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Design of a Culinary Information System at Piksi Ganesha Polytechnic Using the Waterfall Method

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Abstract: The rapid development of the culinary industry demands increased efficiency and effectiveness in information management at Piksi Ganesha Polytechnic. This research aims to design a Culinary Information System using the Waterfall Method to ensure the development of a structured and organized system. The initial stage of research involves analyzing the needs of stakeholders, such as students, lecturers, and administration. This analysis becomes the basis for designing a system that meets user needs and expectations. The design process is carried out in stages, starting from overall system design, database, and user interface, to application business logic. System implementation is carried out after the design is complete, ensuring that each stage has been properly verified and validated. System testing is carried out thoroughly to ensure system quality and reliability. The results of this research indicate that the Waterfall Method provides a solid and structured framework for the development of Culinary Information Systems. Complete documentation, good risk management, and a focus on quality help ensure successful system implementation. Its suitability for stable projects makes it the right choice for the development of a Culinary Information System at Piksi Ganesha Polytechnic. The conclusions of this research contribute to further understanding of the application of the Waterfall Method in the context of information system development in educational institutions.

Keywords: Culinary Information Systems; Information Systems; Waterfall

Introduction

In the era of globalization and rapidly developing information technology, information systems have become an integral part of various areas of life (Ifigeneia & Dimitrios, 2018). One sector that is also feeling the positive impact of advances in information technology is the culinary industry (Ko, 2020); (Blöcher & Alt, 2021). The development of information systems in the culinary context has a crucial role in increasing efficiency, optimizing business processes, and providing a better experience for customers (Dwivedi et al., 2023); (Beerepoot et al., 2023). Software development methods have an important role in ensuring the success of information system implementation. One method that has been proven effective is the waterfall method. This method offers a linear and structured approach to managing software development projects, which consist of a series of interdependent stages.

In this research, we will discuss the design of a culinary information system using the waterfall method. This process involves a series of well-organized steps, from requirements formulation to implementation (Fuertes et al., 2020), to create a culinary information system that is reliable, easy to manage, and able to provide added value for customers and culinary business owners. An information system is a set of organizational procedures that, when implemented, will provide information for making decisions or controlling information (Zemmouchi-Ghomari, 2022). DSS (Decision Support System) is a computer-based information system that uses decision models and special databases to assist the decision-making process for managerial end users (Talari et al., 2022). The

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development of information systems is now very rapid, quite a few people use information systems to help make their work easier (Zeng et al., 2020). One form of information system that is easy to develop is web-based. Web-based information systems are used to display information and to dialogue with data to provide information to make decisions (Aliim et al., 2023).

Indirectly, humans are also required to follow the flow of globalization which is currently happening intensively (Shrestha et al., 2020). Change after change occurs in the economic, social, political, cultural, and technological fields themselves (Kavanagh et al., 2021). The automation system that characterizes the Revolution Era 4.0 has become a global trend in various aspects of life, especially in the culinary world. This era gets rid of manual systems to become automated systems through 6 perfectly designed XXX Information Systems applications. Competition in the culinary field is increasingly fierce. The rapid changes in the world in terms of technological advances (products, services, and processes) as well as the social and economic life of society, encourage the need to take anticipatory steps through policies and strategies so that in the future we can survive in all fields.

The Waterfall method is a software development model that is linear and sequential. The Waterfall method has an organized and linear structure. Each development phase, such as analysis, design, implementation, testing, and maintenance, is executed sequentially. This organized structure can help in efficient project planning and execution. Each phase in the Waterfall method produces comprehensive documentation, including requirements specifications, system design, and test documentation. Good documentation can help with a clear understanding of the project and facilitate maintenance and further development.

Developing a web-based Field Work Practice (PKL) information system using the waterfall method. The results of this research show that the system can carry out street vendor business processes easily without having to use manual methods (Ridwan Setiawan, Ade Sutedi, Taopiq Hidayat 2020). (Roger S. Pressman 2020), an expert in the field of software engineering has suggested that the model Waterfall can still be applied in projects that have stable and unchanging requirements. Pressman emphasizes the importance of having a clear understanding of requirements from the start and says that the Waterfall method can be effective if all stakeholders understand their roles. From the results of this research, it can be concluded that the waterfall method is still used in developing information systems in various contexts, such as web-based street vendor information systems and website development. This method was chosen because it can work in a structured and linear manner, and is suitable for use when system requirements have been clearly defined.

Method

System Development Method

In implementing this software, we will use a combination of Waterfall and Prototyping methods. Referring to the Waterfall method with the characteristics of clear stages starting from the Requirements, Design, Implementation, and Verification to the Maintenance process, guaranteeing timely software delivery to clients. In the design and implementation process, our experts will continue to carry out reviews through coordination once a month with users.

