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**IMPLEMENTATION OF A KIOSK-BASED E-RESEARCH LIBRARY
AND RESEARCH PROCESS AUTOMATION SYSTEM FOR
COMPUTER ENGINEERING DEPARTMENT AT THE
POLYTECHNIC UNIVERSITY OF THE PHILIPPINES**

A Thesis
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Bachelor of Science in Computer Engineering

by

CEPREZ, KAYE CHRELLE ANNE V.
LAMOSTE, YVONNE E.
SAN ESTEBAN, FRANZ DAVID D.
SANDING, EPSTLE PHEY DC.
VILLA, MA. ANDREA JERICKA T.

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CHAPTER 1

THE PROBLEM AND ITS SETTING

Introduction

As the technology advances, several discoveries were found and deep analysis of existing discoveries are done for the improvement of the existing methods.[1] And Research[2][3], referring to etymology, is a word derived from the 16th century Middle French "*recherche*" meaning "to go about seeking", "to go around", or "to wander" and also derived from Latin "*circare*"[4] means "to wander" or "to traverse.", is the driving force that advances the sciences and technologies. And it has been going on for years, meaning research, theses, dissertations, and case studies are preserved in a repository. [5] Repositories are facilities where collections of things may be preserved or stored in places such as library, digital, and institutional. [5][6][7]

The Implementation of a Kiosk-based E-research Library and Research Process Automation System for the Computer Engineering Department at the Polytechnic University of the Philippines aims to leverage technological advancements to enhance the research capabilities and efficiency within the department. As technology continues to evolve, the need for streamlined access to research materials and automated processes becomes increasingly crucial. By integrating a kiosk-based e-research library and automation system, the department can facilitate easier access to resources, accelerate research processes, and improve overall productivity in conducting research, theses, dissertations, and case studies. This system will not only modernize the



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research environment but also contribute to advancing the sciences and technologies within the department.

Theoretical Framework

Implementing a Kiosk-Based E-Research Library and Research Process Automation System holds significant potential for enhancing research capabilities and streamlining processes within the Computer Engineering Department at the Polytechnic University of the Philippines. To ensure the successful adoption and **use** of this technology., it is essential to establish a theoretical framework that addresses the factors influencing user acceptance and use of the system. This theoretical framework draws upon the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to comprehensively understand these factors.

The Technology Acceptance Model (TAM), developed by Fred Davis in the 1980s, believes two main factors influence user acceptance of technology.: perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which a user believes that a particular technology will enhance their job performance, while perceived ease of use pertains to the extent to which a user perceives the technology as free of effort. In the context of the Kiosk-Based E-Research Library and Research Process Automation System, the TAM framework will be instrumental in assessing how faculty, researchers, and students perceive the system's usefulness and ease of use.

Building upon the TAM, the Unified Theory of Acceptance and Use of Technology (UTAUT) integrates additional factors that influence user acceptance and use of technology. These factors include performance expectancy, effort expectancy, social



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influence, and facilitating conditions. Performance expectancy refers to the degree to which an individual believes that using a particular technology will help them attain gains in job performance. In contrast, effort expectancy relates to the ease of using the technology. Social influence encompasses the impact of social factors on an individual's intention to use technology. At the same time, facilitating conditions refer to the degree to which an individual believes that technical and organizational infrastructure exists to support their use of the technology. By incorporating these additional factors, the UTAUT framework will provide a more comprehensive understanding of the determinants of user acceptance and use of the Kiosk-based system within the Computer Engineering Department.

By applying the TAM and UTAUT frameworks, this study will be able to identify and assess the key factors that may impact the successful adoption and utilization of the Kiosk-Based E-Research Library and Research Process Automation System by faculty researchers, and students in the Computer Engineering Department at the Polytechnic University of the Philippines. Data will be collected through surveys, interviews, and observations to evaluate perceptions of usefulness, ease of use, performance expectancy, effort expectancy, social influence, and facilitating conditions. The findings will enable recommendations for strategies to enhance user acceptance and utilization of the system.

Conceptual Framework

The Implementation of a Kiosk-based Research Library and Research Process Automation System for Computer Engineering Department at the Polytechnic University of the Philippines will use an Input- Process-Output (IPO) Conceptual Framework. The



