products and services compared to advertising through television, newspapers, or other media besides websites, because products and services will be offered to people who need the product or service only by searching via

search engines; in other words, when the product or the services offered are seen by someone on the website, it is very likely that this person is someone who is really looking for the product being offered. Compared to marketing through television or newspapers, the person who is looking is not necessarily looking for the product or service being offered, thus marketing costs can be pressed [5].

Hotels utilize their facilities for lodging services, food and drink providers, and other commercially managed services for the general public [6]. As a hotel that is developing and continues to strive to improve the company's services and quality standards in various aspects, including the use of information technology and the internet [7]. The large number of customers who come from outside the city means that companies need to build a system that allows companies to do marketing via the internet and provides opportunities for users who are outside the city to be able to see information directly, quickly, and accurately, as well as make orders and payments remotely [8]. The existing room reservation system still relies on recording reservation books, leading to occasional errors in the manual recording process, paper waste, and data loss due to misplaced records [9]. Therefore, the system requires improvement [10]. Some of the systems that are considered to need improvement are the marketing system, the room booking system, which is still manual using paper records and payment notes written manually, and the system for making income and expense reports [11]. A new web-based computerized system should be implemented to improve this system, as it is more capable of meeting competitive needs, minimizing the use of paper, making it easier for customers to make room reservations, preparing monthly income and expense reports required by the owner of the company, and also marketing the company's business more broadly via the web [12].

The explosion in internet use has led to the emergence of e-commerce technology, which is starting to become a trend for business people. B2C (Business to Customer) is an e-commerce website that carries out business activities directly with consumers [13]. The company needs a B2C e-commerce system to meet the needs of competition with fellow hotel companies and to improve its service to customers with online room booking facilities available on the website [14]. E-commerce is an extension of commerce that exploits electronic media. Despite limited utilization and understanding of electronic transaction media by the internet user community and various groups, business pressure compels business people to use this electronic medium. For example, business ventures must have a website [15]. Ownership of this website determines the credibility of the company, almost the same as ownership of a telephone for a business venture. Based on this, technology has a very important role in running a business, especially computers and the internet [16] [17] [18]. Web-based e-commerce technology enables easy and quick sales, minimizes errors or confusion in transactions, and facilitates marketing. Besides that, operational costs can be reduced to a smaller extent, and the above companies can fulfill their needs [19] [20] [21].

2. Research Methods

In this research, the data collection methods applied include observation, interviews, and a literature study. The system development process uses the RAD (Rapid Application Development) model and UML modeling tools. The development stages consist of requirement planning, design workshops, and implementation. In the requirements planning phase, researchers, managers, and parties involved in internships and research gather to discuss the objectives of the information system they want to build. Then, the researcher identifies the objectives of the information system and explores the additional information and needs required. The design workshop phase is the next step, where researchers design an e-commerce system. Diagrams designed using the Unified Modeling Language (UML) were produced in this workshop. The workshop divided the stages into process design, database design, and interface design. At the implementation stage, researchers carried out several implementation steps. It involves coding e-commerce systems using HTML, PHP, and MySQL programming languages. Researchers carry out application testing using the black box testing method to ensure full operation of each system function. This testing helps researchers identify and correct errors in each function tested. Thus, the entire system development process involves intensive collaboration, structured design, and careful implementation.

3. Results and Discussion

In the requirements planning stage, researchers carry out the process of identifying objects and information system needs carefully. Researchers carry out an in-depth analysis of the running system to reveal the true problem definition, with a focus on finding the best solution. Observations on the system operating in the company reveal that all processes in it are still manual. Processes such as booking rooms, recording lists of customers and orders on the blackboard, recording receipts, checking rooms, recording daily customer data, recording daily expenses, storing order and expense files, and making reports for company owners all still depend on hands. This situation creates the potential for human error, such as data loss and paper waste. Therefore, there was an urgent need to implement an information system that could automate the entire process. The main goal is to increase operational efficiency by reducing the risk of human error and minimizing resource

waste. It is hoped that the implementation of a modern and integrated information system can bring positive changes to carrying out daily business activities.

