Initial stage in developing an online car rental system (OCRS) using customization business model

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Abstract. Online Car Rental System (OCRS) is a prototype of a car booking website where customers can make car booking process via online. OCRS is developed by utilizing customization business model and provides add-on facilities to the customers. It is proposed as an alternative for the community to make car rental. The development is done based on the case study at a brick-and-mortar car rental outlet AMCT Enterprise. In parallel to the business expansion plan, the company faced challenges to manage car booking process. Increasing number of booking has made manual booking process no longer efficient. AMCT needs a computerized database system to manage booking data and online technology to reach a wider customer base. This prototype system is derived from the development process conducted by adapting the Waterfall Model of the SDLC. The methodology comprises of six sequential steps which are planning, analysis, design, development, testing and evaluation as well as the documentation phase. Test plan and questionnaire was designed for collecting evaluation data from targeted users and experts in order to assess the system functionality and usability. It is hoped that OCRS will enhance the flow of current business process for the customers and the organization.

1. Introduction
Car rental is one of the popular services all over the world. It complements cab service as well as newly introduced e-hailing service. There are many car rental providers online. Brick-and-mortar car rental providers however still exist to reach different market segments. Some of these providers are using social media such as Facebook, Instagram and Twitter to promote their car rental service. This is to facilitate customers to get related information regarding services offered by the organizations.

Generally, car booking for rental is done via two common methods which are phone calls or walk-in to the physical office. The risk of customers receiving wrong information or waiting too long for response are still high because there is no proper system used. Furthermore, the customer has no opportunity to view the list of available cars at a particular time. Since any sort of data retrieval will only take place via phone or visiting the office, customers could not get any timely information as needed due to lack of communication tools provided. The customers may also need to fill the same booking agreement form many times, prepare related photocopy documents such as driving license for each booking and wait for the booking status to be approved and informed. This process promotes hassle to the customer.
Sometimes, the staff responsible to handle car booking need more time to go through their records to look for which car that is available, record the booking details in a booking log book and transfer the entire required documents into customers’ file. This repetitive task of having manually to key-in the data by the staff makes the time consumed to perform another productive task disturbed. Handling booking process this way may lead to many possibilities of individual errors like wrong entry of pickup and return details. Since the entire booking particulars are recorded manually, chances of misrecording important information may happen. The booking agreement forms are stored in files and are kept physically in the file cabinet. Growing number of booking implies to the size of storage. In long term performance, file cabinets will consume office spaces and contribute to storage problem.

Hence, a system to provide a specific platform for customers and AMCT Enterprise to conduct booking process and communicate is proposed. Customers can just remain wherever they are, browse car list, pick any available car, provide personal information including booking detail and arrange for pickup to get a car. It is similar to booking other facility such as hotels via online which allow customers to create an account in order to make a frequent ordering convenient. In short, the online system provides and supports the customers for reservations, assist management in knowing rental car inventory at a specified time, process transactions between car rental branches, and transportation transaction processing which provides satisfactory service to customers and support the organization’s operational processes (Aini, Nur, & Waspodo, 2011). The online system may also help the company in reaching a wider customer base.

2. Literature Study

2.1. Components of a Booking System

Based on a research conducted by Germaine (2015), there are three main components needed in a booking system namely Search Engine, Result and Booking Validation. The first step is collecting basic information so that the system can propose car options the customers will explore and evaluate. This searching phase needs to be quick and easy and requiring little investment of time. In the next step, the system should show the matching search criteria results. Lastly, securing customers booking by reassuring them, the last chance to double check that everything is in order before making a financial commitment. Nishant, Rahul, & Kumar Kar (2015), validates the three components of a booking system and suggests more components to enhance customer experience such as omni channel, social media-optimized, utilize location-based and real-time technologies. Table 1 shows the components proposed by the previous researchers.

| Components                        | Germaine (2015) | Nishant et al., (2015) |
|-----------------------------------|-----------------|------------------------|
| Search Engine                     | /               | /                      |
| Match Results of Search           | /               | /                      |
| Booking Validation                | /               | /                      |
| Omni Channel                      | X               | /                      |
| Social Media-Optimized            | X               | /                      |
| Utilize Location-Based            | X               | /                      |
| Real-Time Technology              | X               | /                      |