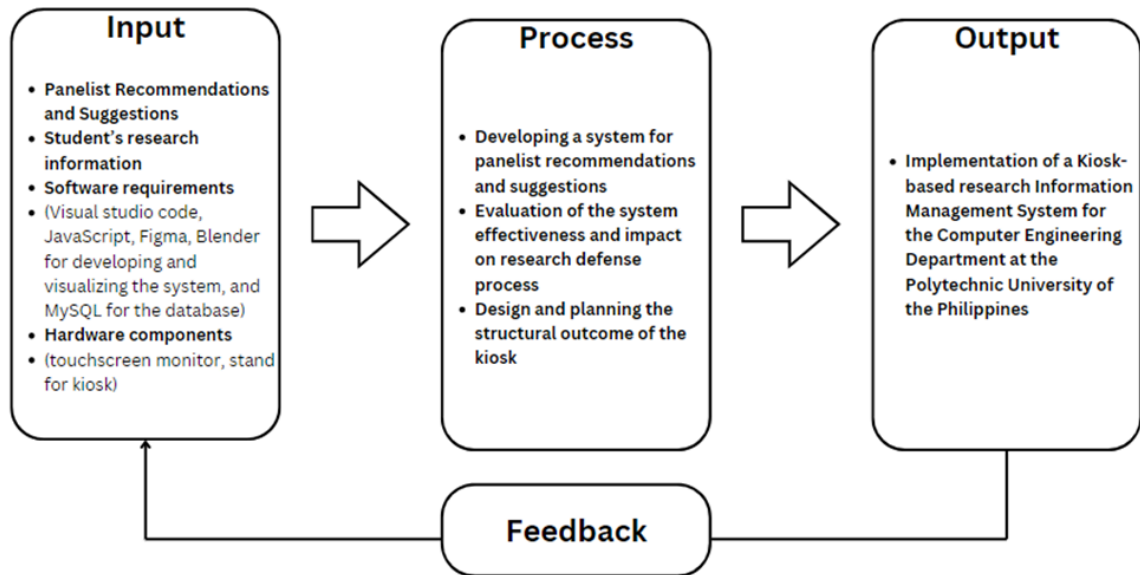
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study will begin by addressing the (1) input of panelist recommendations and suggestions during research defense events; (2) Student's research information; (3) software requirements such as Visual studio code, JavaScript, Figma, Blender for developing and visualizing the system, and MySQL for the database; and (4) Hardware components such as Touchscreen Monitor, and its stand.

The process phase will guide the progression of the study by gathering and analyzing the panelist recommendations and suggestions, Evaluation of the system effectiveness and impact on research defense process, and Design and planning the structural outcome of the kiosk. Finally, the Implementation of a Kiosk-based research Information Management System for the Computer Engineering Department at the Polytechnic University of the Philippines. By implementing this system will enhance the research defense process. Furthermore, the research methodology will follow the Input-Process-Output (IPO) model's guidelines for a closed system by including the feedback loop.



Figure 1.1: Research Paradigm of the Study



Statement of the Problem

The Computer Engineering Department at the Polytechnic University of the Philippines faces challenges in efficiently gathering and managing panelist recommendations and suggestions during research defenses. The current manual process hinders efficiency and compromises data accuracy, leading to potential data loss and inefficiencies in the research evaluation process. To address these challenges, the implementation of a Kiosk-based Research Information Management System is proposed.

This research will attempt to address the following key questions:

1. What are the current challenges faced by the Computer Engineering Department in gathering and managing panelist recommendations and suggestions during research defenses?



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2. How does the manual process of collecting panelist feedback impact the efficiency and accuracy of data collection in the department?
3. What are the potential benefits of implementing a Kiosk-based E-research Library and Research Process Automation System for the Computer Engineering Department?
4. What features and functionalities should be included in the Kiosk-based system to effectively support the gathering and management of panelist recommendations and suggestions during research defenses?
5. How will the implementation of a Kiosk-based E-research Library and Research Process Automation System enhance the professional development support for student researchers in the Computer Engineering Department at the Polytechnic University of the Philippines in terms of:
 - i. Efficiency
 - ii. Accuracy
 - iii. Accessibility

Scope and Limitations of the Study

The research will focus on the detailed design, development, and implementation of a kiosk-based research information management system tailored for the Computer Engineering Department at the Polytechnic University of the Philippines. The study will cover many areas to ensure a robust and effective system.

The research study aims to explore the hardware and software configuration essential for the kiosk system, including an in-depth examination of hardware components, peripherals, touch-based interfaces, and software necessary for interactive



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information access. Additionally, the study prioritizes the user interface and functionality of the system, aiming to provide efficient access to information relevant to students' profiles, feedback, forms, and research courses. It also focuses on information management in the system, streamlining research course operations, and facilitating access to educational resources.

However, the research study acknowledges several limitations that may impact its outcomes. One area for improvement is the study's focus solely on the Computer Engineering Department, potentially limiting the generalizability of findings to other departments within the university. Technical constraints related to hardware and software components chosen for the kiosk system could affect its performance and functionality, influencing the scope of the study. Resource constraints, including time, budget, and expertise limitations, may impact the system's implementation and evaluation comprehensiveness. Additionally, challenges accessing external research papers due to restricted availability or database limitations could affect the study's validity and reliability.

Despite these limitations, the research study aims to provide a comprehensive understanding of the kiosk-based research information management system and its potential impact on the Computer Engineering Department at the Polytechnic University of the Philippines. By acknowledging and addressing these limitations, the study seeks to contribute valuable insights into developing and implementing such systems within academic departments while laying the groundwork for future research.



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Significance of the Study

Students. This research will benefit students pursuing research projects or seeking academic resources by offering easier access to research materials, enhanced learning opportunities, and increased support for their academic endeavors.

Faculty Members. This research will benefit faculty members by providing improved access to research resources, streamlined data management, and enhanced collaboration opportunities, leading to increased research productivity and excellence.

The Department. This research will benefit the Computer Engineering Department as a whole by improving research efficiency, enhancing collaboration among faculty and students, increasing productivity, and strengthening the department's academic reputation through the implementation of the kiosk-based research information management system.

Future Researchers. This research will benefit future researchers by providing insights gained through the implementation of this kiosk-based system, paving the way for further innovation, collaboration, and advancements in research management within the Computer Engineering Department and beyond.



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Definition of Terms

Blender - an open-source software used for creating 3D graphics, animations, simulations, and more.

Figma - a collaborative web application for interface design.

Kiosk - a small, standalone structure or terminal that provides information, services, or products to users in public spaces.

MySQL - a popular relational database management system widely used for storing and managing data in web applications.

