

CHAPTER I

INTRODUCTION

1.1. Background

The development of information technology in the Industry 4.0 era has brought significant changes to how organizations and individuals conduct their daily activities [1]. The utilization of digital technology is no longer focused solely on large-scale industrial sectors, but has also begun to be applied to various support services in the workplace environment. Digitalization has become a necessity to improve efficiency, accuracy, and service quality across various operational aspects [2]. One of the support services that plays an important role in supporting work activities is the food provision service or canteen. The presence of a canteen in an office environment is not merely as a place providing food, but also functions as a facility supporting employee productivity [3]. The quality of canteen services indirectly affects work comfort, break time efficiency, and employee readiness to resume work activities after the break period.

Along with increasing workloads and the demand for time efficiency, office employees tend to expect fast, practical, and easily accessible services. Relatively short break times require a simple food ordering process that does not consume much time. However, in reality, many canteens in office environments still implement conventional ordering systems. Customers are required to come directly to the canteen location, view the menu list manually, and place orders on-site. This ordering pattern often causes long queues, especially during lunch breaks when most employees place orders simultaneously. This condition causes employee break times to become less optimal and has the potential to reduce comfort and satisfaction with canteen services.

Employee canteens, as one of the food service providers in the office environment, also face similar problems. The ordering process, which is still carried out manually, leads to customer accumulation at certain times, particularly during lunch hours. Besides causing long queues, this condition also impacts the inefficiency of the service flow in the canteen. Another problem frequently experienced by customers is the uncertainty of menu availability. Customers often

have to queue for a considerable time before finding out whether their desired menu is still available or sold out. Such a situation not only wastes employees' break times but also causes disappointment that can reduce the level of customer satisfaction with overall canteen services.

In addition to the problems of queues and menu availability, another obstacle quite often experienced by customers is the difficulty in deciding on menu choices. The variety of menus available every day, although intended to provide diverse options, can actually slow down the ordering process. Customers often need more time to choose a menu that suits their tastes and consumption habits. The manual menu selection process without any system assistance or recommendations makes the ordering experience less efficient, especially for customers who have certain preferences based on previous ordering habits. Given the limited break time, this time-consuming menu selection process becomes one of the factors reducing the effectiveness of canteen services

On the other hand, the food ordering process conducted in the canteen generates transaction data that can be further utilized to support service quality improvement. Every ordering activity and rating provided by users can serve as a source of information illustrating user preferences for specific food menus. However, without a system capable of processing this data, the information contained therein cannot be optimally utilized. Therefore, a system is needed that not only supports the food ordering process but is also capable of utilizing transaction data and user ratings to generate relevant menu recommendations in accordance with each user's preferences.

A recommendation system is an information technology-based solution designed to assist users in decision-making by providing relevant suggestions or recommendations [4]. In the context of food ordering, a recommendation system can help customers choose a menu that suits personal preferences, making the ordering process faster, more efficient, and personalized. The User-Based Collaborative Filtering method is a commonly used approach in recommendation systems [5], where recommendations are provided based on the similarity of preferences among users. In this research, user preferences are represented through rating data given after placing a food order. This rating data is used to calculate the

level of similarity between users using the Cosine Similarity method so that the system can recommend menus liked by other users with similar preferences.

The User-Based Collaborative Filtering method is considered suitable to be applied to the food ordering system in the canteen because the characteristics of the available data are relatively simple and easy to process. By utilizing user rating data, the system can identify similarities in preferences among users and generate more personalized menu recommendations. This approach allows the system to utilize existing data from ordering activities and menu assessments to help users determine food choices that match their preferences. In addition, this method also supports the utilization of existing data so it does not require the addition of complex new data in its implementation.

Although the User-Based Collaborative Filtering method has advantages in generating personalized recommendations based on user preferences, this approach has limitations under certain conditions. One common limitation in recommendation systems is the cold start problem, which is a condition where a new user does not yet have enough interaction history or rating data to be analyzed. In such situations, the system cannot directly calculate the level of similarity with other users because sufficient preference data is not yet available. To overcome this condition, the system in this study is equipped with an alternative mechanism in the form of displaying the most popular menu (most popular food) based on the highest ordering frequency. This approach allows new users to still obtain relevant menu suggestions even though they do not have a transaction history. Thus, the developed recommendation system is not only capable of providing personalized recommendations for existing users but also continues to provide value for new users.

A number of previous studies indicate that the application of food recommendation systems using the Collaborative Filtering approach, specifically User-Based Collaborative Filtering, is effective in helping users determine menu choices based on previous preferences. Studies in the context of food and restaurant recommendations prove that calculating similarity between users (user similarity), including with the Cosine Similarity technique, is able to produce relevant and personalized recommendations. These findings reinforce the relevance of selecting

the User-Based Collaborative Filtering method in this research. However, most previous studies have still been applied in general contexts such as restaurants or rating-based food recommendation platforms, so this research holds a different position by specifically applying this method to a food ordering system in an office canteen environment, as well as utilizing user rating data as the basis for forming food menu recommendations.

1.2. Problem Formulation

Based on the background described, the problem formulations in this research are as follows :

1. How to design and build a website-based food ordering system for the canteen?
2. How to implement the User-Based Recommendation method using historical transaction data and user ratings, as well as Cosine Similarity calculations, to generate food menu recommendations?
3. What are the results of testing and evaluating the developed system based on validity testing using Pearson Correlation and evaluation using Cohen's Kappa?

1.3. Research Objectives

The objectives to be achieved in this research are as follows :

1. To design and build a website-based food ordering application for the canteen using the Laravel framework, MySQL database, and Progressive Web Application (PWA) technology.
2. To implement the User-Based Recommendation method using historical transaction data and user ratings, as well as Cosine Similarity calculations, to generate relevant food menu recommendations.
3. To determine the results of testing and evaluating the developed system through validity testing using Pearson Correlation and evaluation using Cohen's Kappa.

1.4. Research Benefits

The expected benefits of this research are as follows:

1. Making it easier for users to order food online and increasing the efficiency of the ordering process at the canteen.
2. Helping users obtain food menu recommendations that suit their preferences through the application of the User-Based Recommendation method.
3. Providing a more structured food ordering management tool for canteen managers and providing a recommendation system that can improve service quality for users.

1.5. Problem Scope

In order for this research to be more focused and directed, several problem boundaries have been established as follows :

1. This research only discusses the food ordering system and the food menu recommendation system at the canteen.
2. The recommendation system uses the User-Based Recommendation method based on user rating data with a 1-5 rating scale, calculating the level of similarity between users using the Cosine Similarity method, and predicting recommendations based on the user with the highest level of similarity (nearest neighbor).
3. To overcome the cold start problem for new users, the system displays recommendations in the form of menus with the highest number of orders (Most Popular Food).
4. The application is developed based on a website using the Laravel framework and Progressive Web Application (PWA) technology, and the research does not discuss other recommendation methods or digital payment systems in depth.