



CHAPTER 1 THE PROBLEM

Introduction

Educational institutions such as PHINMA COC rely on their Business Center to provide essential school items, including uniforms, textbooks, and modules. As student enrollment continues to increase, the demand for these items has likewise grown. At present, the PHINMA COC Business Center handles hundreds of inventory transactions monthly, making efficient inventory management critical to its operations.

Despite its importance, the Business Center primarily relies on manual record-keeping and spreadsheet-based monitoring. This approach often leads to inaccurate inventory records, duplicated entries, misplaced files, and delays in report generation. The absence of real-time inventory visibility further limits effective coordination among warehouse staff, purchasing officers, department in-charges, and administrators.

In addition to inventory concerns, staff attendance tracking is manually performed. This practice may result in inaccurate time records, delayed attendance reports, and reduced accountability. These operational challenges affect transparency, efficiency, and timely decision-making.

To address these issues, this study proposes the development of a **Web-Based Inventory and Stock Monitoring Management System with Automated Reporting and Attendance Tracking** for the PHINMA



COC Business Center. The proposed system aims to streamline inventory processes, automate report generation, improve staff attendance monitoring through a Clock-in/Clock-out feature, and provide secure, role-based access for administrative and operational users. **Students are included as view-only users, allowing them to check the availability of products without the ability to modify inventory data or perform transactions.**

Statement of the Problem

The PHINMA COC Business Center currently depends on manual and spreadsheet-based methods for managing inventory and staff attendance. While functional, this system results in inaccurate records, delayed stock replenishment and distribution, limited real-time visibility of inventory levels, slow report generation, reduced accountability due to the absence of role-based access, and unreliable attendance documentation. These challenges negatively affect operational efficiency and coordination among Business Center personnel.



MAIN PROBLEM:

Given the limitations of manual record-keeping and spreadsheet-based monitoring, how can the efficiency, accuracy, and accessibility of inventory management, stock tracking, and staff attendance be improved through a web-based system at the PHINMA COC Business Center?

Specific Problems:

1. Inventory records for uniforms, books, and other school items are often inaccurate or inconsistent.
2. Stock replenishment and distribution are delayed due to manual processing.
3. Real-time visibility of inventory levels is lacking.
4. Monthly and quarterly report generation is slow and labor-intensive.
5. Accountability and transparency are limited due to the absence of role-based access and audit trails.



6. Staff attendance records are prone to errors and delays because they are manually recorded.

Conceptual Framework (IPO Model)

The study uses the **Input–Process–Output (IPO) Model** to guide the development of a **Web-Based Inventory and Stock Monitoring Management System** for PHINMA COC Business Center. This framework illustrates how data flows through the system to address the current challenges in managing **uniforms and books**.

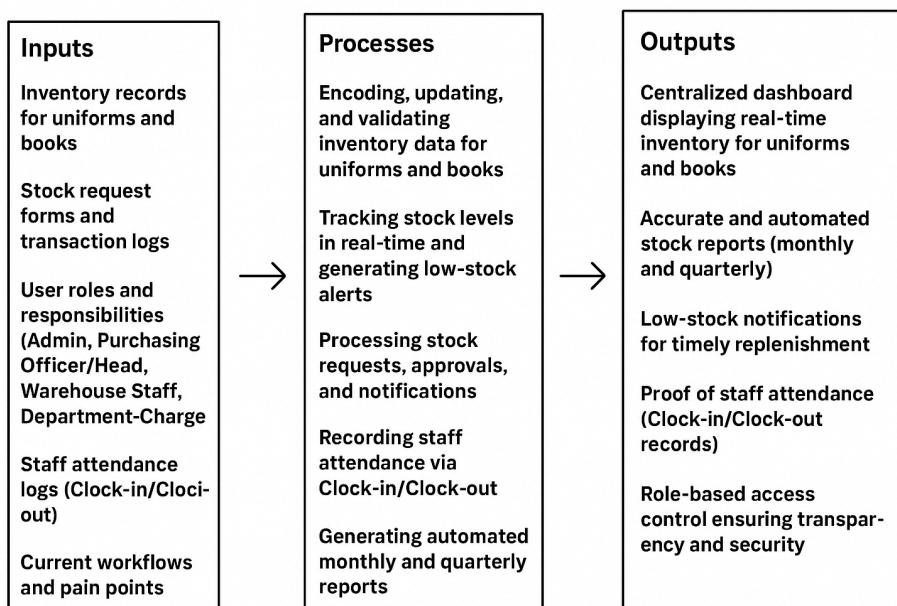


Figure 1. Input–Process–Output Model of the Proposed System

Input



The input stage consists of all the essential data and requirements needed by the system before it can perform any operation. These include:

- **Inventory records for uniforms, books, and other school items**

- **Stock request forms and transaction logs**

- **User roles and responsibilities (Admin, Purchasing Officer/Head, Warehouse Staff, Department In-Charge)**

- **Staff attendance logs (Clock-in/Clock-out)**

- **Current workflows and operational requirements**

- **User feedback on system needs and pain points.**

These inputs allow the system to collect accurate data for both inventory management and staff attendance tracking.

Process

The process stage involves how the system handles, transforms, and manages the input data. These processes include:



- Encoding, updating, and validating inventory data
- Tracking stock levels in real time and sending low-stock notifications
- Processing stock requests, approvals, and notifications
- Recording staff attendance through Clock-in/Clock-out
- Generating automated monthly and quarterly reports
- Implementing secure, role-based access and audit trails
- Supporting mobile access and email/SMS alerts
- Storing digital documents such as invoices and receipts
- Providing analytics dashboards for inventory and attendance trends

These processes transform raw data into organized, validated, and meaningful information.

Output



The output stage presents the final results generated by the system after processing the inputs. These include:

- Centralized dashboard showing real-time inventory and attendance
- Automated stock and attendance reports
- Low-stock notifications and alerts
- Proof of staff attendance through Clock-in/Clock-out records
- Role-based access control ensuring security and accountability
- Improved efficiency, accuracy, and coordination across all operations
- Digital document storage for easy access to stock-related files
- Mobile-friendly system and student portal for better accessibility
- Audit trail logs and calendar integration for task scheduling and accountability

These outputs help PHINMA COC Business Center operate more efficiently, reduce errors, improve coordination, and maintain a reliable record of both inventory and staff attendance.



Objectives of the Study

General Objective:

To design, develop, and evaluate a Web-Based Inventory and Stock Monitoring Management System with Automated Reporting and Staff Attendance Tracking for the PHINMA COC Business Center.

1. Design a centralized system architecture for inventory, stock transactions, and attendance tracking.
2. Develop modules for inventory monitoring, stock requests, approvals, automated reporting, and Clock-in/Clock-out attendance.
3. Implement notification features, analytics dashboards, digital document storage, and mobile-friendly web access.



4. Evaluate the system using ISO/IEC 25010 quality standards and the System Usability Scale (SUS).

5. Implement secure role-based access control to ensure accountability and data integrity.

6. **Provide students with view-only access to check product availability and item information.**

Significance of Study

To the Business Center Administration:

Provides accurate inventory updates, improves reporting efficiency, and enables data-driven decision-making.

To Warehouse Staff and Purchasing Officer/Head:

Simplifies stock monitoring, reduces manual errors, and accelerates stock request processing.

To Department In-Charge:

Provides real-time visibility of available items, improving coordination and timely access to supplies.



To Staff:

Promotes accountability and accuracy in attendance through

Clock-in/Clock-out tracking.

To Students:

Allows students to **view available products and item information in real time**, reducing uncertainty and unnecessary inquiries at the Business Center.

To Future Researchers:

Serves as a reference for developing automated inventory, reporting, and attendance systems in educational institutions.

Scope and Limitations

The study focuses on a web-based system for managing inventory, stock monitoring, automated reporting, and staff attendance at the PHINMA COC Business Center. The system supports multiple user roles with role-based access control.

Students are limited to view-only access, allowing them to check product availability and item details. They are not permitted to modify inventory data, submit stock requests, approve transactions, or access attendance features.



The system does not include payroll processing, financial auditing, barcode scanning, or standalone mobile application development. System accuracy depends on proper data entry by authorized users.

