

Courier Tracking Management System with Notification Using Barcode Scanner

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ABSTRACT

Efficient parcel management remains a critical operational challenge in institutional environments, particularly in handling high volumes of incoming and outgoing courier items in these environments. At Kolej Universiti Poly-Tech MARA (KUPTM), the existing manual processes for tracking and managing parcels have resulted in inefficiencies, data inconsistencies, and delays in retrieving information. This study proposes the design and development of a Courier Tracking Management System integrated with a barcode scanning mechanism and real-time notification features to enhance operational performance. The system was developed using PHP and JavaScript within the Adobe Dreamweaver environment, enabling a web-based platform for automated data capture, tracking, and user interaction. A structured development approach was adopted, followed by system validation through unit testing and a user evaluation. The findings indicate that the proposed system significantly improves tracking accuracy, reduces processing time, and enhances overall management efficiency, achieving a user-reported success rate of 85%. The integration of barcode scanning and notification functionalities demonstrates practical applicability in streamlining parcel-handling processes within institutional settings. This study contributes to the advancement of digital logistics solutions by providing a cost-effective and scalable model for efficient courier-management.

Keywords: *Courier Tracking Management System, Barcode Scanner, Parcel Tracking, Notification System, Logistics Management*

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1. INTRODUCTION

This study deals with a courier tracking management system. The Courier Tracking Management System is a web-based system that manages incoming and outgoing parcels at Kolej Universiti Poly-Tech MARA (KUPTM). The current practice of parcel management and tracking is carried out manually, which results in an increase in workload and time waste among the administrative staff as the parcels have to be delivered to the respective departments. Furthermore, recipients of the parcels, who are commonly among KUPTM staff and students, also faced difficulties in tracking their parcels as they had to repeatedly check the arrival of the packages at the administration office. Thus, it is believed that KUPTM requires a Courier Tracking Management System to manage ingoing and outgoing parcels effectively and efficiently. The aim of this study is to develop a Courier Tracking Management System for KUPTM to assist the management of parcels among staff and administrators. In this study, the tracking process was automated, and the parcel update collecting status was provided. Moreover, the system will provide a Short Message Service (SMS) notification that will notify users of the arrival of the parcel time without any delay.

The development of users' application uses Spiral Methodology and the programming language used is PHP programming while XAMPP, Apache, MyPHP is used as a server backend and Adobe Dream Weaver serves as IDEs at the development stage. The system is web-based and allows users to access it using their portable devices. The system was found to be successful in improving the efficiency of tracking parcels in KUPTM, with a success rate of 85 percent.

2. RESEARCH PROBLEM

Since online businesses have become one of the top options in business transactions, the number of online shoppers has also increased yearly (Hajli, Shanmugam, Papagiannidis, Zahay, & Richard, 2017; Shuen, 2018). Indirectly, the courier service sector has expanded significantly. Courier companies have become a major necessity for companies that require courier services regularly to deliver parcels from different places (Le & Ukkusuri, 2018; Rai, Verlinde, & Macharis, 2018; Rajendran, Wahab, Ling, & Yun, 2018). Most staff and students of KUPTM also use courier services to deliver their online purchased goods or items and have them delivered to KUPTM because most of them spend more time at the establishment rather than at home, which makes the transitions or process easier for both parties, that is, the courier company and the receiver.

The administration department of KUPTM is responsible for receiving letters and parcels addressed to KUPTM staff and students. However, the administration department's personnel are not responsible for managing personal parcels, as they are only required to handle formal letters and parcels. Most of them feel obliged to receive and handle parcels for other staff members as well. Thus, their workload has increased drastically as they require more time to handle and manage parcels, which at times occupy most of their workspace and disrupt their movements.

Many complaints were made by the receiver, as most of them did not receive any updates from the administration department regarding their parcel's arrival status. The only way for them to find out about the delivered parcel is by regularly checking the status at the administration office, which some find inefficient and cumbersome. Meanwhile, for students, the Student's Council will make an announcement through social media platforms such as Twitter to update them on the arrival of their parcels. However, this has not proven to be efficient, as not all students are active on social media platforms, and they might not have a Twitter account. Moreover, administrative staff also expressed their concerns and discomfort in having to manage staff and students' personal parcels, as at times, these recipients do not collect their packages or parcels at all, which results in the administration office being full of uncollected parcels from staff and students.

3. RELATED WORKS

Reviewing the existing courier tracking process and workflow is fundamental to meet the research objectives. Various technologies have recently been developed and emerged to provide an automatic approach to track, monitor, and manage courier services (Atletiko, 2017; Iwan, Kijewska, & Lemke, 2016). A review of related work shows the advantages and disadvantages of existing systems. The related works selected were the Track and Trace PosLaju System, City-Link Express System, and FedEx Tracking System. These are all related to the proposed system, which is used to track and manage parcels.

