
Design and Development of Customer Preference Management System: A Web-Based App for Managing Customer Preferences

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Abstract: The Covid19 pandemic has forced many micro-businesses to venture into online business. In Malaysia, they used multiple social media platforms, such as Facebook and Instagram, and e-commerce platforms, such as Shopee. Orders are taken via WhatsApp, private messages, and other channels. The multi-ordering media lead to the loss of customers' data for future engagement. Furthermore, due to the unavailability of customer preference records, it is difficult for sellers to market their new products tailored specifically to their previous purchases. Hence, the project aims to design and develop a web-based application for managing customer preferences in a more organized way. The design and development of the system followed the system prototyping methodology. First, the functional and non-functional requirements were gathered through content analysis. Next, a prototype named CPMS was developed. It is hoped that the system can assist micro-businesses in managing customer records, searching the sales history, preferences, and product details, and simultaneously sending messages to frequent customers.

Keywords: Micro-business, customer preference

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1. Introduction

During the Movement Control Order (MCO), small and medium-sized businesses (SMEs), particularly, have started using the digital platform to regulate internal and external value chains, including management tasks, marketing, and promotion. This new platform has frequently resulted in increased productivity and profitability. However, digitalization is not widespread for micro-businesses. Underprivileged Malaysian micro-businesses cannot afford digitalization for many reasons [1]. Hence they have been relying on social media platforms to promote and sell their products [2]. Micro-businesses prefer social media to promote their products as a result of easy and quick access to the platforms[3]

In general, micro-businesses usually use the most economical method to sell their products and communicate effectively with their customer because the local Facebook selling groups does not charge any fees and the profits belong to them. In addition, they will also use Messenger or WhatsApp as their online communication tools to manage customer transactions. For instance, when online shoppers decide to proceed with a purchase, they will immediately contact the seller by Messenger or WhatsApp. However, although using multiple platforms for promoting and ordering brings convenience, it is difficult for the sellers to keep track of orders and manage the customers' data.

Consequently, micro-businesses will lose the chance to keep track of their customers, such as promoting new products. If micro-businesses ignore this problem, they will

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lose the opportunity of converting the first-time customer into a long-term customer. On the other hand, if businesses keep track of stuff purchased by the customers, they can specify the target customers - for example, a customer may be requested for a particular product that was out of stock. Failing to keep this data could cost potential customers when they replenish the supply. It is because the sellers cannot remember each customer's preference. In addition, due to the unavailability of customer preference records, micro-businesses could not plan well on replenishing certain products with more demand. The unorganized records in the Messenger and WhatsApp conversations, as well as social media private messages, will cause unnecessary difficulty to the sellers. The problem must be solved to sustain their business.

Hence, we proposed a Customer Preference Management System (CPMS) to tackle the problem. It is because a computerized system is essential for the business. The primary administrative task of holding customer records will bring dividends to the company's performance [4]. Realizing who the buyers are, the frequency of transactions and the contact information will be beneficial in sales, customer service, and product analysis and keep the company focused on customers [4]. Finally, it seems to be helpful for micro-businesses where customer preferences are critical. So, collecting customer preferences is an essential marketing technique that can be used to sustain a business.

The system provides a platform for searching for specific products to determine who purchased them. Thus, it is much easier to check the records through the system than to review the records manually. In addition, the seller can make their decision based on customer preferences. In this way, they can replenish the stock of the product depending on the colour that most customers prefer. This is because the micro-businesses can search it out through the system and make decisions quickly. Hence, it is more convenient to use the system.

2. Related Works

As a marketing medium, social media plays an ever more critical role. Growing retailers were using social media to reach teenagers and young adults, and social networking sites were crucial in that trend [5]. Online shopping is a phenomenon nowadays and significantly affects buyers and sellers [6]. Past studies also indicated that low-income communities used social networking actively [7]. Many of them are using doing their business on the Internet via Facebook [8], contributing to the numerous micro-businesses [9]. Social media's attributes apply to all businesses, from large multinational corporations to micro-businesses [10].