Definition of Terms

- **Attendance** – Refers to the daily presence or absence of staff, recorded through the Clock-in/Clock-out feature of the system.
- **Dashboard** – The interface displaying key information such as real-time inventory levels, notifications, and attendance summaries.
- **Data Privacy Act (RA 10173)** – Philippine law that protects personal and sensitive information processed by the system.
- **Inventory** – The recorded quantities of uniforms, books, and other school-related items managed by the Business Center.
- **Role-Based Access** – A security model where user permissions are assigned according to their role (e.g., Admin, Warehouse Staff, Department In-Charge).
- **School Items** – Includes uniforms, books, modules, and other supplies issued by the Business Center.



- **Stock Monitoring** – The process of tracking item quantities, movements, and availability in real time.
- **Student** – A PHINMA COC student who can only view available products and item information in the system without access to inventory modification, requests, or approvals.
- **Web-Based Inventory System** – The online platform developed to record, track, and manage inventory, staff attendance, and automated reports.



CHAPTER 2

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter presents relevant literature and studies that support the development of the proposed **Web-Based Inventory and Stock Monitoring Management System with Automated Reporting and Attendance Tracking** for the PHINMA COC Business Center. The review includes both local and international sources discussing key concepts such as inventory automation, digital record management, real-time stock monitoring, staff attendance systems, and role-based access control.

The selected literature addresses issues directly related to the study's **Statement of the Problem**, including inaccurate records, delayed reporting, lack of real-time visibility, and limited accountability in traditional manual processes. Furthermore, the reviewed works strengthen the study's objectives by highlighting proven system features and best practices such as automated reporting, centralized databases, workflow routing, and secure permission settings, which contribute to improved operational efficiency, data accuracy, and system usability.

Through this review, the study establishes a strong theoretical and empirical foundation for designing a responsive and reliable inventory and attendance management system tailored to the needs of PHINMA COC Business Center.



Local Literature

According to Santos (2020), there is a growing adoption of web-based systems in Philippine educational institutions to improve inventory management and administrative efficiency. These systems have been shown to reduce manual errors, streamline stock monitoring, and enhance reporting capabilities.

In a study conducted by Cruz and Reyes (2021), web-based inventory systems implemented in Philippine universities and small colleges improved the accuracy of stock records for uniforms, books, and learning modules. The study highlighted that centralized digital platforms allow real-time tracking of inventory, prevent duplicate entries, and facilitate faster stock issuance and replenishment. Santos and Villanueva (2019) further noted that proper system design, role-based access control, and user-friendly interfaces contribute to smoother coordination among staff, department heads, and administrators.

Research conducted in Philippine schools and DepEd offices also emphasizes the benefits of automated workflows for inventory and attendance management. According to Garcia et al. (2021), systems that integrate stock request forms, approval processes, and reporting mechanisms significantly reduce manual paperwork and enhance accountability. Similarly, local academic projects featured in warse.org (2020) point out that while technology improves efficiency, consistent user



training, proper data encoding, and active monitoring are necessary to maintain accurate and reliable records.

Overall, local literature establishes that web-based inventory systems in Philippine educational settings enhance operational efficiency, data accuracy, and coordination—insights directly informing the proposed system for PHINMA COC Business Center

Foreign Literature

According to Karthikeyan and Sivasankar (2021), web-based inventory platforms provide real-time visibility of stock levels and reduce discrepancies caused by manual tracking. Their study highlighted that automation enhances data accuracy and minimizes operational delays, benefiting institutions handling large volumes of item transactions.

In a study conducted by Olanrewaju and Adeyemi (2022) in Nigeria, digital inventory systems significantly improved accountability through role-based access and audit trails. The authors emphasized that assigning specific user permissions helps prevent unauthorized modifications, strengthening data security and compliance with institutional policies.

Research by Zhang and Liu (2023) in China showed that web-based stock monitoring systems streamline workflow processes through automated notifications and reporting functions. Their findings demonstrated that



automated alerts for low stock levels and scheduled reports enable faster decision-making and prevent shortages—essential for institutions managing educational supplies such as books and uniforms.

Al-Harbi (2022) further examined web-based attendance monitoring using Clock-in/Clock-out automation. The results indicated that digital attendance systems reduce inaccuracies and improve transparency in employee timekeeping. The study concluded that integrating attendance features into existing institutional systems enhances overall operational management.