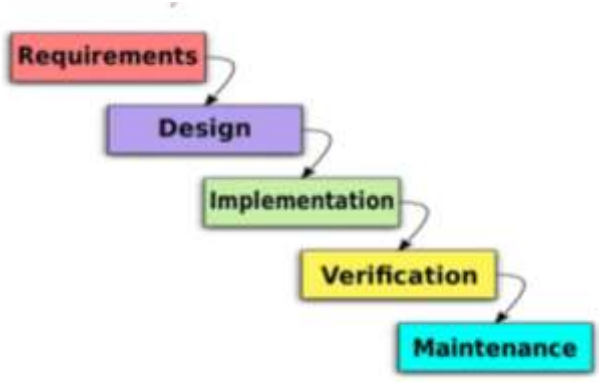

Figure 1. Waterfall Model

System Analysis Needs

Table 1. Business Process Use case describes the interactions between actors in the system on the website.

Actor	Description
Admin	People who can manage or administer data in the website system.
Cashier	People can view products, input orders and make transactions on the website.

Table 2. Identify Use cases

Use case Name	Description	Actor
Login	This Use case describes the activities of the process of accessing the system by entering a password and username.	Admin, Cashier.
Registration	This use case describes the activities to obtain access rights for each display.	Admin.
List Display Menu List	The system displays, adds, edits, and deletes the menu list available on the website.	Admin.
Menu Category	The system displays, adds, edits, and deletes menu categories available on the website.	Admin
Service Order	In this process, the cashier inputs food and drink orders ordered by customers.	Cashier
Payment	After processing the order, the cashier receives payment from the customer and uses the payment method.	Cashier
Partner List	Displays Cooperating requests.	Admin.
Report.	After the entire series of transactions have been carried out, the Admin carries out routine transaction reports to be given to company superiors.	

System Use cases

This website has 2 actors, including the admin actor describing admin activities who can add products to the website, send items to the cashier, add Users, and check the cashier status from the system. Meanwhile, the cashier actor can only provide the ordering action, then enter the payment transaction, and can provide an ordering report. The use case of this website is presented in the following image:

Use Cases

Use case Scenarios: Item Purchase Scenario, Usecase Name: OrdersActors: Cashier, Admin, Purpose: Carry out order transactions, Description: How the ordering process works.

Table 3. Item Purchase Scenario

Admin	System	Cashier
		Open the website, and log in. Carry out the process of inputting Menu, Category, User, Partner, and other data
	Displays Menu List, Categories, Users, Partners, and others	
Open the website and log in		
	Displays the Food Menu offered on the website.	
Process orders according to customer orders		
	The system displays a list of orders by customers.	
	The system calculates the total price the customer must pay.	
The cashier processes the transaction		
	The system stores reports for every transaction carried out	
		Admin gets transaction reports

System Technical Specifications

The environment used in the development stage: Database uses MySQL, PHP version 8.1.6, WEB-based program using Laravel 8, Bootstrap icon.

Discussion

Figure 2. Admin Usecase Diagram

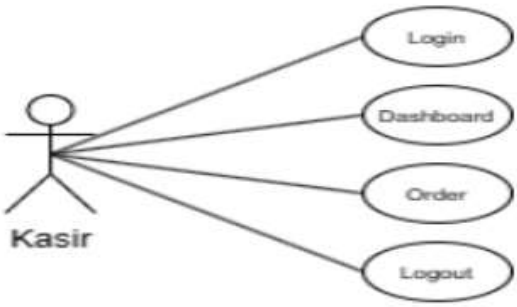

Figure 3. Usecase Cashier Diagram

The Figure 1 and 2 explain the use case diagram which has 2 actors, namely the admin and the cashier. The system can facilitate admins in several activities, namely logging in, logging out, viewing menu schedules, reporting, and order history. The system can also facilitate admins in several activities, namely logging in, logging out, verifying proof of payment, creating a new menu schedule, editing menu schedules, editing coupon packages, viewing order results, editing orders, editing customers, and editing customer coupons.

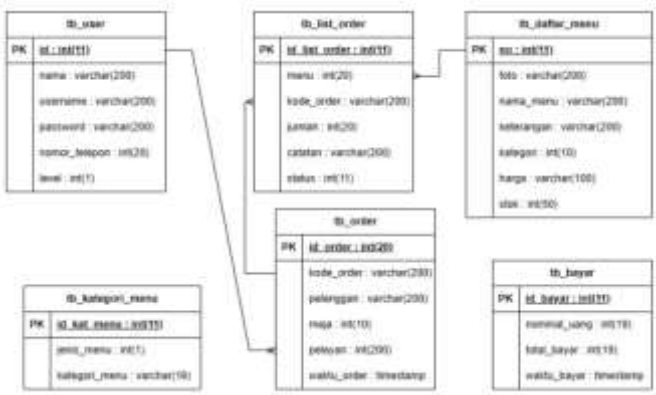

Figure 4. *Ordering Chart*

Contains several tables, namely the user table, order list table, order table, menu list table, menu category table, and payment table. The order table functions as a customer data storage area for customer login authentication and customer biodata. The menu table is a place to store menu schedule data. The coupon package table contains coupon package data used when customers are in the coupon purchasing process. After a customer selects and purchases a coupon, the data will be stored in the customer coupon table. When a customer exchanges a coupon for a menu, the data will be stored in the order table.