Track and Trace PosLaju

Based on Figure 1, PosLaju is the most well-known website that focuses on tracking parcels and provides details about the cost of postage fees (Yusoff, 2014). Users can search for parcels and postcodes, calculate postage fees, and find PosLaju Malaysia outlets. The website has provided some guidelines for the users to use, but the interface looks very simple. As for the functions, everything is functioning well, but it does not provide any updated features that might attract the user to surf the website. In addition, the properties on the website are too direct and not too much information.

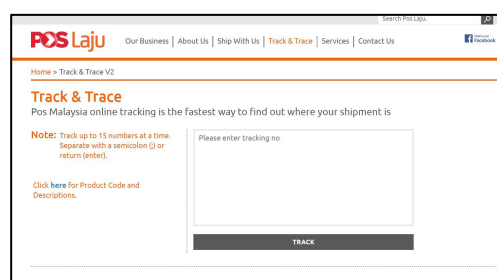


Figure 1. Track and Trace PosLaju Website

City-Link Express

As shown in Figure 2, City-Link is also a website for tracking users' parcels. There are various functions that are well functioning, while the features that are included in the website might be helpful for the page users (Takerngsaksiri, Wakamiya, & Aramaki, 2019). The application provides a user sign-in, which allows users to create their own account on the City-Link website. The website provides various information that the users can obtain, and at the same time, their website does not only focus on the track, but the users can also access the company's details, services, and products. In the tracking space, they also provide instructions to key in the number tracking, so it is good for users to track their parcels without much difficulty and hassle.



Figure 2. City-Link Express Website

FedEx Tracking

Based on Figure 3, the FedEx website does not only focus on tracking parcels but also provides a lot of information that users can search, such as shipping, tracking, services, and location (Bhardwaj & Momaya, 2006). FedEx also provides a database in which users can have their own accounts. The system interface is user-friendly and easy to comprehend. It also uses good graphics in terms of the picture, and the combination of colors used is well-suited. FedEx also provides instructions on how to enter the tracking number, and it can also track the other way round, such as by using the track reference, TCN, and by providing proof of delivery. This is useful because they have a backup if the users do not remember their tracking number.



Figure 3. FedEx Tracking

4. METHODOLOGY

The system was developed using the Spiral Model. The spiral model (Figure 4) has four phases: identification, development, evolution, and risk analysis. A software project repeatedly passes through these phases. In the baseline spiral, starting in the planning phase, requirements are gathered and risks are assessed. Each subsequent spiral builds upon the baseline spiral. The benefit of the spiral model is the high amount of risk analysis; hence, the avoidance of risk is enhanced. It is also suitable for large and mission-critical projects. The spiral model also includes approval and documentation control. The last benefit is that software is produced early in the software life cycle, and additional functionality can be added later.

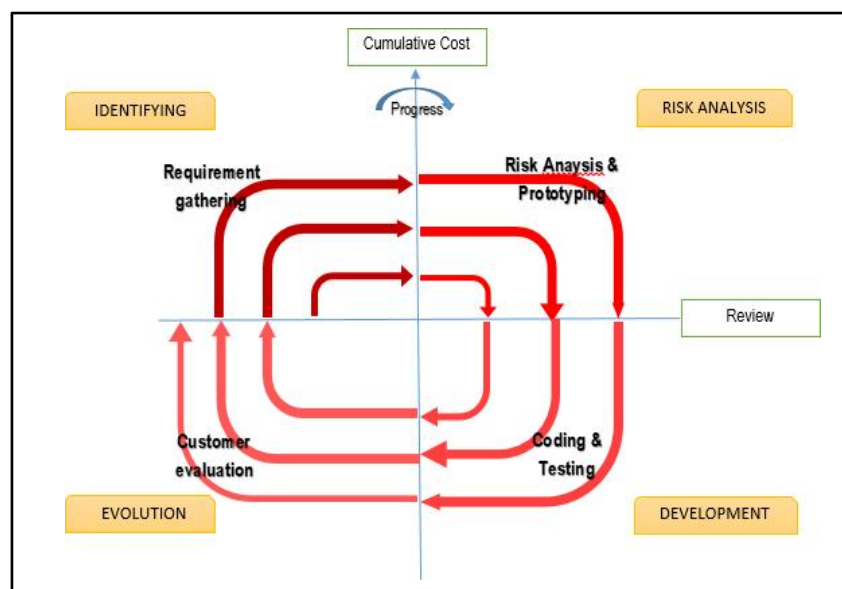


Figure 4. Spiral Model

The programming language used for the implementation included PHP programming, which was employed for the development of the users' application. XAMPP, Apache, and MyPHP were used as server backends, and Adobe Dream Weaver served as IDEs at the development stage.