2.2. E-Service and Online Booking Features

E-service can be defined as a service offered to a consumer, over an electronic medium such as the Internet (Kardaras & Karakostas, 2012). Website that offers e-service covers the information search services that are delivered to consumers mainly over the internet. Based on previous study conducted
by Shalina (2017), it usually offers website customization and product description, agreement services and after-sales services. In addition, organizations who offer the e-service also must include online reviews to gain trustworthy and loyalty from customers (Sparks & Browning, 2011). All the attributes of e-service as shown in Table 2, will enhance customers’ valuation of product offerings, increase customer retailer relationships and ensure customer satisfaction (Lee, Lee, & Lee, 2012) and the product’s perceived value. Based on Simon (2016), he suggested 10 Must-Have Features of an online booking system meanwhile Pranoti (2017), stated that there are 14 features of a powerful car rental website features. After reviewing all the features, all the common features are shown in Table 2.

| Table 2. Comparison Features of E-Service and Online Booking |
|---------------------------------------------------------------|
| Component                                      | Simon (2016) | Pranoti (2017) | Shalina (2017) |
| Real-Time & Easy Booking                        | /            | /              | X              |
| Visual Calendar                                | /            | X              | X              |
| Beautiful Image Gallery                         | /            | X              | X              |
| Currency and Language Settings                  | /            | X              | X              |
| PayPal Payment Options                          | /            | X              | X              |
| Credit Card Storage Options                     | /            | X              | X              |
| Appealing ‘Book Now’ Button                     | /            | X              | X              |
| Social Media Integration                        | /            | /              | /              |
| Online Support and Phone Support                | /            | X              | X              |
| Access to the Cloud                             | /            | X              | X              |
| Flexible Plans                                 | X            | /              | X              |
| Mobile Ready                                    | X            | /              | X              |
| Recommendation and User Feedback               | X            | /              | X              |
| Quick and Secure Online Payments                | X            | /              | X              |
| Localization                                   | X            | /              | X              |
| Flexible Quotation System                       | X            | /              | X              |
| Communication and Update                        | X            | /              | /              |
| The FAQ section                                | X            | /              | X              |
| User Role Management                            | X            | /              | X              |
| Grouping and Tracking                           | X            | /              | X              |
| Member Profiles                                 | X            | /              | X              |
| Website Analytics                               | X            | /              | X              |
| Product Description                             | X            | X              | /              |
| Agreement Services                              | X            | X              | /              |
| After-Sales Services                            | X            | X              | /              |
| Search Engine                                   | X            | X              | /              |
| Product Customization                           | X            | X              | /              |
| Online Registration                             | X            | X              | /              |
| E-Catalogue                                     | X            | X              | /              |
| Customer Purchase History                       | X            | X              | /              |
| How-To Section                                  | X            | X              | /              |
| Shopping Cart                                   | X            | X              | /              |
2.3. Related Existing Systems
The purpose of analysing similar existing systems is to gather information that is potentially useful for the development process. There are many types of system which are similar to OCRS that has been established by various developers. The similar existing systems that have been reviewed and analyzed are KlezCar, Green Matrix CarRental (GMCR), Paradise Rent a Car and Easy Rent Car. Table 3 shows findings from this analysis.

| E-Service Features                  | Availability in Similar Existing System |
|-------------------------------------|-----------------------------------------|
|                                     | KLezCar       | GMCR       | Paradise Cars | EasyRent Car |
| Real-Time & Easy Booking            | /             | /          | /             | /            |
| Visual Calendar                     | /             | /          | /             | /            |
| Beautiful Image Gallery             | /             | /          | /             | /            |
| PayPal Payment Options              | X             | X          | X             | /            |
| Appealing ‘Book Now’ Button        | /             | /          | /             | /            |
| Social Media Integration            | X             | X          | X             | /            |
| Online Support and Phone Support    | /             | /          | /             | /            |
| Recommendations and User Feedback   | /             | /          | /             | /            |
| Quick and Secure Online Payments    | /             | /          | /             | /            |
| Flexible Quotation System           | /             | /          | /             | X            |
| Communication and Update            | /             | /          | /             | /            |
| The FAQ section                     | /             | /          | /             | /            |
| Member Profiles                     | /             | /          | /             | /            |
| Product Description                 | /             | /          | /             | /            |
| Agreement Services                  | /             | /          | /             | /            |
| Search Engine                       | /             | /          | /             | /            |
| Online Registration                 | /             | /          | /             | /            |
| E-Catalogue                         | /             | /          | /             | /            |
| Customer Purchase History           | /             | /          | X             | X            |
| How-To Section                      | /             | X          | X             | /            |
| Shopping Cart                       | /             | /          | /             | /            |

2.4. Customization Business Model
Customization Business Model is chosen to differentiate a system to previous related project and gain customers’ loyalty (Bock, Mangus, & Folse, 2016). Gilmore & Pine (1997) as cited by (Mart, 2007) explained that adaptive customization offers a standard product that can be customized by the customers themselves, without any direct interaction with the company. In short, all the process is done by the potential customers to enhance customers experience when using the system. Customization works well as the customers know best what their goals and needs are. This approach is simple-to-use, easy-to-find, and easily edited, with both a clear intent and benefit to users.