Visual Studio Code - a streamlined code editor with support for development operations like debugging, task running, and version control.



CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 Investigating the Use of Information Kiosks in Academic Environments

Information kiosks have become increasingly popular in various settings, including academic environments, due to their ability to provide quick and easy access to information. In the context of research information management systems, information kiosks offer a convenient way for students and faculty to access research resources, databases, and other relevant information. Several studies have explored the use of information kiosks in academic environments and have highlighted their potential benefits.

One study by Smith et al. (2017) examined the implementation of information kiosks in a university library and found that they were effective in improving access to library resources and services. The study also revealed that students and faculty appreciated the convenience and ease of use provided by the kiosks. Another study by Jones and Brown (2018) investigated the use of information kiosks in academic departments and found that they were particularly useful for disseminating research information and promoting collaboration among researchers. The study highlighted the importance of user-friendly interfaces and relevant content in maximizing the effectiveness of information kiosks.



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In the context of the Computer Engineering Department at the Polytechnic University of the Philippines, the implementation of a kiosk-based research information management system could offer numerous benefits, including improved access to research resources, enhanced collaboration among faculty and students, and increased visibility of departmental research activities. By providing easy access to research databases, journals, and other resources, information kiosks can help streamline the research process and facilitate knowledge sharing within the department.

Overall, the literature suggests that information kiosks have the potential to enhance research information management systems in academic environments by providing convenient access to resources and promoting collaboration among researchers.

2.2 Data Measurement in Research Information System

The article "Data Measurement in Research Information Systems: Metrics for the Evaluation of Data Quality" by Otmane Azeroual, Gunter Saake, and Jürgen Wastl, published in *Scientometrics*, delves into the critical aspect of evaluating data quality in research information systems (RIS). In recent years, RIS has become an integral part of the university's IT landscape, emphasizing the importance of ensuring high-quality data within these systems. The authors present a comprehensive framework for measuring data quality in RIS, highlighting the significance of metrics in assessing the completeness, accuracy, consistency, and timeliness of data. The metric completeness calculation example showcases how different attributes, such as author information, DOI, article title, publication type, and publication year, contribute to the overall completeness score of a dataset.



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Furthermore, the article discusses the necessity of context-specific data quality verification and introduces an approach that can serve as a foundation for examining and enhancing data quality in RIS. By incorporating techniques like data cleansing, data profiling, and potentially exploring the ETL process and semantic text analysis, researchers can address data quality issues effectively within the RIS environment.

The study also shows the importance of expert interviews and quantitative studies with universities and research institutes to measure data quality in the RIS. This approach can provide insight into companies' real challenges in maintaining high-quality data and inform future strategies to improve data quality standards.

In conclusion, this article **is** essential to the field of data quality assessment in RIS. By providing a structured framework and highlighting the significance of metrics and techniques for data evaluation, the article serves as a guiding resource for researchers, academics, and institutions seeking to enhance the reliability and integrity of data within their research information systems.

2.3 Interactive Touch System: Quick Access and Enhance Experience

Touch-based KIOSK has proven helpful in many areas [13]. Examples of such usage include the use of touch devices in banks [16], retail malls [14] health KIOSK [17], KIOSKs for blind users [18], information KIOSKs [19], use of Computer KIOSKs for Breast Cancer Education [20] and the popularity of tablets and touch computers can be considered proof of this idea. Moreover, touch reduces the complexity of interaction and makes it a more personal experience.



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An interactive kiosk is a computer-like device that gives people self-service access to products and services. Kiosks typically reside in shopping malls, airports, hospitals, school campuses, company cafeterias, and other locations where personal computers are inaccessible. Much like a private or office computer, a kiosk can offer Internet access for browsing the web and checking email. The platform also provides features for visualizing multimedia content and the availability of numerous software applications. Unlike a regular PC, a kiosk typically performs only a few specific tasks, is designed for use by many people, and is often optimized for remote control and management. Famous examples of interactive kiosk applications include [15].

The advantages of kiosks are significant, and increasing numbers of companies utilize them to deploy self-service applications. In fact, according to Forrester Research, 80% of brick-and-mortar retailers with an online presence plan to install interactive terminals in their stores. There are many reasons for the popularity of interactive kiosks. First, new technologies like web-based applications reduce project costs and reduce the need for custom software development projects. Next, the widespread availability of Internet access provides kiosk owners with an affordable way to connect all their terminals, regardless of geographic location. Most significantly, though, kiosks represent a way to simultaneously lower overhead and improve customer and employee satisfaction. For example, sportswear retailer REI found that its network of 115 kiosks produced as many sales as a 25,000 sq. ft. store for a fraction of the cost and with virtually no monthly overhead. And since over 65% of consumers have made Internet purchases before, most find in-store kiosks are a familiar and convenient way to augment in-store shopping experiences in recent years.



2.4 Role of a Kiosk-based Information Management System

A Kiosk-based Information Management System plays a crucial role in providing efficient and accessible information to users. This system is designed to offer a user-friendly interface for individuals to access a wide range of information, such as maps, directories, event schedules, and other relevant data. Kiosk-based Information Management Systems are commonly utilized in public spaces, such as airports, shopping malls, and educational institutions, to enhance the overall experience of visitors and customers. By centralizing and organizing information in a digital format, this system streamlines the process of obtaining necessary information and contributes to a more efficient and organized environment. In addition, it can also serve as a valuable tool for businesses to promote their products and services through interactive displays and multimedia content.