According to [11], most micro-businesses are often run from homes. They employed various ordering techniques (i.e. via customized forms on their blog; via private messages - SMS, social media, WhatsApp, email; via comment sections etc.). Various delivery techniques are used. It might be delivered personally (cash on delivery) or via mail. Some

sellers specify a particular day for shipping and update the tracking number across various platforms. Some sellers send private messages by SMS, WhatsApp, email, or social media to update the tracking number. Customers can reach them through SMS, WhatsApp, email, private messages on Facebook or Instagram, and other means of communication. In addition, they also used a variety of payment methods, including cash on delivery, PayPal (a less common choice), and bank/online transfers. They occasionally experience data loss issues using various platforms [10].

Many existing systems could help micro-businesses manage their data—for example, CRM tools like SugarCRM and HubSpot. However, the price range of the system per month was too expensive for micro-businesses. Thus, it might increase their burden. Table 1 lists the price range for those two systems.

Table 1. Price Range for SugarCRM and HubSpot

CRM system name	Price Range	Price Range (in Malaysian Ringgit)
SugarCRM	\$40 - \$150	RM171.16 – RM641.85
HubSpot	£0 - £41	RM0 – RM217.69

*The price range was for every user per month

*The currency in RM was updated by Morningstar for Currency and Coinbase for Cryptocurrency on 25 June 2020, 2:18 am

Based on [12], SugarCRM offers modular, adaptable solutions to ensure the performance of both small and large businesses. SugarCRM was one central dashboard with a simple user interface and even provided a range of services suitable for many sectors [12]. The functionalities of SugarCRM included customer service like handling all customer relationships, complaints and workflow efficiently; sales management and financial services [12].

Further, SugarCRM has provided various plans such as Sugar Professional, Sugar Enterprise and Sugar Ultimate. For Sugar Professional, the system's price was \$40 per month per user. In this plan, the system contains a basic CRM and some idea for growing the small business with a storage of 15GB. As for Sugar Enterprise, the system's price was \$65 per month per user, and the system contains more CRM capabilities and the best value for larger businesses with a storage of 60GB. Meanwhile, Sugar Ultimate provides the most comprehensive capabilities of CRM with \$150 for every user per month. Moreover, it has the highest level of support with a storage of 250GB.

In addition, HubSpot was known as a one-stop platform for organizing customers and was also a good choice for companies that wanted to target specific role groups through sales and marketing activities [12]. The system's functionalities included integrating customer data, customized emails, and primary social media contact and tracking capabilities.

According to [12], HubSpot had provided some plans such as CRM Free, Plus and Enterprise. The system was free to

use for CRM Free and limited to five users. The system also had limited features such as organizing the customer contact insights, gaining insight into each potential customer and monitor transactions only. CRM Plus provides a complete CRM for any size team, and the system's price was £27 for every user per month. Meanwhile, CRM Enterprise is priced at £41 per month per user. In this plan, the system contains a deeply customizable sales CRM for the business. Thus, we could conclude that the more complete the functions, the higher the cost of the system. Hence, a free web-based application platform named Customer Preference Management System (CPMS) was proposed and intended for micro-businesses to organize their customer data more effectively.

3. Methodology

This project has been conducted by adapting System Prototyping [13]. System prototyping performs the analysis, design, and implementation phases concurrently to develop a simplified version of the proposed system and give it to the users for evaluation [13]. There are four basic processes in system prototyping, as illustrated in Figure 1

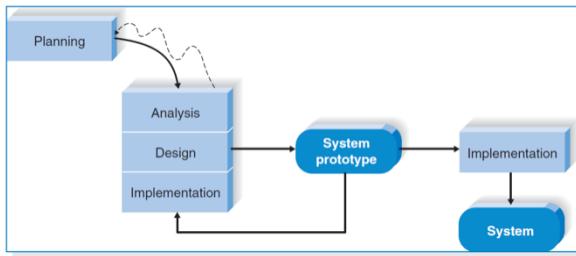


Figure 1. System Prototyping

A. Planning

In this phase, the problems faced by the micro-businesses and the proposed solution were discussed to solve the issues. Moreover, system requirements were also addressed in this phase.

B. Analysis

The requirement of the customer preferences management system was analyzed by conducting a requirement analysis process. The activities involved in this phase identified the functional and non-functional requirements for the system. The requirement was gathered by analyzing the problems faced by the sellers. A use case analysis, process modelling and data modelling were produced in this phase. The design of user interface sketches was also created in this phase.