A running operational system can be illustrated through a rich picture that depicts a series of steps in daily activities. The receptionist plays a key role in this cycle, starting with confirming room availability for interested customers. If the room is available, the customer continues by booking a room and providing personal identification. The receptionist confirms the customer's payment to ensure the room order is received. The receptionist manually records visitor data in a daily report book and updates visitor information on the visitor register whiteboard. The receptionist hands over the room key to the customer, issues a room booking receipt, and records daily income. The checkout process, or adding room orders by customers, is also handled by the receptionist, who then updates visitor data. The company owner is involved in manual monitoring by looking at daily visitor data on the whiteboard and daily notebook, as well as checking directly with the company. In the end, the receptionist records daily income and daily expenses and receives confirmation of monthly income and expense reports from the owner. The owner carries out manual checks and confirms the report results directly at the company. This entire process illustrates the urgent need to automate information systems to increase efficiency, reduce the risk of errors, and minimize manual involvement in a company's day-to-day operations.

Based on the results of the observations and interviews described previously, a number of problems emerged in the operational system. Recording and inputting data, which is still done manually, is one of the main complaints, increasing the risk of losing receipts and resulting in the waste of paper in the recording process. Furthermore, cash-only payment methods pose difficulties for customers, and orders that can only be placed directly at the company restrict accessibility for customers outside the area. The company identified a need to use electronic media for marketing in order to increase its visibility. The development of technology has also resulted in the inability of companies' manual systems to compete with competitors who have adopted technology in their operations. Limited communication between customers and the company, dependence on manual calculations in making reports, and the need for company owners to come directly to find out about accommodation conditions are also obstacles to company efficiency and development. Furthermore, the problem of manual document storage without an integrated database results in difficulties in searching for data and preparing income and expenditure reports. All of these problems indicate the urgency of adopting more modern and integrated information systems to increase efficiency, reduce errors, and support business growth.

After successfully identifying problems in the current system, the next step involves carrying out a system requirements analysis to design solutions that can address the identified problems. The author proposes a design for a B2C e-commerce system based on the described problem requirements. The proposed system aims to minimize excess use of paper and ink by relying more on the web and computers as operating media. The system uses an integrated database to store every document it produces. The flow of this proposed system includes several stages. First, the admin logs in and manages users in the system, including adding and deleting users. Customers can register on the system to start the room booking process. The admin will confirm user registration, then customers can check room availability, select a room, and make an online order. The next process involves payment by the customer, with validation of proof of payment by the manager. After validation, the manager sends proof of validation to the customer. The manager validates the proof of payment for customers to print and use during their stay. The receptionist can place orders directly in the system if a customer comes in person, with cash payments recorded in the system. The manager is responsible for managing daily income and expenditure report data in the system. After the admin registers them, owners can monitor the system, view visitor lists and data, and access daily transactions. Admins can use the chat feature to view and respond to chats from other users. Owners can view monthly reports and print reports if needed. The proposed system meets identified needs, brings about positive change, and improves the company's operational efficiency.

After detailing the planning of system requirements and defining the problems and objectives of system development, the researcher entered the design workshop phase. At this stage, researchers are actively involved in creating system designs using unified modeling language (UML) tools. The design incorporates theories explained on a theoretical basis as well as the interactions between researchers and end users of the system. The researcher carried out the design workshop stage, which involved creating an e-commerce system use case. This process begins by identifying business actors involved in the e-commerce system ecosystem. Next, we identify use cases that encompass a range of activities and functionality that the system needs to accommodate. We carry out these steps carefully, considering the importance of thoroughly understanding how interactions between business actors and systems can occur. The results of this design workshop will later form the basis for designing an e-commerce system that can meet needs, minimize existing problems, and optimize previously determined development goals.

