

## Dynamic Bookstore Self-Ordering Kiosk System

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### Abstract

Kiosks are becoming increasingly popular in various industries because they allow customers to order for themselves and streamline business operations. This project explored the benefits of implementing kiosk systems in a bookstore to increase efficiency, improve the customer experience, and reduce operating costs. The goal of the kiosk system is to develop a self-order kiosk that allows customers to browse, purchase, and check out books without the assistance of an employee. This project used some materials such as a touch screen display, a computer system, a kiosk system website, an inventory management system, and a database management system. This project is targeted at all customers of Dynamic Bookstore for the system evaluation. The study used the waterfall model methodology to guide the development of this project. The implementation test result found that customers can search for items faster using a kiosk system. The online survey feedback study on customers found that 100% of respondents' perception of purchasing options shows that most customers prefer Dynamic Bookstores' self-ordering kiosk system. The results also indicate that efficiency, ease of use, time savings, and speed of browsing result in numerous customers using the kiosk system is noticeable. Future improvements include the implementation of popular mobile payment systems such as Online Banking, Touch n Go, Credit payments, Apple Pay and Google Pay should be included to meet the increasing desire for digital payment methods and increase customer satisfaction. In summary, implementing a kiosk system in a large bookstore holds tremendous potential for improving the customer experience, simplifying operations, and achieving cost savings, according to the results of the project testing.

## 1. Introduction

A self-ordering kiosk technology enables users to obtain information or finish purchasing without requiring human involvement. A kiosk system is an interactive self-ordering system that allows users to browse and order the items they need, saving time using a kiosk system. They are widely used to improve customer satisfaction and efficiency. A kiosk system can give customers a quick and easy option to purchase things. More people are turning to self-ordering devices such as kiosks for simpler and quicker purchases.

The advantages of the kiosk system are ease of use, increased customisation, and reduced waiting time [1]. Touchscreen technologies can be used in kiosk systems to allow for user engagement. Because of the increasing use of technology that allows for self-ordering, kiosk systems have become an essential part of modern customer service. The primary goal of a self-ordering kiosk is to enable users to complete a variety of daily chores without the assistance of a committed individual.

The rise of self-ordering kiosks in Malaysia has become common, but some large bookstores still lack this system. This absence means customers cannot easily search for and purchase books independently, leading to longer wait times at checkout and for staff assistance. This reliance on staff alone can further contribute to delays. In contrast, having a self-ordering system allows customers to independently search for items, check availability, and place orders, improving their overall experience. Without kiosks, customers may become frustrated and dissatisfied, potentially choosing to shop elsewhere. Implementing a kiosk system in large bookstores can streamline the checkout process, reduce wait times, and enhance efficiency, ultimately providing customers with a seamless and satisfying shopping experience.

The project's theme is to provide a convenient and efficient way for customers to purchase items while improving the overall shopping experience. It is assumed that the kiosk system will be deployed in a physical bookstore or a retail environment. The scope may also include the development of a mobile app that allows customers to access the kiosk's features and services from their mobile devices. In the future, implementing popular mobile payment systems such as Apple Pay or Google Pay payment methods will enhance efficiency.

## 2. Literature Review

The literature review examines the implementation and effectiveness of self-ordering kiosk systems in large bookstores. It explores the benefits and challenges of touch-based kiosks, including their impact on customer satisfaction and the role of backend systems in optimizing functionality. Additionally, the review analyses how these kiosks improve operational efficiency, reduce staff workload, and streamline front-desk tasks. It also considers potential drawbacks such as technical issues and user resistance. By synthesizing previous research, the review informs the methodology and analysis of this study, providing insights for optimizing the customer experience and operational efficiency in large bookstores.

### 2.1 Function, Advantage and Challenge

A self-ordering kiosk system in a large bookstore serves several functions. Firstly, it can display products by category, allowing customers to navigate and find the items they are looking for easily. Secondly, customers can select their preferred options directly from the kiosk system, eliminating the need to browse shelves or wait in queues. Additionally, the kiosk system enables customers to edit their orders, providing flexibility and convenience. Lastly, customers can utilize the search option to quickly find specific books or authors of interest, enhancing the overall purchasing experience. Self-ordering kiosk systems could reduce waiting times, reduce labour costs, improve speed, and raise levels. Also, can integrate knowledge of customer value [1].