The study "Toward accessible self-service kiosks through intelligent user interfaces" by Simen Hagen, F. Sandnes, explores the challenges and potential solutions in designing universally accessible self-service kiosks. The authors emphasize the importance of ensuring that these kiosks are usable by individuals with diverse physical and cognitive abilities, educational backgrounds, and levels of familiarity with the system. The study presents a prototype of a universally designed kiosk with a multimodal intelligent user interface, which adapts to the user's physical characteristics. Key features of the prototype include a touch-sensitive display with adjustable interaction area based on the user's height, dynamic text size adjustment based on the user's reading distance, and increased touch target sizes for users with motor difficulties.



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Additionally, the study introduces a Byzantine visualization technique to optimize screen real estate and provide additional visual cues. The techniques explored in this study have the potential to enhance the accessibility and usability of public self-service kiosks, which could have significant implications for various applications such as ticket sales, airport check-in, and general information services [29].

The impact of using kiosks on enterprise systems in the service industry has been explored in the research conducted by J. Chen, D. Yen, K. Dunk, A. E. Widjaja. Their study focused on the use of self-service kiosks and guest service agents as part of hotel's Enterprise Information Systems (EISs) to investigate their impact on the experience of business and leisure travelers during the registration process. The findings of their study provide empirical evidence on how to improve service quality for both types of travelers and emphasize the importance of the first physical interaction between the travelers and the service provider. The study highlights the significance of effective and efficient design of self-service kiosk systems and EISs in enhancing front office management to better accommodate the specific needs of different types of travelers. Therefore, this research contributes to the understanding of how Kiosk-based Information Management Systems can enhance service quality and customer satisfaction in the service industry.

The role of Kiosk-based Information Management Systems has become increasingly important in today's technological landscape. The study "Integrated Inventory Management and Asset Tracking System with User-centric Computer Kiosk Interface" highlights the significance of automated systems in streamlining processes and ensuring accurate data management within companies and corporate organizations. This project aims to automate manual processes, allowing efficient management,



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organization, and storage of items, equipment, purchase orders, and reports. The Descriptive Research Method and Developmental Method, specifically the Modified Waterfall Model, were utilized in the project to ensure thorough analysis, classification, and development of the system. Additionally, the ISO 9126-1 Model was employed for software evaluation, focusing on criteria such as functionality, usability, reliability, efficiency, portability, and maintainability. The evaluation results indicated high mean scores for end-users and IT experts, reflecting the system's effectiveness. Overall, Kiosk-based Information Management Systems play a crucial role in enhancing efficiency and accuracy in data management for organizations [30].

Kiosks are increasingly being used by companies to offer self-service applications, with 80% of brick-and-mortar retailers planning to install interactive terminals. The popularity of kiosks is due to new technologies, affordable internet access, and the ability to lower overhead and improve customer and employee satisfaction. For example, sportswear retailer REI found that its network of 115 kiosks generated most sales from a 25,000-square-foot store with no monthly fees and low overhead. Over 65% of consumers find in-store kiosks a familiar and convenient way to enhance their shopping experiences. In conclusion, kiosk-based Information Management Systems significantly contribute to enhancing efficiency, accessibility, and customer satisfaction across various industries, making them an integral part of modern business operations.



2.5 Navigating Transformation in Research Libraries: An Analysis of Recent Studies

Research libraries are crucial in supporting scholarly activities, and their development is vital to address the evolving demands of the academic community. This review delves into significant topics discussed in four influential papers, offering insights into collaboration, evaluation, flexibility, and methodical strategies. As research continues to advance, libraries must embrace these themes to serve the needs of scholars and researchers effectively. By understanding and implementing these fundamental principles, research libraries can ensure that they remain valuable and relevant institutions within the academic landscape.

The article "Evolving in Common: Creating Mutually Supportive Relationships Between Libraries and the Digital Humanities" by Vandegrift and Varner sheds light on key themes across four seminal papers, emphasizing the importance of collaboration, assessment, adaptation, and systematic approaches in integrating libraries into the digital humanities. The authors highlight the need for libraries to engage actively with DH practitioners and scholars, providing necessary resources and support to facilitate digital scholarship. As the digital humanities continue to shape the research landscape, libraries must adapt and evolve with these developments. By establishing mutually supportive relationships with the digital humanities, libraries can better serve the changing needs of academia and contribute to advancing scholarly endeavors. It provides valuable insights into the collaborative efforts between libraries and the digital humanities, emphasizing the importance of creating mutually supportive relationships to



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meet the evolving demands of academic research. This article is a valuable resource for librarians, scholars, and practitioners seeking to integrate libraries into the digital humanities ecosystem. [26]

In a recent review by Rzasa and Baker, titled "Measures of Effectiveness for a University Library," the authors discuss the crucial aspect of assessing library effectiveness. According to Rzasa and Baker, two key measures play a significant role in evaluating the effectiveness of a university library: user satisfaction and engagement metrics. These measures are essential in guiding decision-making processes within the library, ensuring that initiatives and services are aligned with the users' needs. A successful library must balance quantitative metrics, such as usage statistics, and qualitative impact, such as user feedback and overall satisfaction. In today's rapidly evolving academic landscape, it is imperative for university libraries to not only provide access to a wide range of resources but also to engage with their user community actively. By implementing measures of effectiveness, such as user satisfaction and engagement metrics, libraries can better understand the needs and preferences of their users, thereby enhancing the overall quality of their services. As the role of university libraries continues to expand and adapt, it is clear that assessing library effectiveness is paramount. By focusing on user satisfaction and engagement metrics, libraries can remain relevant and valuable institutions within the academic community. [27]