Based on the use case narrative previously explained, the researcher then developed an activity diagram as a visual representation of the flow of system activities. This diagram shows two main activities, namely activity login and activity manage account. Activity login shows a series of activity flows from the login use case, which requires all actors to fill in a username and password to enter the system. Every user who wants to access the

system must carry out the authentication process. Meanwhile, activity management shows the flow of activity when an actor manages a user account. Actors in account management can carry out three actions: adding users, editing user data, and deleting users. If the data entered is complete, the system will save the information and direct the actor back to the manage account page. Researchers can use this activity diagram to clearly describe the interactions and workflow that occur in the system, ensuring that each activity is carried out in accordance with the steps specified in the previous use case. This diagram provides a useful visual guide for understanding the processes and functionality associated with login activities and user account management.

Based on the previous use case narrative, we have developed the activity diagram and described several additional activities as follows: Activity-setting accounts visualize the flow of actor activity in editing user data directly from within the system. If the changed data is complete, the system will save the changes and return the actor to the user page with a success message. Registration activity describes the flow of customer activities in registering into the system. The actor will enter registration data, and if the data is complete, the system will save it in the database and display a success message. If the data is incomplete, the system will return the actor to the registration data content page. Availability check activity describes the flow of customer and receptionist activities in checking room availability before making a booking. This activity ensures that customers can choose available rooms that suit their needs. Room booking activity visualizes the flow of user activity in making room reservations. The user ensures an accurate and customer-preference-based booking process by selecting the type and number of rooms to be booked. These activities optimize the interaction between the actor and the system, ensuring efficient execution of each step and producing a success message upon successful completion of the process. This activity diagram is a visual guide that helps researchers and end users understand more clearly the processes related to setting up an account, registering, checking availability, and booking rooms in an e-commerce system.

To expand the activity diagram, we have added several additional activities: The payment for booking activity depicts the flow of user activity after booking a room. The user completes the room booking process by making a payment. Activity: The select pay menu visualizes the flow of user activity in selecting payment options after booking a room. In this step, the user will select the desired payment method to complete the transaction. The send proof of payment activity outlines how customers send proof of payment after making a room booking. This activity shows customer involvement in providing payment confirmation to the company. The manage order data activity describes the flow of receptionist activities in managing order data from customers. This activity involves the process of managing and recording order data carried out by the receptionist to ensure the order and accuracy of information related to room reservations. With the addition of this activity, the activity diagram becomes more complete and provides a more comprehensive picture regarding interactions between users, customers, and receptionists in the payment process and managing room orders. This diagram serves as a useful visual aid in understanding the workflow and maintaining clarity of the processes involved in the proposed e-commerce system.

All actors in the system can carry out the login sequence by entering the username and password in the login form interface and then pressing the login button. The system will validate the data, and if it is valid, the login object will send a message to create data in the user class. After that, the system will display the main menu page for the actor. The send-message sequence can be carried out by all actors who have entered the system. The actor enters data into the message form displayed on the system interface and then presses the send button. The actor sends the message to the message object, creating data in the message class. The system will display a success message after the sending process is successful. The receptionist and customer actors can carry out the room order input sequence. This process involves filling out the order form on the room booking page, namely entering the number and type of rooms as well as the booking date. The system will store the order data in the order database. The customer actor who has placed the order carries out the proof of payment input sequence. The customer opens the room booking page, selects the payment menu in the booking database to view room booking data, and inputs proof of payment. The receptionist will then update the booking database if the data entered is correct. The receptionist actor carries out the income input sequence. Income comes from orders made by customers offline. The receptionist enters the income input page, fills out the form, and saves the data to the income database for generating income and expenditure reports. The receptionist actor also carries out the expenditure input sequence, which involves expenses from company activities. The receptionist enters the expense input page, fills out the form, and saves the data to the expense database for generating income and expense reports. This entire series of activities creates an integrated system, allowing actors to interact with various functions according to their roles in the company.