In addition, implementing a self-ordering kiosk system in a large bookstore offers numerous advantages. It reduces social friction, minimizes queues, improves accuracy, and enhances customer satisfaction. Customers can self-order, purchase desired books, and complete their purchases efficiently, resulting in shorter waiting times and increased satisfaction. The kiosk system also aids in precise inventory management and provides valuable data for informed decision-making regarding product offerings and marketing strategies. Adopting a self-ordering kiosk system can boost customer happiness, streamline processes, and drive business growth.

While a self-ordering kiosk system offers benefits, it also presents challenges. One challenge is ensuring the availability of knowledgeable and skilled staff to handle kiosk traffic, particularly during peak periods. Properly trained personnel can effectively manage the kiosks, reduce waiting lines, and maximize system efficiency [2]. Additionally, some customers may be technophobes, uncomfortable with technology and dissatisfied with technical limitations.

### 2.2 Customer Perception

Before and after, the services provided will affect the same customer's experiences after purchasing. According to research, customer expectations influence consumer perceptions. Self-ordering kiosk technology has been considered as a useful device for difficulties by providing a different and exciting experience. The element that leads to a different perspective is the characteristics of touch screen ordering kiosks. The significant characteristics of a computer are its interface design, secure system, and performance. Several studies include Taufik and Hanafiah [3], Rastegar [4], and Jeon et al. [5] indicated that perceived usefulness significantly influences consumer perception toward the use of a touch screen ordering kiosk.

## 2.2.1 Customer Perception of Self-Ordering Kiosk Feature Affected by Perceived Usefulness

Perceived usefulness (PU) can be defined as a person's faith that employing a specific technology would improve their performance. It is an important ancient aspect of the usage and adoption of modern technology. Much prior research discovered an excellent connection between perceived value, customer opinion, and desire to use a self-ordering kiosk system [6]. Customers' perceived value is the degree to which they feel self-ordering kiosk system technology will increase service, revealing that perceived usefulness has an important impact on consumer perception of utilizing a self-ordering kiosk system [7]. Previous research showed that perceived usefulness was the greatest driver of attitudes toward self-ordering kiosk systems.

## 2.2.2 Customer Perception of Self-Ordering Kiosk Feature Affected by Perceived Ease of Use

Perceived ease of use (PEOU) is the degree to which someone seems to believe that using a certain system includes minimal effort. It also impacts customers' self-ordering. These precedents of technology user acceptability precedents of technology accessibility that are widely used to measure consumer acceptance and perception. According to a previous study, the ease of use of self-ordering kiosks may impact client usage patterns from the technology acceptance model [8]. PEOU plays an important role in influencing intention to use because when an innovative technology is simple to use, it will increase the likelihood of the users using it [9].

## 2.2.3 Customer Perception of Self-Ordering Kiosk Feature Influenced by Perceived Satisfaction

Perceived Satisfaction (PS) is characterized as users' acceptance of information systems and the amount of satisfaction associated with their use. The perceived utility, convenience of use, and satisfaction are important factors in determining whether to employ a self-ordering kiosk system. Previous studies have discovered that user satisfaction with the self-ordering kiosk system considerably affects their propensity to utilize it again. Customers usually do not like to wait long to receive the service as they tend to become impatient. So, they prefer to use a self-ordering kiosk system [10].

## 2.3 Differences Between a Counter System and a Kiosk System

Table 1 shows the difference between the counter system and kiosk system. There are six features for each comparison we found.

**Table 1** Differences between a counter system and a kiosk system

Features	Counter System	Kiosk System
Human interaction	Customers engage with staff at the physical counter.	Customers communicate.
Personalization	Customers can receive personalized attention along with help from employees.	Customers have a few options for requesting assistance.
Speed	Human interaction may cause delays.	Can be quicker due to self-service capabilities.
Cost	More resources and staff may be needed.	It is possible that fewer personnel and resources will be required.
Customer control	Customers have less control throughout the entire procedure.	Give customers more involvement throughout the process.

## 3. Methodology

The methodology used in this study is waterfall methodology, a phrase used to define the many phases of an IT project's development, from concept through implementation. The waterfall model is the Sequential development model. The approach is separated into six stages, each with its own set of processes. This methodology comprises 6 phases: planning, analysis, design, implementation, testing, and maintenance. Quantitative research is essential for gaining a deeper knowledge of its use in the field [11]. Primary data is acquired from a dynamic kiosk system

user via online Google Forms. All 51 respondents for the survey have represented the users. We conducted one face-to-face questionnaire for Dynamic Bookstore staff. The data for this study was acquired qualitatively from the target users.