5. THE PROPOSED SYSTEM

The proposed system eliminates all manual work by providing useful functionalities that do not exist in the current practice. The scope of this project is to facilitate users in managing and tracing parcels that arrive at KUPTM. Figure 5 shows a flowchart of the proposed system. The proposed system focuses on tracking parcels using a barcode scanner that provides an SMS notification as an acknowledgement of arrival. Admin will add barcode number and phone number to the system for new arrival parcel. The system then automatically sends an SMS notification to the parcel's receiver. First-time users must register using the link provided in the SMS notification. A QR Code will be sent via email for parcel collection.

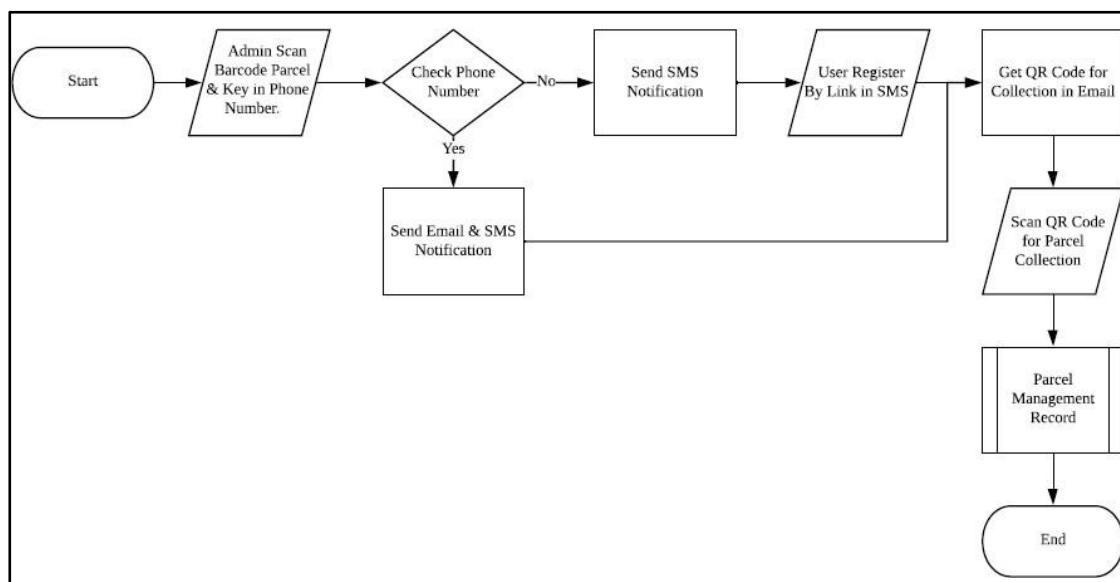


Figure 5. Flow Chart Diagram

Figure 6 shows the main page of the user. The main feature of the main page is that the user can track and trace their parcel. They need to use a barcode scanner to read the tracking number or manually enter the tracking number into the text box and click the submit button. Users can go to other pages by clicking on the Location & Contact or FAQ button.

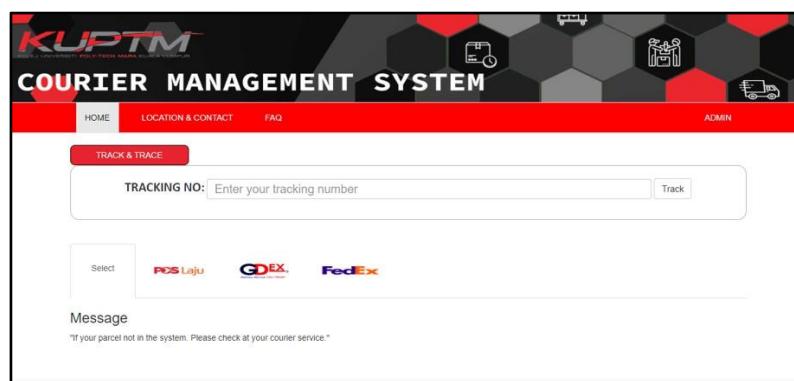


Figure 6. Main Page

The security administration page has an authentication password and username to log into the system. This ensures that only authorized personnel can access and control the system. The Administration main page provides a search engine for administrators to trace parcels using a tracking number. Figure 7 shows the Main Page for the system administrator.