Additionally, the article discusses the challenges and strategies associated with organizational change in research libraries, focusing on the insights provided by Lee. One key aspect Lee highlights is the importance of leadership involvement in driving organizational change. Strong and visionary leadership is essential for guiding research libraries through periods of transformation, setting strategic directions, and inspiring a



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shared vision among staff members. Additionally, staff collaboration and engagement are critical components for successful change implementation. Involving library staff at all levels in the change process fosters a sense of ownership and harnesses the organization's diverse expertise and perspectives. Furthermore, Lee underscores the significance of focusing on excellence amidst organizational change. Research libraries must strive to uphold high standards in their core functions of collection development, information literacy, research support, and scholarly communication, even as they navigate transitions in service models, resource allocation, and technological infrastructure[28].

In conclusion, research libraries must adapt, cooperate, and pioneer new approaches. By amalgamating their findings, we provide stakeholders with the means to navigate the intricate landscape of library evolution. As libraries continue influencing scholarly domains, these principles remain fundamental to their prosperity.

2.6 Review of Related Literature Synthesis

The review of related literature highlights the significance of information kiosks in various settings, particularly in academic environments. Here is a synthesis of the key points discussed in the RRL:

Information kiosks have gained popularity in academic settings for quick and easy access to research resources, databases, and relevant information. Studies have shown that information kiosks in educational environments improve access to library resources, enhance collaboration among researchers, and promote the dissemination of research information. User-friendly interfaces and relevant content are crucial in maximizing the effectiveness of information kiosks in academic departments.



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Information kiosks offer numerous benefits, including improved access to research resources, enhanced collaboration among faculty and students, and increased visibility of research activities. Kiosks streamline the research process, facilitate knowledge sharing, and promote cooperation between researchers in academic environments.

Evaluating data quality in research information systems (RIS) ensures high-quality data within academic institutions. Metrics play a crucial role in evaluating the completeness, accuracy, consistency and timeliness of river information service data. To effectively address data quality issues within RIS, it is recommended to use techniques such as data cleansing, profiling, and expert interviews.

Touch-based kiosks have proven beneficial in various sectors, including banks, retail malls, health kiosks, and information kiosks. Touch interfaces enhance user experience, reduce interaction complexity, and provide a more personalized interaction.

In conclusion, the synthesis of the related literature underscores the importance of information kiosks in academic environments for improving access to resources, promoting collaboration among researchers, and enhancing the overall research information management system. Additionally, the focus on data quality assessment in research information systems highlights the need to maintain high-quality data to support reliable research outcomes.



CHAPTER 3

METHODOLOGY

Research Design

The research design for implementing a Kiosk-based E-research Library and Research Process Automation System for the Computer Engineering Department at the Polytechnic University of the Philippines can be structured using the engineering design process.

This research will begin by identifying the problem faced by the Computer Engineering Department in efficiently gathering and managing panelist recommendations during research defenses. This will involve conducting a thorough analysis of the current manual processes and their impact on data accuracy and efficiency. The next step will involve researching existing literature on information kiosks in academic environments and data quality evaluation in research information systems to gather insights and best practices. Subsequently, the brainstorming phase will focus on conceptualizing the features and functionalities required in the Kiosk-based system to address the challenges identified, enhance efficiency, accuracy, and accessibility, and support professional development for student researchers. The evaluation and selection process will involve assessing the potential benefits of the system, considering factors such as user acceptance, ease of use, and impact on research processes. The



development phase will encompass

designing and planning the

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structural outcome of the kiosk, including hardware and software requirements such as Visual Studio Code, JavaScript, Figma, Blender, MySQL, and Touchscreen Monitor components. Testing and evaluating the system's effectiveness will be crucial to ensure it meets the department's needs and enhances the research defense process. Finally, the implementation phase will focus on deploying the Kiosk-based system within the department, monitoring its performance, and gathering feedback for continuous improvement.

Through this systematic approach, the research design aims to leverage technological advancements to streamline access to research materials, automate processes, and enhance productivity within the Computer Engineering Department at the Polytechnic University of the Philippines.