### 3.1 Research Process

We use the waterfall model in our methodology method. Waterfall methodology is a typical project management design emphasizing sequential and predictable tasks. The Waterfall approach is straightforward to use, and it may suit the project's requirements. The following are the steps that it takes to develop a kiosk system for a Dynamic bookstore utilizing the waterfall methodology:

#### 3.1.1 Planning

During this phase, we began speculating about the project we wanted to do and how we might build it more effectively and creatively. This stage also identifies barriers and outlines how the system will function. So, we started creating a proposal to generate additional ideas.

#### 3.1.2 Analysis

In achieving the goal, direct interviews using feedback forms were carried out to obtain data from the Dynamic Bookstore staff. We shared a questionnaire with employees to determine whether the system was necessary. The questionnaire included questions such as, "Does this system need to help customers find the things they need?" and "Does this system help to find things easily, faster, and save time?" The following inquiry was whether the technology-assisted personnel in updating stock, improved Dynamic Bookstore's quality, and also the requirements of this system for Dynamic. We collect and analyse ideas or information by conducting face-to-face questionnaires with the staff at Dynamic Bookstore regarding establishing a Self-Ordering Kiosk System. As a result, we use specific tools and software to create flowcharts and entity relationship diagrams.

#### 3.1.3 Design

This system design aids in the specification of hardware and system requirements and establishes the scope of the overall system architecture. The system's design will be simple, with the system to utilize dependent on the information received to accomplish the project's purpose. The system's design, databases, user interfaces, and system interfaces are included. For the Design part, we utilized Canva and Pencil software to generate a basic drawing of the system flow we would create. We designed our system interface with Canva and Pencil software since it is simple to use and access.

Fig. 1 shows the main page of the customer interface on the left side, with the navbar above the interface and the login and register buttons on the right side. Then on the right side, the main page of the admin interface, with the navbar on the left side of the interface and the feature that allows employees to update products, inventory, view order list, view sales report, update category list, update subcategory list, and update settings.

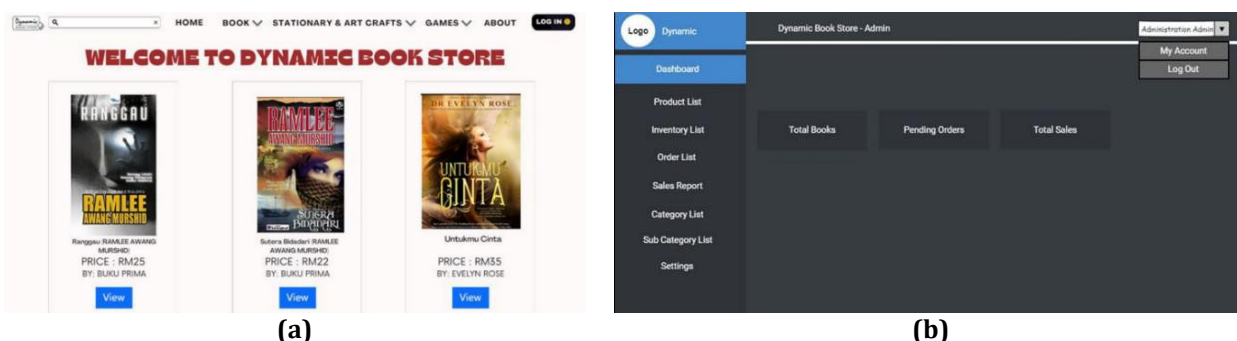


Fig. 1 Sketch of the main page (a) Interface of the users; (b) Interface of the admin

Fig. 2 shows the database tables that were used in the Dynamic Bookstore Kiosk System. We have 11 tables as our entity: cart, categories, clients, inventory, orders, order\_list, products, sales, sub\_categories, system info, and users.

Table	Action	Rows	Type	Collation	Size	Overhead
cart	Browse Structure Search Insert Empty Drop	2	InnoDB	utf8mb4_general_ci	16.0 KiB	-
categories	Browse Structure Search Insert Empty Drop	3	InnoDB	utf8mb4_general_ci	16.0 KiB	-
clients	Browse Structure Search Insert Empty Drop	6	InnoDB	utf8mb4_general_ci	16.0 KiB	-
inventory	Browse Structure Search Insert Empty Drop	310	InnoDB	utf8mb4_general_ci	16.0 KiB	-
orders	Browse Structure Search Insert Empty Drop	10	InnoDB	utf8mb4_general_ci	16.0 KiB	-
order_list	Browse Structure Search Insert Empty Drop	10	InnoDB	utf8mb4_general_ci	16.0 KiB	-
products	Browse Structure Search Insert Empty Drop	313	InnoDB	utf8mb4_general_ci	288.0 KiB	-
sales	Browse Structure Search Insert Empty Drop	10	InnoDB	utf8mb4_general_ci	16.0 KiB	-
sub_categories	Browse Structure Search Insert Empty Drop	30	InnoDB	utf8mb4_general_ci	16.0 KiB	-
system_info	Browse Structure Search Insert Empty Drop	5	InnoDB	utf8mb4_general_ci	16.0 KiB	-
users	Browse Structure Search Insert Empty Drop	1	InnoDB	utf8mb4_general_ci	16.0 KiB	-