Result and Discussion

Definition of Information Systems

An information system is a collection of sub-systems, both physical and non-physical relate to each other and work together harmoniously to achieve one goal namely processing data into useful information (Wijoyo et al., 2021); (Zhou et al., 2019).

Culinary Understanding

Culinary means cooking or food. Culinary is processed products in the form of side dishes, food, and drinks. Culinary cannot be separated from close cooking activities related to daily food consumption (Khan, 2023). The word culinary is an element of absorption In English, culinary means related to cooking (Yudhistira, 2022).

Unified Approach (UA)

UA is an object-based system development methodology that combines pre-existing processes and methodologies and uses UML as standard modeling (Huss et al., 2023). The stages in Ali Bahrami's Unified Approach (UA) methodology are as follows:

Object Oriented Analysis (OOA)

A unified Approach is an approach method that has a systematic method to carry out the analysis process (Hinov, 2023); (Grames et al., 2022). The purpose of the analysis is to find out and understand the essence of problems and system responsibilities by understanding what work is done by the system through modeling (Efthymiou et al., 2016). The steps of Object Oriented Analysis are Actor Identification, Development of Activity Diagrams, Development of Interaction Diagrams, Class Identification, Relationships Attributes and Methods. The final goal of this stage is to produce appropriate classes for user needs (Fatimah et al., 2019).

Object Oriented Design (OOD)

System design is carried out based on the results of the previous analysis stages (Kannengiesser & Gero, 2022). Stages Object Oriented Design includes Designing Class Diagrams, Methods, Attributes, and Associations. The aim is to provide a clear picture of information and make it easier to understand the software creation process. At the design stage, the focus is more on how to display information and designing interfaces so that actors can interact with the system.

Object Oriented Programming (OOP)

This stage is the stage of migrating the system design results into a system software program. The implementation stage of the proposed system by adopting the construction of UA which is the stage after design (Ullah et al., 2019); (Davila Delgado et al., 2019). At the implementation stage, namely with Component-Based Development stages. Component Development is known as the terms access layer, interface layer, and business layer (Campeanu & Saadatmand, 2019). The term MVC (Model, View, Control); The access layer (model) is related to database access; The interface (view) layer is related to creating a system interface with the user; The business (control) layer is related to the program code that regulates between models with views.

Figure 5. Login View

Figure 6. Dashboard View

Figure 7. Menu List Page Display

Figure 8. Food and Drink Category Page Views

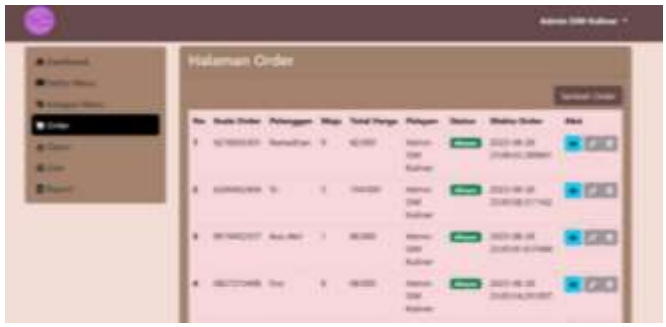

Figure 9. Order Page Display

Figure 10. Kitchen Yard View

Figure 11. User Page Display

Figure 12. Report Page Display

Conclusion

Designing a Culinary Information System at Piksi Ganesha Polytechnic using the Waterfall Method, several conclusions can be drawn as follows: Structured Development Stages: The Waterfall Method relies on a structured, stage-by-stage approach, starting from requirements analysis, design, implementation, and testing, to maintenance. This provides a clear and organized framework for information systems development. Limitations of Change: Waterfall has the characteristic of being less flexible towards change. Each stage must be completed before moving on to the next stage. If requirements change or errors occur in the early stages, it can be difficult and expensive to change them in later stages. Project Quality and Assurance: The Waterfall Method emphasizes strong documentation, comprehensive testing, and good risk management. This can contribute to the quality of the result and provide certainty in terms of schedule and budget. The Importance of Thorough Requirements Analysis: Because Waterfall requires a thorough requirements analysis at the start of a project, successful implementation relies heavily on a deep understanding of user needs. Errors or deficiencies in this analysis can have a major impact on the entire project. Clear Responsibilities: The Waterfall Method divides the project into stages with clear responsibilities for each stage. This helps in identifying who is responsible for each aspect of development, making project management easier. By considering these conclusions, the selection of the Waterfall Method for designing the Culinary Information System at Piksi Ganesha Polytechnic needs to take into account the nature of the project, user needs, and the flexibility required in the information system development process.

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Author Contributions
Conceptualization; A. D. A., N. F. A., C. R.; methodology.; A. D. A..; validation; N. F. A..; formal analysis; N. F. A.; investigation.; A. D. A.; resources; C. R; data curation: A. D. A.; writing—original draft preparation. N. F. A.; writing—review and editing: I A. D. A; visualization: N. F. A. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest
The authors declare no conflict of interest.

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