Collectively, foreign literature highlights the global effectiveness of automated inventory, reporting, and attendance systems in reducing errors, improving transparency, and enhancing workflow efficiency. These insights support the development of a web-based system for PHINMA COC Business Center as a modern solution to manual operational challenges.



Local Studies

According to a project featured on warse.org (2020), web-based inventory systems developed for universities and small businesses help reduce manual errors and improve stock monitoring. The study also emphasized that proper user training is crucial to maintaining data accuracy—an issue directly relevant to PHINMA COC.

Cruz and Reyes (2021) published case studies on ResearchGate highlighting Philippine schools that implemented automated inventory workflows. Their research showed that systems using forms, approvals, and role-based access improved coordination and accountability, demonstrating that automation positively affects operational efficiency.

Foreign Studies

Studies published in the **Formosa Journal** (2022) highlighted how web-based inventory systems help organizations maintain accurate records, track stock levels in real time, and reduce errors caused by manual spreadsheets. These systems provide centralized data storage and automated alerts for low stocks, aligning with the operational needs of PHINMA COC.

Research on ResearchGate (2021) further described the advantages of integrating multiple campus services, such as inventory tracking and attendance, into a single platform. The study noted that integrated systems reduce duplicate work, support approval workflows, and strengthen



accountability through audit trails, directly aligning with the objectives of PHINMA COC's proposed system.

Synthesis of Reviewed Literature and Studies

According to the reviewed local and international literature, there is a growing need for automated and centralized inventory systems in educational institutions. Local studies, such as those from WARSE (2020) and ResearchGate (2021), demonstrated that web-based inventory systems significantly reduce manual errors, streamline data encoding, and improve overall stock monitoring. These studies also highlighted the importance of user training in maintaining data accuracy—a challenge observed at PHINMA COC, where reliance on spreadsheets often results in inconsistent records and reporting delays.

Research involving Philippine schools (Garcia et al., 2021) further revealed that automated workflows incorporating forms, approvals, and role-based access controls improve coordination among stakeholders, enhance accountability, and ensure accurate information is available for decision-making. Foreign studies (Karthikeyan & Sivasankar, 2021; Zhang & Liu, 2023) reinforced these findings by showing how web-based inventory systems maintain real-time stock visibility, reduce reliance on error-prone spreadsheets, and automate low-stock alerts.

Furthermore, studies exploring integrated campus systems, which combine inventory, attendance, and workflow automation (Al-Harbi, 2022; ResearchGate, 2021), demonstrated that merging related functions within a single platform enhances efficiency and strengthens audit trails. These insights align with



PHINMA COC's need for improved accountability, real-time reporting, and role-based access.

Overall, the reviewed literature supports the development of an automated, web-based inventory and stock monitoring system with attendance tracking. The consistent findings across local and international studies indicate that such a system can address issues of inaccurate records, slow reporting, limited transparency, and manual attendance tracking, providing a strong foundation for PHINMA COC's proposed solution.





Research Gap

Despite extensive research on automated inventory systems and digital record-keeping, several gaps remain in existing literature relevant to PHINMA COC Business Center:

- 1. Limited Studies Focused on Inventory Systems for Educational Business Centers:** Most existing systems target retail, warehouses, or general school inventory, with few addressing the unique operations of school business centers handling uniforms, books, and student requests (Santos, 2020).
- 2. Lack of Integrated Inventory and Staff Attendance Tracking in One Platform:** Prior studies often focus on either inventory management or attendance monitoring alone. Integrated solutions combining stock monitoring with Clock-in/Clock-out attendance remain underexplored (Al-Harbi, 2022).
- 3. Insufficient Emphasis on Automated Monthly and Quarterly Reporting:** Existing literature highlights basic stock monitoring but rarely addresses automated generation of structured reports, a core operational need for PHINMA COC (Cruz & Reyes, 2021).
- 4. Limited Use of Role-Based Access for Multi-Department Coordination:** Many systems do not implement comprehensive role-based controls for Admin, Purchasing Officer, Warehouse



Staff, Department In-Charge, and student requesters, resulting in limited accountability and unclear approval workflows (Olanrewaju & Adeyemi, 2022).