Flowchart of Research Design

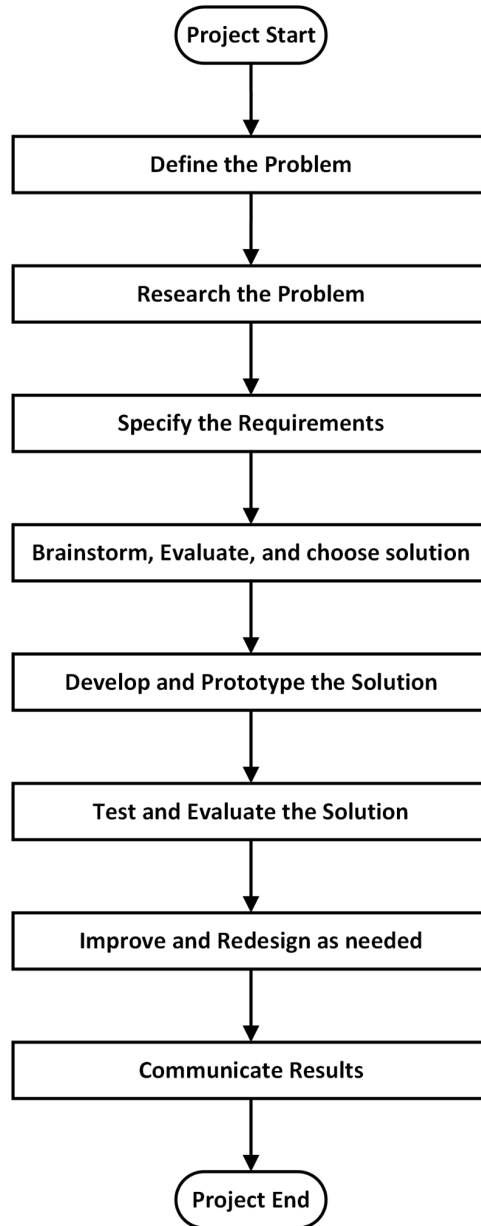


Fig. 3.1 Flowchart of Research Design



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Description of Research Instruments Used

To collect the data required to achieve the intended output, the researchers will use survey questionnaires as the research instrument to assess the study's functionality, reliability, and efficacy. And the Likert-scale will be utilized to allow respondents to express their rate on certain variations of scales such as satisfaction and agreement with the prompts and questions. In addition, the researchers will also prioritize any ethical concerns such as participant confidentiality and informed consent.

Sampling technique

Purposive sampling will be utilized to select participants in this study, including panelists, student researchers, and department administrators involved in research defense. This method allows the researchers to choose the participants based on the purpose of the study. Purposive sampling ensures that the participants selected can provide a valuable insight into the effectiveness and usability of the Kiosk-based system

Statistical Treatment

The collected data from the implementation of the Kiosk-based Research Information Management System will undergo statistical treatment to extract meaningful insights and inform decision-making processes. The primary statistical method utilized is descriptive statistics, aimed at summarizing, organizing, and understanding the features of the measured data. This involves calculating measures such as percentage, mean, and standard deviation to analyze various aspects of the system's performance and user interactions



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- Percentage calculations will be employed to express proportions or frequencies of specific events or outcomes within the dataset. This will allow researchers to quantify the relative contribution or occurrence of different features or functionalities of the Kiosk system.
- The mean will be calculated to determine the average value of certain metrics related to the Kiosk system's performance or user feedback. By summing up relevant data points and dividing by the total number of observations, researchers can assess the central tendency and overall effectiveness of the system.

$$\bar{x} = \frac{\sum x}{n}$$

Where:

\bar{x} = sample mean

$\sum x$ = sum of each value in the sample

n = number of values in the populations

- The standard deviation will be computed to measure the variability or dispersion of data points around the mean. This statistical measure provides insights into the consistency and reliability of the Kiosk system's performance metrics or user feedback.

$$S = \frac{\sum (X - \bar{x})^2}{n}$$



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Where:

s = sample standard deviation

\sum = sum of

x = each value in the sample

\bar{x} = sample mean

n = number of values in the sample

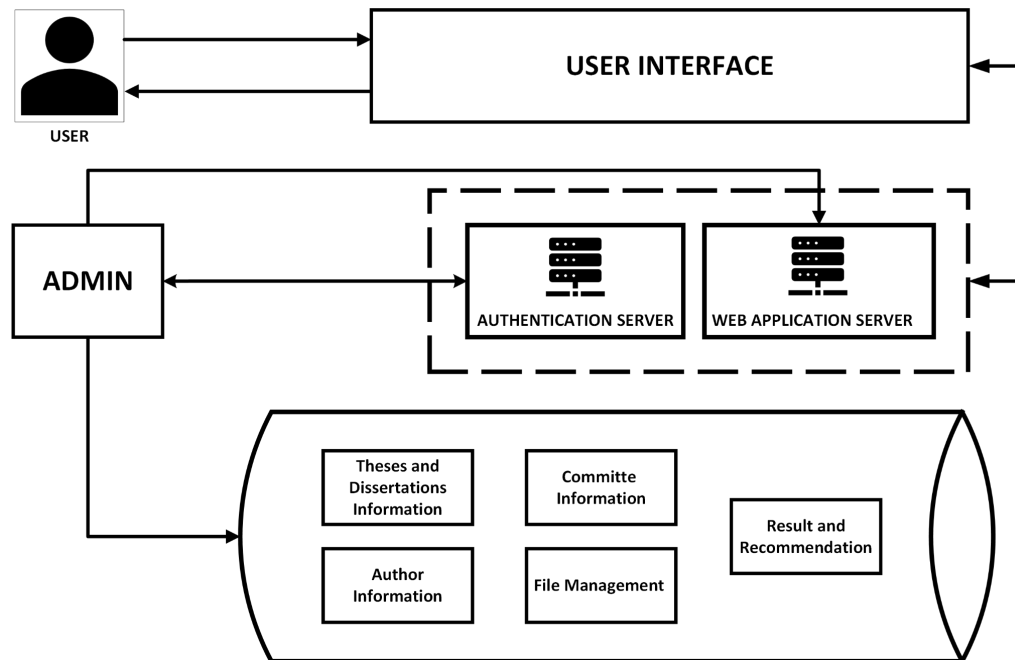
Design Project Flow

A. System Architecture Diagram

The system architecture diagram depicts a three-tier architecture designed in the Model-View-Controller (MVC) pattern. The architecture consists of three layers: the presentation layer (View), the business logic layer (Controller), and the data access layer (Model). This design pattern allows for the separation of concerns, making the system more modular, maintainable, and scalable. The View layer is responsible for user interaction and interface presentation, the Controller layer handles user input and application logic, and the Model layer manages data storage and retrieval. This architecture promotes code reusability, flexibility, and easier maintenance of the system.