Fig. 2 Database tables that were used in Dynamic Bookstore Kiosk System

### 3.1.4 Implementation

With input from the design phase, the system is initially constructed in small programs, which are then combined in the following step, implementation. We will code the design into source code and discover errors and issues. This is the stage at which the original code is generated and compiled into an operating program, from which the database and text file develop.

### 3.1.5 Testing

After each unit's testing, all units built during the implementation phase are merged into a system. After all the modules have been integrated into a full system, we will test each function for errors and failures. This is done to ensure that the system that is constructed is as efficient as possible. This is also known as verification and validation, and it is the process of determining whether a software solution fulfils the original criteria and specifications, as well as whether it achieves the intended goal. The kiosk system also has been tested by our client which is Dynamic Bookstore staff.

Fig. 3 shows we tested our system via a Google Meet with the staff of Dynamic Bookstore to test and evaluate the system. After presenting, the staff evaluated the overall project and recommended to us to improve the payment method in the future.

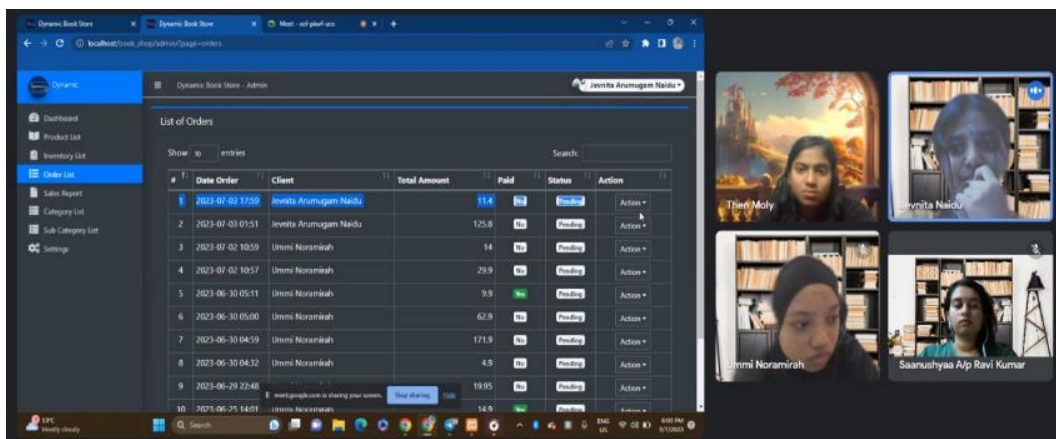


Fig. 3 Google Meet with the staff of Dynamic Bookstore

### 3.1.6 Maintenance

This is the final stage of the waterfall model. Maintenance involves fixing faults that were not discovered in the prior stage. After the system is completely operational, it must be maintained and upgraded as needed to ensure that it continues to work successfully and fulfils the bookstore's needs.

## 4. Results and Discussion

The results and discussion section presents a detailed study analysis, including the implementation and data collected. It provides the questionnaire responses organized by aspects of effectiveness, allowing for careful investigation of the findings across clusters of groups using a self-ordering kiosk system in a large bookstore.