5. Scarcity of Systems Evaluated Using ISO 25010 Standards:

Most related studies assess basic functionality only, with few providing systematic evaluation based on ISO 25010 software quality criteria such as reliability, security, usability, and maintainability (Karthikeyan & Sivasankar, 2021).

6. Minimal Research Addressing Spreadsheet-Dependent

Operations in Schools: Although many institutions still rely on manual or spreadsheet-based processes, few studies directly address the transition from spreadsheet systems to fully automated web-based platforms tailored to school inventory workflows (Garcia et al., 2021).



CHAPTER 3

Research Design

This study employed a **developmental research design** using a **descriptive–evaluative approach**. The primary focus was the design, development, and preliminary evaluation of a **Web-Based Inventory and Stock Monitoring Management System with Automated Reporting and Attendance Tracking** intended to improve the efficiency, accuracy, and accountability of operations at the PHINMA COC Business Center.

The developmental approach enabled the systematic creation of the proposed system based on identified user requirements, while the descriptive–evaluative method assessed the system's quality, usability, and effectiveness. System evaluation was conducted using recognized software quality standards, specifically **ISO/IEC 25010** and the **System Usability Scale (SUS)**. This research design is appropriate for IT capstone projects where both system development and performance evaluation are the primary objectives.



Respondents and Sampling Technique

The respondents of the study consisted of individuals who are the intended users of the proposed system. These include Administrators, Purchasing Officers/Heads, Warehouse Staff, Department In-Charge personnel, and students of PHINMA COC.

The respondents were distributed as follows: one (1) Administrator, two (2) Purchasing Officers/Heads, six (6) Warehouse Staff, and one hundred twenty (120) Department In-Charge personnel.

Students were considered view-only system users. Their interaction with the system was limited to checking product availability and viewing item information. They were not involved in inventory management, stock requests, approvals, or attendance monitoring.

The study employed **purposive sampling**, selecting respondents based on their direct involvement in Business Center operations and familiarity with the existing manual inventory and attendance processes.



Research Locale

The study was conducted at the **PHINMA COC Business Center**, located within the PHINMA COC campus. The Business Center was selected due to its reliance on manual and spreadsheet-based inventory management, which results in challenges such as inaccurate stock records, delayed reporting, and inefficient monitoring. The locale provided an appropriate environment for identifying system requirements and evaluating the developed system under actual operational conditions.

Data Gathering Procedure

The data gathering process followed a structured and systematic procedure to ensure accuracy and reliability:

1. **Permission and Coordination** – Formal approval was secured from the Business Center administration to conduct the study and gather relevant data.
2. **Requirements Gathering** – Interviews, observations, and surveys were conducted with administrators, staff, and students to identify workflow issues and system requirements.
3. **System Design and Development** – Collected requirements served as the basis for designing and developing the proposed system.



4. **System Testing** – Functional testing ensured that all system features operated correctly.
5. **System Evaluation** – Respondents evaluated the system using standardized instruments (ISO/IEC 25010 and SUS).
6. **Data Compilation and Analysis** – Evaluation results were collected, tabulated, and analyzed for interpretation.

Research Instruments

Standardized evaluation instruments were used to assess the developed system:

- **ISO/IEC 25010 Software Quality Model** – Assessed functional suitability, performance efficiency, usability, reliability, security, maintainability, and portability using a five-point Likert scale (1 – Strongly Disagree to 5 – Strongly Agree).
- **System Usability Scale (SUS)** – Measured overall system usability and user satisfaction using ten (10) statements rated on a five-point Likert scale. Higher SUS scores indicate better usability and user experience.

Reliability testing was conducted to ensure consistency of responses.

Where applicable, **Cronbach's Alpha (α)** was computed to verify internal reliability. Baseline comparisons between the manual system and the web-based system were also used to measure improvements in efficiency, error reduction, and user satisfaction.



System Development Life Cycle (SDLC)

The study adopted the **Modified Waterfall Model** as the SDLC framework due to its structured and sequential approach, suitable for systems with clearly defined requirements such as inventory and attendance management systems. Each phase was completed before proceeding to the next to ensure systematic development and minimize errors.