Table 2 lists twelve essential functional requirements with their priority. The functional requirements include new seller registration, login into the system, updating seller profile, updating staff profile, managing staff information, managing customer information, managing product information, managing customer sales records, managing customer preference, sending email, managing view records and

logout from the system. Meanwhile, Table 3 lists two non-functional requirements, such as the reliability and usability of CPMS.

The requirements from Table 2 were then translated into the computer system's functionality. The next step is the CPMS criteria visualization and modelling. The Unified Modelling Language (UML) was used to represent and model the specifications. There are two diagrams of behaviour: (1) use case and (2) action diagrams. In addition, an entity relationship diagram (ERD) represents the relationships of entity sets stored in the database. The diagrams were drawn using StarUML.

Figure 2 shows the use case diagram and the communications between use cases and the actor. The use case diagram is detailed to illustrate the dynamic behaviour of the CPMS. Meanwhile, the entity relationship diagram in Figure 3 shows all the entities of the CPMS. The interactions between the entity sets are illustrated clearly in the diagram

C. Design and Prototyping

Sublime Text 3 was used to design the interface of the system. Software prototyping is a standard method of showing the product prerequisites so that the users can get further recommendations. The cPanel was used as the web hosting control panel. It can natively sustain CSS, HTML, PHP, and JavaScript. Further, cPanel was used to manage pivotal functions such as storing. Figure 4, 5, and 6 shows some of the interfaces of CPMS.

D. Implementation

The final tasks, such as testing and bug fixes, were conducted in this phase. After the system was uploaded to the server, a usability evaluation of the system was conducted with 30 respondents. The respondents include potential users such as sellers and non-sellers. Due to the conditional movement control order (MCO), all respondents were recruited online.

The respondents were approached randomly by sending an invitation via email or WhatsApp. The instruments used for the evaluation were the CPMS website and a post-task questionnaire.

The questionnaire consisted of 36 questions and was divided into three parts; (1) demographic information, (2) the usability of CPMS and (3) the respondents' feedback. The respondents were asked to follow the assessment procedure: (1) read and understand the information sheet provided, (2) read and sign a consent form via a google form, (3) interact with CPMS and (4) answer the post-task questionnaire. The feedback from the evaluation was used to improve the system.

Table 2. List of Functional Requirements for CPMS

No.	Requirements Description	Priority
1	Registration	
1.1	The new seller shall register an account before login into the system.	Mandatory
2	Login	
2.1	The seller and staff shall select the user type and key in the correct user ID and password before login into the system.	Mandatory
2.2	The seller and staff shall login into the system after verifying the user ID and password.	Mandatory
3	Update seller profile	
3.1	The seller shall update his/her personal information after he/she register the account.	Mandatory
4	Update staff profile	
4.1	The staff shall update his/her personal information after the seller add he/she to the system.	Mandatory
5	Manage staff information	
5.1	The seller shall add staff information into the system.	Mandatory
5.2	The seller shall delete the staff information from the system.	Mandatory
5.3	The seller shall search the staff's information by user ID.	Mandatory
6	Manage customer information	
6.1	The seller and staff shall add, update, delete and search the customer personal detail.	Mandatory
7	Manage product information	
7.1	The seller and staff shall add the product detail.	Mandatory
7.2	The seller and staff shall update the product detail.	Mandatory
7.3	The seller and staff shall delete the product detail.	Mandatory
7.4	The seller and staff shall search the product detail by product's ID.	Mandatory
8	Manage customer sales record	
8.1	The seller and staff shall add the sales record.	Mandatory
8.2	The seller and staff shall update the sales record.	Mandatory
8.3	The seller and staff shall delete the sales record.	Mandatory
8.4	The seller and staff shall search the sales record by customer's ID or sales' ID.	Mandatory
9	Manage customer preference	
9.1	The seller and staff shall add the customer preference.	Mandatory
9.2	The seller and staff shall update the customer preference.	Mandatory
9.3	The seller and staff shall delete the customer preference.	Mandatory
9.4	The seller and staff shall search the customer preference by customer's ID.	Mandatory
10	Send Email	
10.1	The seller and staff shall send email to a customer or all customers.	Mandatory
11	Manage view record	
11.1	The seller shall view all staff information.	Mandatory
11.2	The seller and staff shall view the customers and product information.	Mandatory
11.3	The seller and staff shall view the customer sales record.	Mandatory
11.4	The seller and staff shall view the customer preference.	Mandatory
12	Logout	
12.1	The seller and staff shall log out the system	Mandatory