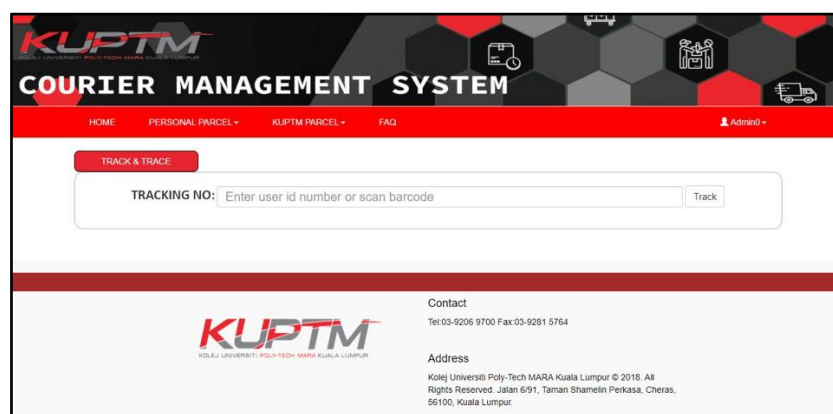


Figure 7. Admin Main Page

The System Administrator can insert new received parcel using barcode scanner in Add New Parcel Page as shown in Figure 8. The system Administrator must enter all the data provided in the form. The system automatically sends notifications via SMS to the phone number entered.

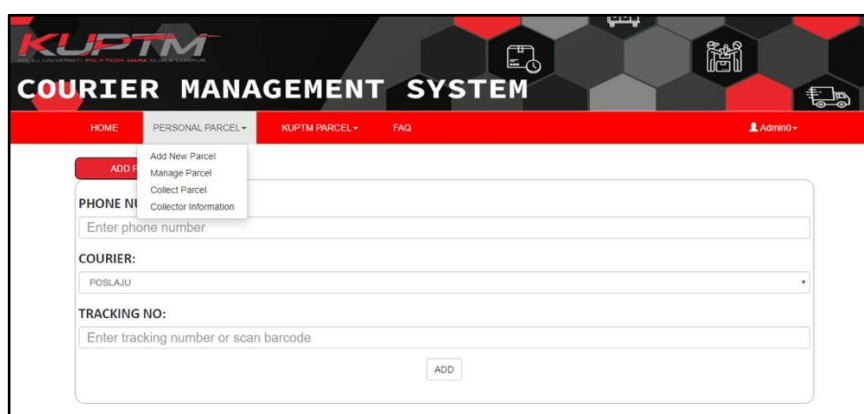


Figure 8. Add New Parcel Page

The Manage Parcel's Page provides a search and filter mechanism that can list data according to status. The system administrator can update or delete the information by clicking the action at the right of the table, as shown in Figure 9.

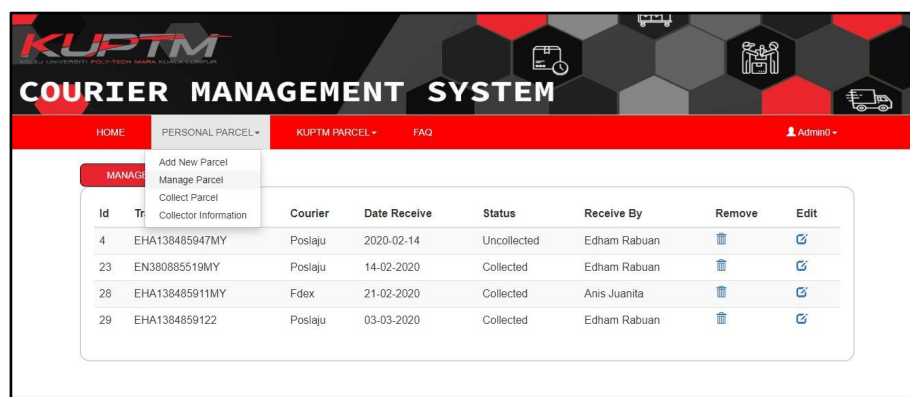


Figure 9. Manage Parcel Page

6. CONCLUSION AND RECOMMENDATION

The KUPTM Courier Tracking Management System has already been developed as an official system that can benefit students and academic and non-academic staff by facilitating the business process. We believe that the administrative staff can manage their work easily without wasting time getting their parcels. In addition, this study established every single phase of the system efficiently within the given time. However, several improvements can be made for further development.

6.1. It can be integrated with existing systems.

The KUPTM Courier Tracking Management System can be integrated with the existing Campus Management System (CMS) to provide an existing database of students and staff.

6.2. Provide verified notifications or security.

Providing a secured pin number can ensure that only the right recipient collects the parcel. The system automatically generates a pin number, which the parcel recipient receives the pin number through SMS.

6.3. Upgrade to mobile application version.

Mobile applications will be more efficient since the emergence of mobile application technology has become a bridge to communication and expanded profit in more business industries.

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