Planning Phase

This phase identified overall objectives, target users, and expected outputs.

Meetings with Business Center staff were conducted to understand existing workflows and challenges. Project scope and limitations were defined to ensure feasibility within the Capstone 1 timeline, and a project plan outlining activities, responsibilities, and schedules was prepared.

Requirements Gathering Phase

Essential information was collected through:

- Interviews with administrators, warehouse staff, and department heads
- Direct observation of inventory tracking and attendance processes
- Surveys to identify system limitations and desired features

These inputs formed the basis for system modules such as inventory monitoring, stock requests, automated reporting, and clock-in/clock-out attendance tracking.



Analysis and Design Phase

The Analysis and Design Phase focused on designing the system architecture, database structure, user interactions, and information flow.

- **Conceptual Design** – A context diagram illustrated system interactions with Administrators, Purchasing Officers/Heads, Warehouse Staff, Department In-Charge personnel, and **Students** (**view-only**).
- **Use Case Diagrams** – Students were limited to the “**View Product Availability**” use case, while all inventory, approval, reporting, and attendance functions were assigned to authorized personnel only.
- **Database Design** – An Entity-Relationship Diagram (ERD) and logical database schema were developed, applying normalization techniques to reduce data redundancy and ensure data integrity.
- **Process Flowcharts** – Manual and proposed system flowcharts were created to visualize workflow improvements and demonstrate how automation streamlines inventory and attendance management.



Development Phase

This phase focused on building the system based on the design specifications. A three-tier architecture was employed, ensuring a clear separation between the presentation, application, and database layers.

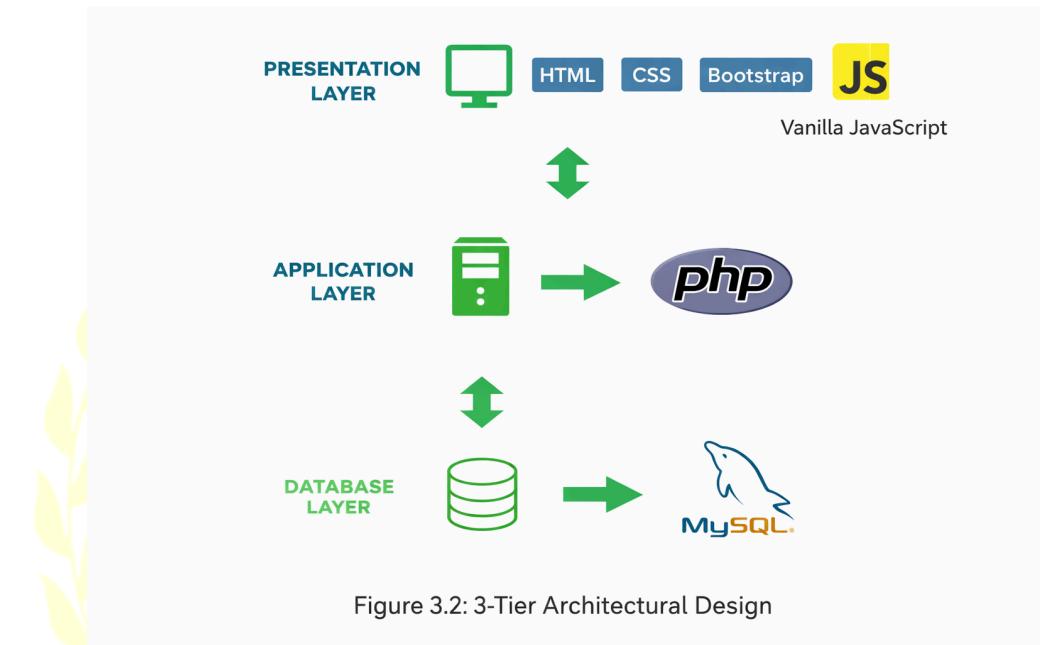


Figure 3.2: 3-Tier Architectural Design

Testing and Evaluation Phase

System testing and evaluation were conducted to ensure the correctness, reliability, and usability of the developed system. The following testing activities were performed:

- **Functional Testing** – Verification of all system features, including inventory tracking, stock requests, approval workflows, notifications, automated report generation, and Clock-in/Clock-out



attendance logging.