Table 3. List of Non-Functional Requirements for CPMS

No.	Requirements Description	Priority
1	Reliability	
1.1	The system should crash no more than once per half an hour.	Desirable
1.2	If the system crash, it must behave perfectly normal when reloaded again.	Mandatory
2	Usability	
2.1	The seller and staff must able to use the system easily.	Mandatory
2.2	The seller and staff must able to manage their information easily.	Mandatory

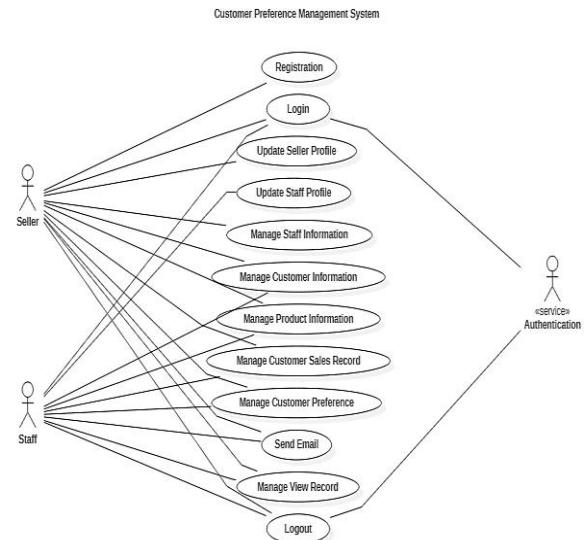


Figure 2. Use Case Diagram for CPMS

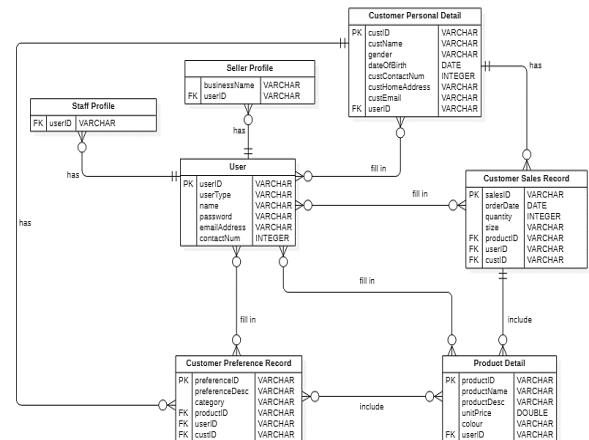


Figure 3. ER Diagram for CPMS

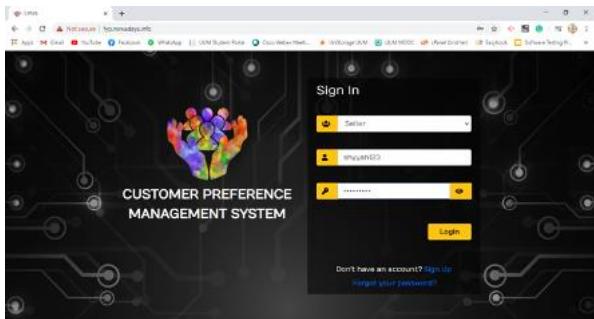


Figure 4. The interface for login

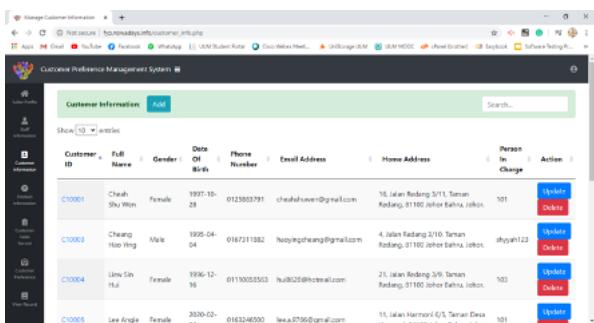


Figure 5. The main interface of CPMS – Seller Profile

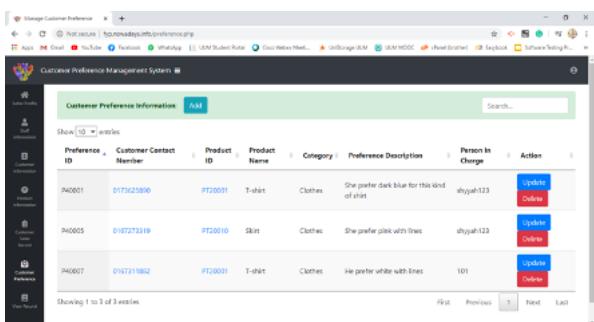


Figure 6. The interface for managing customer preference information

5. Findings

Based on the data collected, 50% were categorized as a student, 10% were categorized as the private sector, 6.67% were categorized as seller, and 33.33% were categorized as other respondents (30% were students and part-time sellers, 3.33% was a housewife). Furthermore, most respondents had not done any part-time online business, which is 60%. On the other hand, 40% of the respondents had done part-time online business, and most were students.

Most of the respondents were female, 73.33%, followed by the male respondent, 26.67%. The majority of respondents were in the age range between 21 to 25 years old, which is 76.67%. 16.67% were in the age range between 26 to 35 years old. Only 3.33% were in the age range between 16 to 20 years old and over 46 years old, respectively.

100% of respondents used the Internet every day. Meanwhile, 60% of the respondents accessed 4 to 10

websites daily. However, 13.33% of them had accessed less than four websites per day, 11 to 20 websites per day and more than 21 websites per day, respectively.

In addition, 96.67% of the respondents agreed that keeping the information in the computerized system was much needed for an online seller. Regarding the awareness of the Customer Preference Management System (CPMS), 40% of the respondents had heard about the CPMS, 46.67% had not heard about the system, and the rest were unsure whether they had heard about it the system or not. Apart from this, 96.67% of the respondents indicated that if they are online sellers, they agreed that the CPMS was needed for keeping the data about their employees, and only 3.33% disagreed. All respondents (100%) also agreed that the CPMS was required to retain their customers' data

The questionnaires also measure the respondents' perception regarding the usefulness and ease of use of CPMS. It has also assessed the satisfaction of the respondents towards CPMS. More than 90% of the respondents rated three, four or five of the post-task scales for the three aspects of usability—only a few rated one and two.