Based on a preliminary study conducted on 72 respondents, mostly would like to have add-on extras if they were given the chances. 60% respondents would like to have GPS in the car, 27.1% customers want SLI Insurances and 11.4% would like to have DVD Player. Meanwhile, 34.3% of respondents agreed that the car only is sufficient. Figure 1 illustrates findings gathered from the study.
3. Methodology
In this section, the phases in the methodology used, which is the adapted Waterfall Model, will be discussed. To develop the prototype of OCRS, there are several steps that should be followed sequentially. The phases include problem assessment, execute project plan, evaluate project, and project documentation. Table 4 outlines project methodology for the project execution.

| PHASES                  | ACTIVITIES                       | TECHNIQUE                        | DELIVERABLE                                |
|-------------------------|----------------------------------|----------------------------------|--------------------------------------------|
| **PROBLEM ASSESSMENT**  | Identify Current Business Process Flow | Observation                      | Business Process Flow Chart & Problem Statement |
|                         | Distributing Online Questionnaire | Questionnaire                    | Analyzed Results to support Problem Statement |
|                         | Conduct Interview                | Interview                        |                                            |
|                         | Write Report                     | Microsoft Word                   | Chapter 1                                   |
| **EXECUTE PROJECT PLAN**|                                  |                                  |                                            |
|                         | Compare Similar Features of Existing System | Researching Features Used by Existing System | Features to be Included in the Proposed System |
|                         | Identify Suitable System Development Model | Researching Suitable System Development Model | Adapted Waterfall Model Model |
|                         | Find Suitable Theory             | Researching                      | Customization                              |
|                         | Write Report                     | Suitable Theory                  | Business Model                              |
|                         | Identify User Requirement        | Microsoft Word                  | Chapter 2                                   |
|                         |                                  | Interview                        | User Requirement                            |
| **DESIGN**              | Design Process Flow Diagram      | Draw.io                          | Process Flow Diagram                        |
|                         | Design Context Diagram           | Context Diagram                  |                                            |

Figure 1. Add-On Facilities

If you are given opportunity to add on, what are the type of facilities you may require?

| Facility                        | Number of Responses | Percentage |
|---------------------------------|---------------------|------------|
| GPS                             | 42                  | 58.3%      |
| Baby seat                       | 9                   | 12.5%      |
| DVD player                      | 19                  | 25.4%      |
| SLI insurance                   | 7                   | 9.7%       |
| Bluetooth singing               | 25                  | 34.7%      |
| No thanks, Just...              | 1                   | 1.4%       |
| Car charging port               | 1                   | 1.4%       |
| phone holder for                | 1                   | 1.4%       |

Table 4. Summary of the Project Methodology
3.1. Problem Assessment

This section is to identify and understand the current business process, problem faced by the customers and requirement related to car booking process at AMCT Enterprise. An observation is made, and preliminary survey was conducted among AMCT’s staff and online questionnaire was distributed to the customers to strengthen the observation results. The following discussions present findings gathered from the survey. Figure 2 and Figure 3 depict the acquired results. 65 respondents (91.1%) agreed on having a website that will allow them to perform car booking process via online.

![Pie Chart](image_url)

**Figure 2.** The Need for an Online Car Rental System
Respondents are allowed to choose more than one answer for this question. It seems that 80.6% of customers believe that it would be easier to get car for rental information via a website while 37.5% of the customers answered they have difficulties to book a car for rental with the current booking system. 26.8% respondent also answered that they had to fill in the same form of agreement repeatedly.

3.2. Execute Project Plan
In this phase, an analysis was conducted to gain more information regarding the online car booking and other related issues. User requirements has been gathered by conducting interviews, observation and distributing questionnaires to the AMCT and potential customers. The analysis activities consist of comparing similar features of existing system, identifying suitable system development model and researching suitable theory to be implemented in the proposed system.

In the design activity, a Process Flow Diagram, Context Diagram, Data Flow Diagram, Entity Relationship Diagram, Site Map and User interface has been designed. Next, is the implementation activity. In this activity, the system has been put into action and the final product has been developed based on the collected user requirements. Figure 4 illustrates the Entity Relationship Diagram and Figure 5 shows a screenshot of OCRS main page.
3.3. Evaluate Project

Testing activities involves testing the usability and functionality of the proposed solution or system. Test Plan as shown in Table 5 was used in System Testing for the developer and tester to identify any defects of the developed system. After that, a system demonstration was conducted among randomly selected users and they have answered a questionnaire in the User Testing activity.