- **Scenario-Based Testing** – Simulation of real-world user interactions such as login, data entry, stock request submission and approval, and report generation. **Student interactions were limited to viewing product availability and item information only.**

- **System Evaluation** – One hundred twenty-nine (129) respondents evaluated the system using the ISO/IEC 25010 Software Quality Model and the System Usability Scale (SUS). Students participated only in usability-related evaluation criteria, including interface clarity and ease of access to product information, and were excluded from functionality, security, and administrative feature evaluation.

Additional testing included reliability checks, baseline comparisons between the existing manual system and the developed web-based system, and security assessments to ensure compliance with the **Data Privacy Act of 2012 (RA 10173)**.



Deployment Phase

The Deployment Phase involved making the system fully operational at the PHINMA COC Business Center. This phase included hosting and configuring the system on the server, ensuring accessibility through web browsers, and conducting user training for administrators, staff, and students. Users were guided on proper inventory management, report generation, and attendance tracking to ensure smooth system adoption.

Deployment ensured that the system delivered its intended benefits, including improved efficiency, accurate inventory records, streamlined attendance tracking, and enhanced user experience.

Tools, Technologies, and Technical Environment

The system was developed using the following tools and technologies:

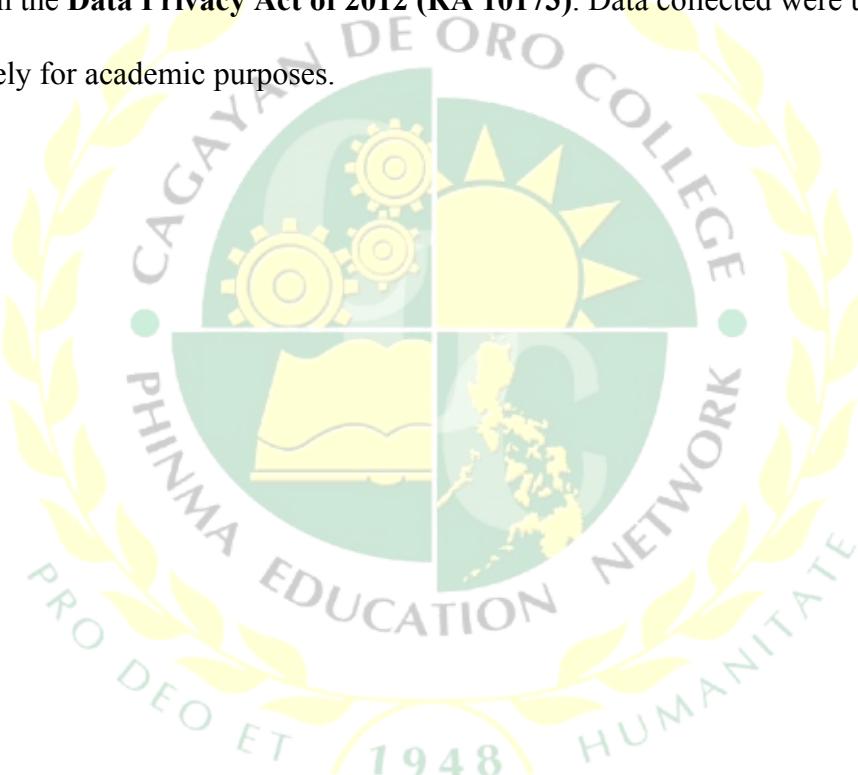
- **Programming Languages:** PHP, JavaScript
- **Frameworks/Libraries:** Bootstrap 5
- **Database Management System:** MySQL
- **Development Tools:** Visual Studio Code, XAMPP
- **Operating System:** Windows 10
- **Web Browser:** Google Chrome

These tools and technologies were selected based on their compatibility, accessibility, and suitability for web-based system development.



Ethical Considerations

Ethical standards were strictly observed throughout the study. All respondents provided informed consent prior to participation and were informed of their right to withdraw at any time. Confidentiality and anonymity were ensured, and all personal data were handled in compliance with the **Data Privacy Act of 2012 (RA 10173)**. Data collected were used solely for academic purposes.





CHAPTER 4

Analysis and Interpretation