Fig 3.2 System Architecture Diagram

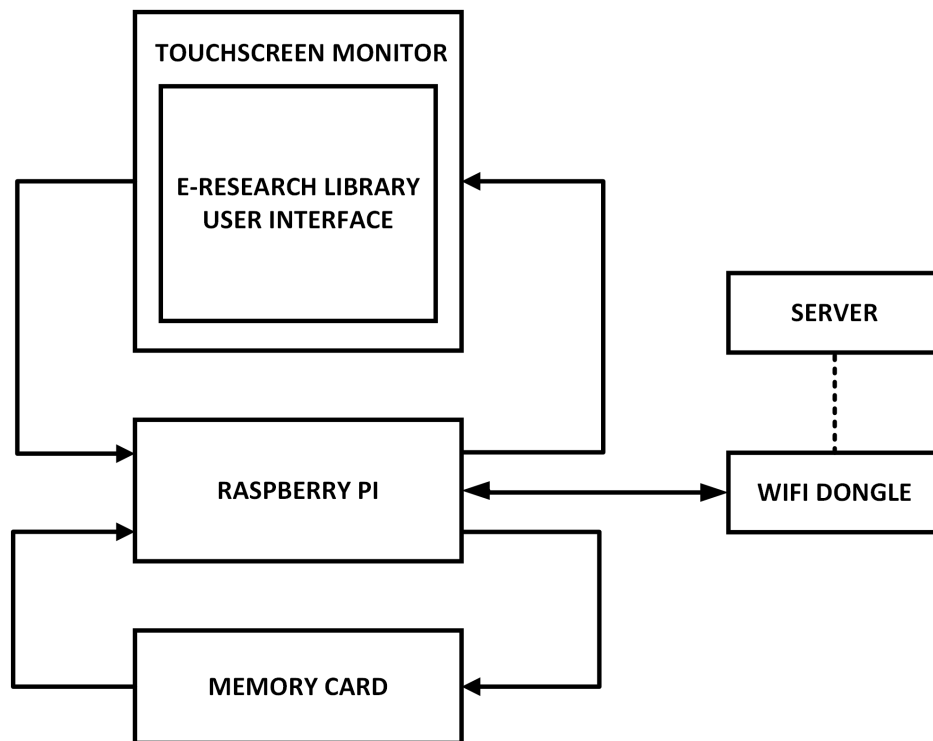


B. Block Diagram

The block diagram of the Kiosk Information Management System comprises a user interface device in the form of a touchscreen monitor. This interfaces with a main controller, which is responsible for processing and managing the information displayed on the monitor. Additionally, the system includes a memory card/SD card for storage and a Wifi Dongle to establish connectivity to the web server, enabling access to online information and updates.



Figure 3.3 Block Diagram



C. Data Flow Diagram

The Data Flow Diagram of the study consists of 2 levels: Level 0 and Level 1. Level 0 shows the context of the system, a simple and broad overview of the system. Meanwhile, the Level 1 shows more details of processing of the system.



Figure 3.4 Data Flow Diagram Level 0

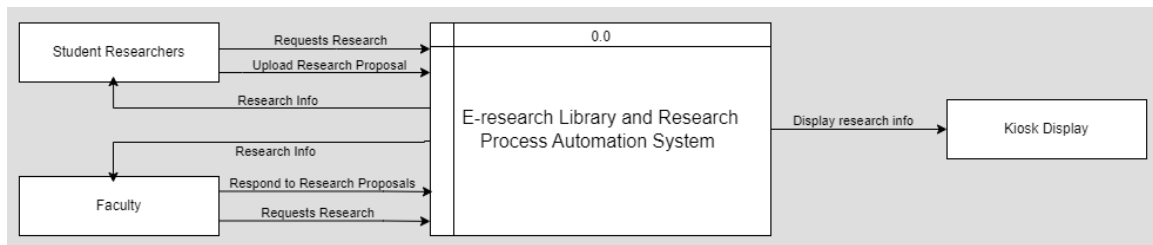
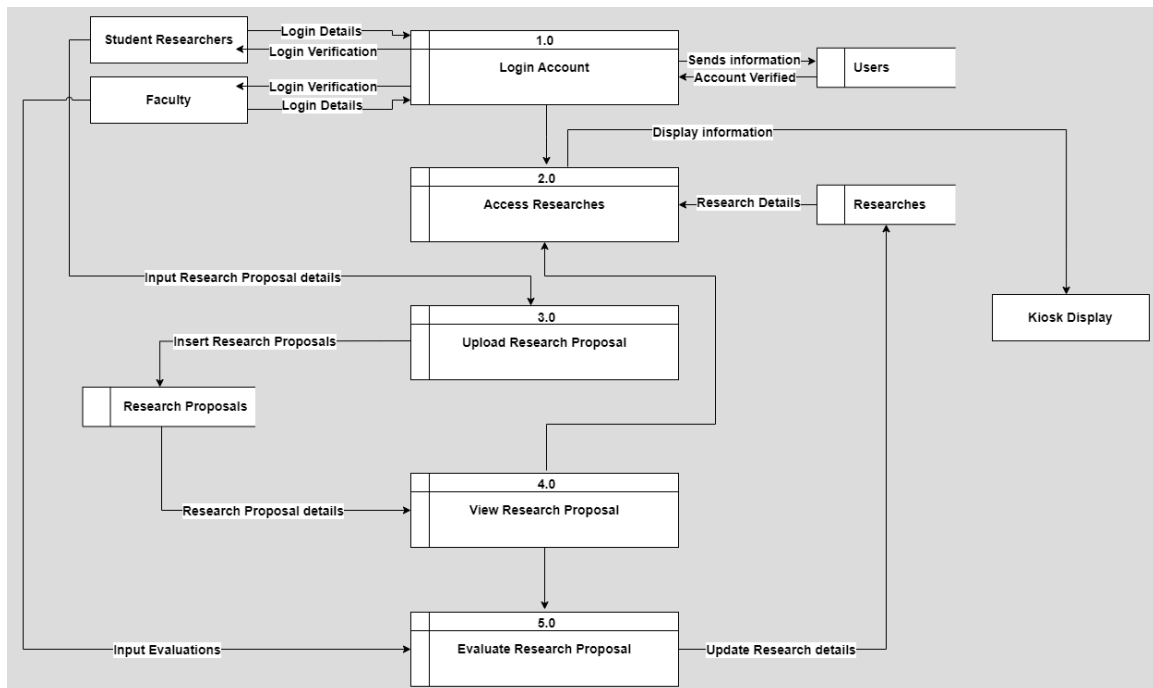