Deployment diagrams depict the physical architecture of the hardware and software used in an e-commerce system. There are four main nodes that provide hardware representation, namely the client workstation node, application server node, database server node, and printer node. The main hardware that supports all system processes is the Dell PC, while the LaserJet printer supports printing activities. Software is represented by component symbols, and on client workstation nodes, Google Chrome version 3.1 and Adobe Reader software

are required to support client-side functionality. The application server node requires supporting software, such as an e-commerce system, Google Chrome, XAMPP, and Adobe Reader. The database server node requires supporting software in the form of MySQL to manage and store system data. Meanwhile, at the printer node, supporting software is required in the form of Epson MyPrinter and Epson Scanner to support printing and scanning needs. The interaction and communication between these four nodes are represented by the lines that connect them. The lines initiate connectivity through the company's existing LAN network using TCP/IP protocols. With this deployment diagram, companies can clearly understand the physical structure of the hardware and software required and how the interactions between them occur in running the e-commerce system. The CRUD matrix, which stands for create, read, update, and delete, forms a key instrument in assigning and managing individual user access rights to a developed database. Each operation in this matrix has a specific role in data management: First, the create operation gives system users the right to create new files in the database, allowing them to store new information relevant to the system's needs. Meanwhile, the read operation limits users to the reading function only, allowing them to view the information in the database without allowing changes or deletions of data. Update operations authorize system users to update data that already exists in the database. This allows them to change stored information according to their needs. Finally, the delete operation gives system users full control over deleting data they deem no longer relevant or need to retain. By utilizing a CRUD matrix, the access rights of each user can be clearly regulated, ensuring that they only have access based on their duties and responsibilities. This approach not only improves data security but also optimizes efficiency and regularity in system database management.

After the design stage is complete, the next step in system development is the implementation stage, which consists of two main aspects, namely coding and testing. After designing all the menus and pages needed, the next step is to start programming or coding. First, programmers code the basic functions of the system to ensure primary functionality. In line with the development of system functionality, the team also carries out database creation. Once all functions have been successfully implemented and are running smoothly, the final stage of implementation involves enhancing the system's appearance to make it more attractive and user-friendly. Ensuring a good user experience, a user-friendly interface plays a key role in enabling smooth and effective use of the program. During the testing stage, the team conducts a series of system tests to verify the proper functioning of each previously designed function. This aims to ensure that each function runs correctly and according to expectations. This testing includes testing the functionality, security, and overall performance of the system. If any discrepancies or problems are found in the system, the results of this testing stage will serve as the basis for making adjustments and improvements.

4. Conclusion

Based on the research results, we can conclude that the developed B2C e-commerce system offers numerous significant benefits and features. First, this system makes a positive contribution by providing real-time information to the public regarding hotels, including room availability conditions, and allowing them to easily book rooms online via the web platform without being limited by time or location. The system development process followed the RAD (Rapid Application Development) approach, which included stages from requirements planning, design workshop, to implementation. This system is designed with main features such as customer registration, room reservations, payments, expense input, and the ability to view monthly income and expense reports. Furthermore, this e-commerce system makes it easy for customers to make room reservations while also assisting managers in monitoring the occupancy rate. The visitor list view feature allows managers to see the ratio of the number of customers who have made room reservations to the total number of rooms available at the company. Lastly, this system provides an advantage for managers by providing a menu to view reports on total monthly income and total expenses. This makes it easy to track and analyze the company's financial performance periodically. Thus, it can be concluded that this e-commerce system not only improves the customer experience in booking rooms but also provides an effective tool for managers to manage and monitor overall company performance.

Based on the conclusions produced, there are several suggestions that can become the focus of research for further development. The e-commerce system that has been developed can expand its functionality by developing a mobile application version, which aims to increase system speed and provide easy access to customers, in line with the increasing trend of using mobile applications. This aims to increase system speed and provide easy access to customers, in line with the increasing trend of using mobile applications. Second, design an e-commerce system that integrates with the expedition management system used. Integration between the e-commerce system and the expedition management system will bring efficiency benefits in managing overall business processes, allowing companies to optimize various operational aspects. Finally, it is necessary to provide training to company management regarding the procedures for using this proposed system. This training aims to ensure a good understanding of the system so that management can utilize it optimally. The company

expects that implementing this system well will bring significant benefits. Thus, further research should focus on developing these aspects to enhance the performance and effectiveness of e-commerce systems.

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