Table 5. Test Plan Sample

| Behaviour Description | Comment | Developer Date: | Tester Date: |
|-----------------------|---------|----------------|-------------|
| Click ‘Register’ button | Register to OCRS |               |             |
| Click ‘Login’ button | Login to OCRS |               |             |
| Click ‘Profile’ button | Display Customer dashboard |               |             |
| Click ‘Submit’ button | Display updated customer information |               |             |
| Click ‘Car List’ button | Display list of registered cars in the system |               |             |
| Click the car name | Display car details |               |             |
| Insert rental information | Display total charge and ‘Book Now’ button |               |             |
| Click ‘Book Now’ button | Selected car with rental information added into the cart |               |             |
| Click ‘Add-on Facilities button | Selected add-on facilities added into the cart and display total price, and display ‘Confirm’ button |               |             |
| Click ‘Login’ button | Display payment page |               |             |
| Click ‘Submit’ button | Display payment status |               |             |
| Click ‘My Booking’ button | Display booking status and history of booking |               |             |
| Click ‘Upload’ | Upload and store photo to the database |               |             |
| Click ‘Logout’ button | End |               |             |
3.4. Documentation
This last phase where a full report of the project is produced by refining and compiling all the chapters. The purpose of documentation phase is to update any changes on the original documentation.

4. Conclusion and Future Works
This system is proposed to assist users to perform car booking process. It also aims to help AMCT Enterprise to manage all their customers’ personal information and booking properly in a computerized database. To fulfil customers’ satisfaction, they are equipped with customization features in the system which provides the ability to use add-on facilities. It is hoped that the development of the system will fulfil all the requirements outlined by the stakeholders and will be executed successfully in terms of the functionality and usability.

User evaluation was conducted to gauge users’ feedback for 7 constructs which are perceived usefulness, design, satisfaction, perceived ease of use, navigation, system capability and customization. 30 respondents have been randomly selected to evaluate OCRS. A set of questionnaire is used as an instrument to collect findings. Likert scale of 1-5 where 1 is for strongly disagree and 5 for strongly agree is used as measure. Table 6 summarizes feedback regarding customization construct. As all means are above 4 it can be concluded that OCRS has provided customization features that can satisfy the respondents.

| Table 6. Customization Features Usability Result |
|-----------------------------------------------|
| Item | Question | Mode | Mean  | SD   |
|------|----------|------|-------|------|
| G1   | I can choose various type of payment methods. | 5    | 4.24  | 0.73 |
| G2   | I can choose any add-on facilities provided in the system. | 4    | 4.17  | 0.74 |
| G3   | I can change the site's colour to my preferences. | 5    | 4.05  | 0.86 |
| G4   | I can choose any available car easily with several clicks. | 4    | 4.07  | 0.75 |
| G5   | Overall, I'm satisfied with the customization features provided in the system. | 5    | 4.15  | 0.79 |

References
[1] Aini Q, Nur S, and Waspodo B 2011. Development of car rental management information system. Proc. of The 1st Int. Conf. on Information Systems for Business Competitiveness Development, pp. 101–105.
[2] Bock DE, Mangus SM and Folse JAG 2016. The road to customer loyalty paved with service customization. Journal of Business Research, 69(10), pp. 3923–3932
[3] Germaine S 2015. The essentials of designing hotel reservation interfaces. Retrieved from https://speckyboy.com/the-essentials-of-designing-hotel-reservation-interfaces/
[4] Kardaras D and Karakostas B 2012. Services customization using web technologies. Business Science Reference. https://doi.org/10.4018/978-1-4666-1604-2
[5] Lee J, Lee Y and Lee Y J 2012. Do customization programs of e-commerce companies lead to better relationship with consumers? Electronic Commerce Research and Applications, 11(3), pp. 262–274.
[6] Marti M 2007. Complexity management: Optimizing product architecture of industrial products. Complexity Management: Optimizing Product Architecture of Industrial Products, (3352), pp. 1–248.
[7] Nishant KS, Rahul S, and Kumar Kar S 2015. The “Retailification” of the Car Rental Industry.

[8] Pranoti P 2017. 14 Powerful features of a car rental website. Retrieved from https://wisdmlabs.com/blog/features-car-rental-website/

[9] Shalina I 2017. Merchant and Personal Shopper Agent System (MPSAS).

[10] Simon L 2016. 10 Booking app features for tourism businesses. Retrieved from https://www.rezdy.com/blog/10-booking-app-features-tourism-businesses/

[11] Sparks B and Browning V 2011. The impact of online reviews on hotel booking intentions and perceptions of trust. Tourism Management, 32, 1310–1323. https://doi.org/10.1016/j.tourman.2010.12.011

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