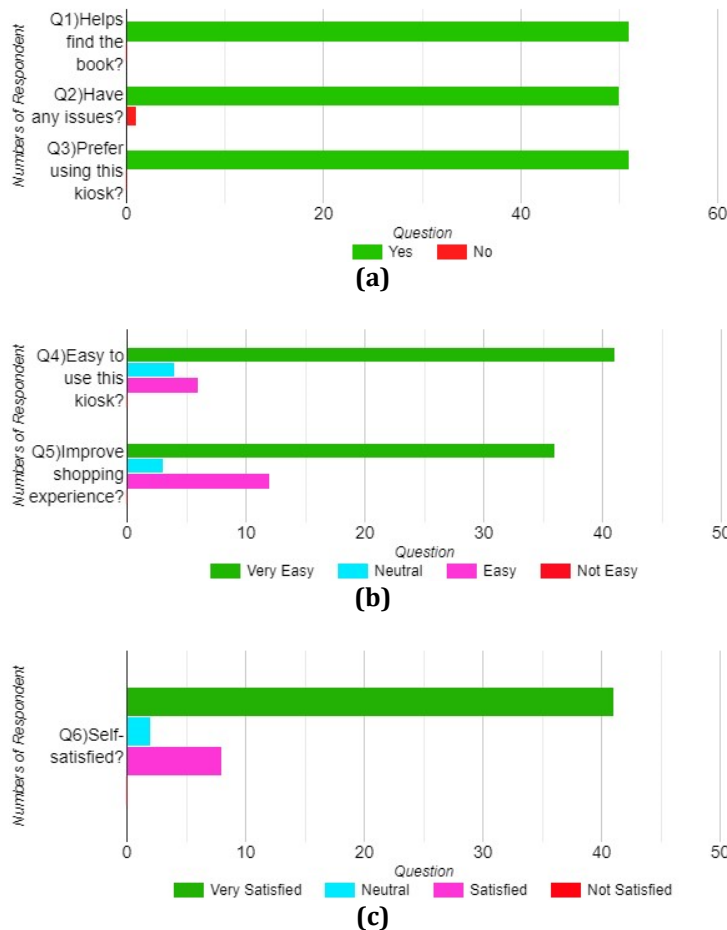
Furthermore, certain questions in the questionnaire can serve as identifiers to derive criteria for grouping subjects into user clusters based on their experience, resulting in a comprehensive summary for this project.

### 4.1 Discussions

We arranged a Google Meet with the staff of Dynamic Bookstore to test and evaluate the system. She has seen the system we have developed in detail. After presenting the system, the staff evaluated the overall project and she said that our system fulfilled their wishes. She also suggests improving the payment method like Touch n Go, online banking and so on. So that, their customer feels so easy to make the payment.

### 4.2 Data Analysis

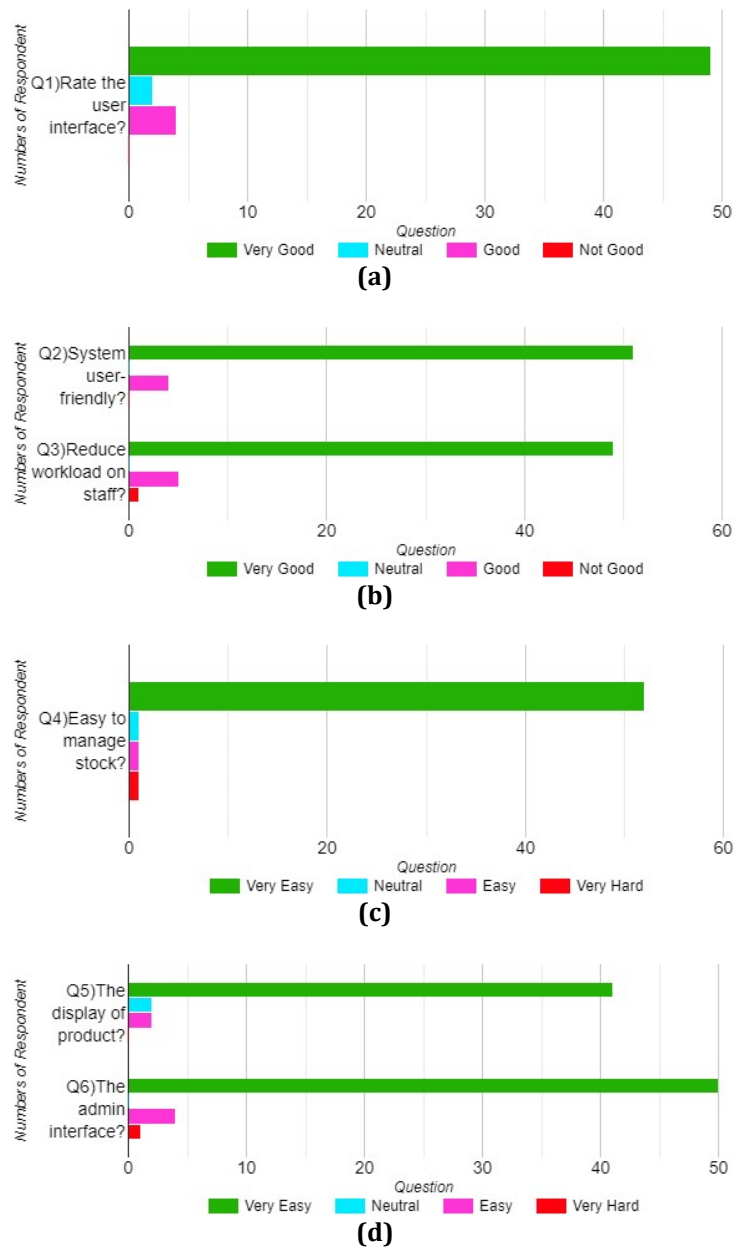
In this study, the respondent’s demographic information was gathered using two questionnaires, one before and one after the implementation of a Dynamic Bookstore self-ordering kiosk system. The first survey question is about the respondent before implementing a kiosk system. The questions we are addressing are whether the system helps the consumer find the items, whether there are any issues with using the system, whether the customer prefers using the system, whether it is easy to use and improves the purchasing experience, and whether the customer feels satisfied with the system’s implementation. 51 people answered this first survey. There are the following questions:



**Fig. 4** The response before implementing a kiosk system (a) Questions 1 to 3; (b) Questions 4 and 5; (c) Question 6

Fig. 4 shows the survey we got before implementing a kiosk system. Most of them prefer using our kiosk system and are satisfied with the development of the kiosk system.

Besides that, the second survey’s questions are about the respondents after implementing a kiosk system. The questions we are addressing are to rate the user interface and design, whether the system is user-friendly, whether the customer is satisfied with the product arrangement, whether it is easy to update and manage stock for staff, whether the system reduces the workload on staff, and how satisfied with the admin interface. The respondent for this survey is 55 people. There are the following questions:



**Fig. 5** The response after implementing a kiosk system (a) Question 1; (b) Questions 2 and 3; (c) Question 4; (d) Questions 5 and 6

Fig. 5 shows the survey we got after implementing a kiosk system. Most of the users and our admin are satisfied with the development of the kiosk system.

This research has not been fully achieved by the overall analysis and results. In addition, it can summarize the self-ordering ordering kiosk system as very easy for customers to use in large bookstores. The result proved the analysis that customers agree that they do not have issues using a kiosk system. According to the initial data, people prefer utilizing a self-ordering kiosk system since it is simple to use, user-friendly, and improves overall shopping. It additionally enables staff to monitor, update stock, and reduce workload. As a result of this survey, we may conclude that this self-ordering kiosk technology provides customer and staff satisfaction. Even though this research is only focused on large bookstores, its findings did provide a satisfactory with regarding the development of the self-ordering kiosk for improvement of the features on Dynamic which are large bookstores.

## 5. Conclusion

In conclusion, implementing a kiosk system in a major bookstore has enormous potential for improving the customer experience, simplifying operations, and delivering cost savings, according to the findings from project testing. To maintain the system's continuous efficacy and success in addressing the shifting demands of consumers in the bookstore business, it is critical to address any identified difficulties and aggressively pursue possibilities for development. Incorporating suitable mobile payment replacements into the kiosk system can further enhance

the purchasing experience, offering customers rapid and safe methods to complete transactions, which requires further research. The kiosk system may respond to the growing need for digital payment methods by integrating popular mobile payment systems such as Online Banking, Touch n Go, Credit payments, Apple Pay and Google Pay, enhancing user satisfaction and minimizing transaction time [12]. By streamlining the checkout process, bookstore employees will be able to devote more time and resources to giving personalized guidance and recommendations to consumers. This enhances not just customer happiness but also operational effectiveness and productivity. Furthermore, integrating customer data gathered via the kiosk system to enhance the personalized experience might provide substantial insights for advertising and suggestions. By analysing customers' choices, browsing history, and purchase trends, the kiosk system could provide personalized book recommendations, customized discounts, and targeted notifications [13]. Kiosk technology can improve bookstore operations.

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## Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

*The authors confirm contribution to the paper as follows: **study conception and design, data collection, draft manuscript:** Jevnita Arumugam Naidu, Saanushyaa Ravi Kumar, Ummi Noramirah Muhammad Shamudin, Hannes Masandig; **draft manuscript preparation:** Jevnita Arumugam Naidu, Saanushyaa Ravi Kumar, Ummi Noramirah Muhammad Shamudin, Hannes Masandig. All authors reviewed the results and approved the final version of the manuscript.*

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