Figure 3.5 Data Flow Diagram Level 1





D. Flowchart

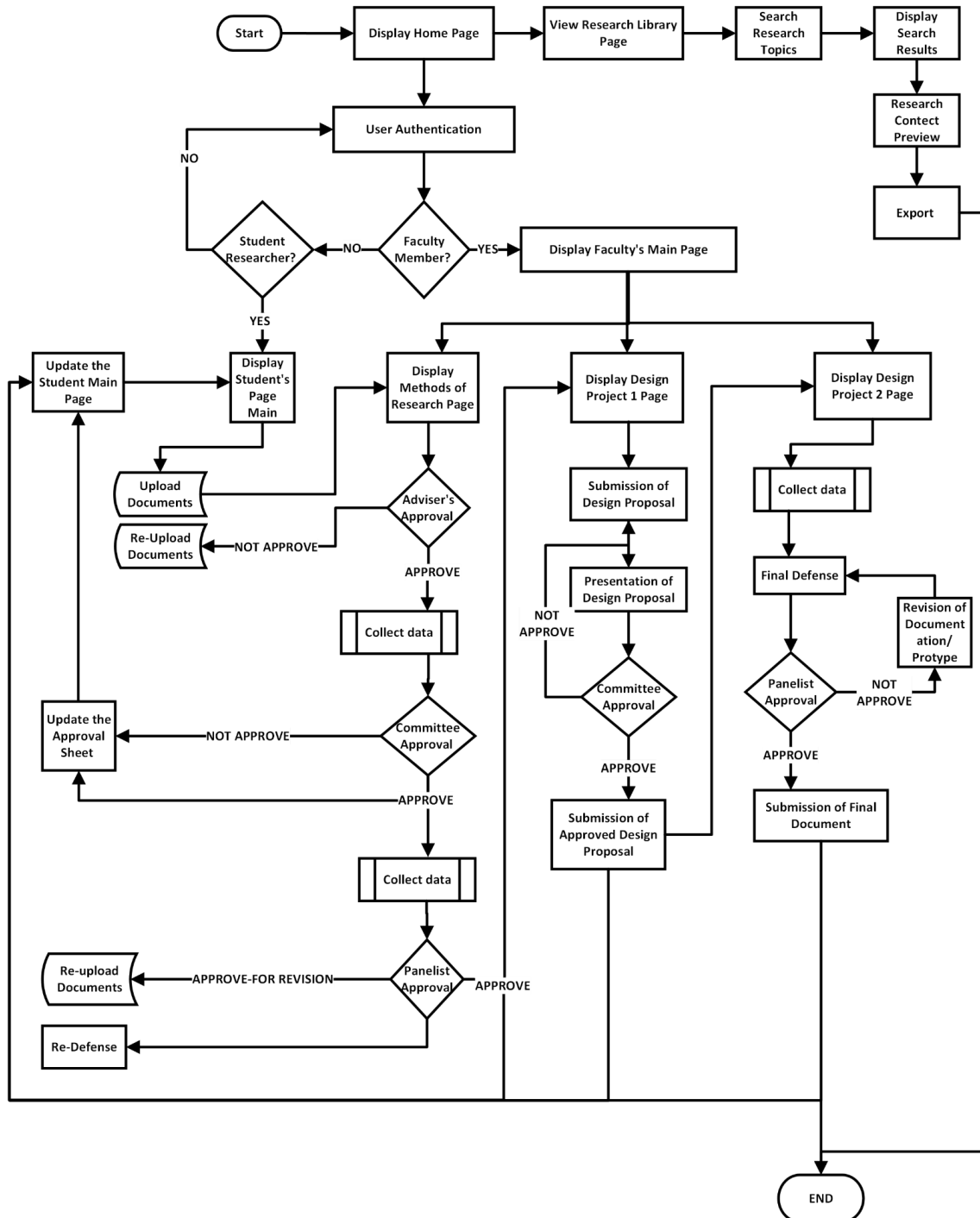


Fig. 3.6 Flowchart



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