The evaluation results have shown that CPMS is useful and easy to use. Most respondents (92.9%) indicated that they were satisfied with the ease of completing the task overall. Besides, most respondents (93.3%) agreed that CPMS made it easier to search the data because the table would display the data according to the keyword they inserted. So, this would save more time when searching for particular product details or customer preference information.

Furthermore, almost all respondents (96.6%) agreed that CPMS was easy to learn and use without following the instructions given because the system's features were easy to understand, and they could easily remember how to use the CPMS. They would also like to recommend the CPMS to their friends (96.7%).

However, some respondents encountered some problems, like the requirements of the password being too complicated and the Wi-Fi problem making the page loading slow. In addition, only one respondent could not use CPMS successfully every time because they could not save the data for the customer preference part after trying 4 to 5 times. The bugs were fixed after the evaluation.

6. Conclusion

This paper depicted the design and development of a web-based application for helping micro-businesses to manage customer data in a more organized way. Based on the respondents' data, most respondents were satisfied with the functions of CPMS and recognized that the CPMS could help them keep the information as a future reference when deciding on new products. However, some respondents indicated that CPMS confused them when they saved more detailed sales information. A few of them also reported that CPMS could be more visually attractive. Nevertheless, they were still satisfied with the CPMS overall.

Moreover, some respondents would also prefer to know

the information such as the product picture, total sales per record and more detailed staff information like a home address and bank account. Hence, in future work, we would add detailed information according to the seller's needs, improve the system's interface and provide a statistical service (i.e. the system will automatically count the most popular products that most customers prefer). So this would make it easier for the seller to obtain detailed information faster than manually checking it.

This study is expected to provide solutions regarding customer relationship management for micro-businesses. Furthermore, it is hoped that this study contributed to the initial ideas of helping micro-businesses by designing or improving the current micro-businesses commerce implementation.

7. Acknowledgements

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