Prin Track_ Real-Time Workflow Monitoring Management and Inventory using Predictive Analytics and Logistic Regression Algorithm for Designers Print

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ABSTRACT

The PrinTrack System is a web-based workflow monitoring and inventory management platform developed to enhance the efficiency, accuracy, and transparency of customized printing operations. It enables administrators and operators to monitor order progress, manage inventory, and track production status in real time. Developed for Designer's Print, a small-scale printing company specializing in customized shirts, mugs, and stickers, the system addresses issues related to delayed tracking, miscommunication, and inefficiency in manual monitoring processes. PrinTrack, a real-time workflow monitoring and inventory management system that utilizes predictive analytics through the Logistic Regression algorithm to enhance operational efficiency for Designers Print. It seeks to predict product demand and workflow status, enabling data-driven decisions for inventory control and resource allocation. PrinTrack also offers administrative control, live notifications, and an organized database structure for efficient record management.

The study employed a quantitative research design using structured surveys and system testing to collect measurable data regarding the system's functionality, reliability, and usability. Developed using PHP for backend processes, JavaScript and CSS for user interface design, and MySQL for database management, the system utilizes data visualization tools to monitor workflow and inventory in real time. The study utilized the Iterative Methodology, allowing the system to be continuously developed, tested, and refined based on user and expert feedback. This approach ensured that improvements were made in each cycle, enhancing the system's reliability, usability, and overall performance. In accordance with the ISO 25010 Software Quality Model, the system was evaluated in terms of Reliability, Efficiency, Usability, Security, and Portability by 50 respondents comprising 40 users and 10 technical experts. Their evaluation provided comprehensive insights into both user experience and technical functionality, ensuring that the system met quality standards and operational effectiveness.

PrinTrack is a web-based system that enhances workflow monitoring and inventory management for Designer's Print using predictive analytics through the Logistic Regression algorithm. The system effectively improved operational efficiency, reliability, and usability based on ISO 25010 evaluations from users and technical experts. It is recommended to integrate mobile accessibility and advanced analytics to further enhance system functionality and decision-making efficiency.

Keywords: PrinTrack, Workflow Monitoring System, Real-Time Inventory, Logistic Regression Algorithm, Customized Product Manufacturing, PHP, MySQL, Iterative Methodology, Predictive Analytics, ISO 25010

INTRODUCTION

Operational effectiveness and real-time production monitoring are essential elements of customer satisfaction and business success in the customized product manufacturing industry, especially for companies making personalized stickers, mugs, and hats. Due to the personalized nature of bespoke items, conventional manual

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tracking techniques frequently result in inefficiencies including incomplete orders, misunderstandings between departments, and opaque manufacturing processes.

For companies of all sizes, the Smart Inventory Management System is a complete solution that makes inventory tracking, order management, and restocking easier. Through automation and real-time monitoring, it guarantees that companies keep the proper stock levels, avoid shortages, and steer clear of overstocking. Enhancing retail productivity and profitability requires careful inventory control and sales analysis. To find product linkages and improve cross-selling prospects, this project offers a data-driven methodology that incorporates association analysis. (K.R. Aswathy et al., 2025).

The company was officially established in January 2021. By April of the same year, 77 P. Visitacion, Brgy. Kalawaan, Pasig City the business began hiring its initial team members to support its growing operations. According to the company's co-founder, the idea to start the business came from a shared vision between him and a former colleague and close friend, both of whom previously worked as engineers in a construction firm. The company currently faces challenges in efficiently tracking and managing customized product orders, especially when the owner is away from the physical location. Without a centralized and accessible system, monitoring the progress of each order and maintaining accurate inventory records becomes difficult, leading to delays, miscommunication, and potential errors in fulfilling customer requests. As the business grows and the volume of online orders increases, manual tracking methods become less practical and more prone to mistakes. Therefore, there is a critical need for an online system that provides real-time visibility into order statuses and inventory levels. Such a system will enable the owner and staff to monitor operations remotely, ensure timely production, and maintain sufficient stock, ultimately improving customer satisfaction and operational efficiency.

The specific objectives of the study are to:

1. To create a real-time monitoring system that uses Logistic Regression functions
2. To update the status of ongoing production automatically, eliminating the need for human refreshes.
3. To develop a dashboard for inventory tracking that displays restock levels and available supplies, along with automated notifications when inventory hits a critical level.
4. To create a product monitoring tool that shows the estimated time of completion and manufacturing status of each item, automatically updating when a stage is finished or delayed.
5. To create a workflow monitoring module that walks users through the printing process step-by-step and advances to the next step automatically when tasks are completed.
6. To provide an assessment framework based on ISO/IEC 25010 in order to evaluate the system's security, usability, efficiency, and functionality in real-time.

Scope

The main features and capabilities that facilitate the effective tracking of orders, inventory, and production workflows are covered by PrinTrack: Real-Time Workflow Monitoring Management and Inventory. Each of the system's five primary divisions is crucial to maintaining efficient operations and accurate reporting.

The key features integrated into the system include:

Orders

- Allows admins to monitor all ongoing jobs
- Displays key details like Order ID, workflow status, and priority level.
- Includes a search function and tools to move orders through different production stages.
- Helps manage production queues and prioritize tasks efficiently.

Finished Orders

- Logs all completed jobs for reference and reporting.
- Provides a summary table with order details and timestamps.

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- Includes visual reports such as monthly bar charts and product distribution pie carts.
- Supports post-production review and performance analysis.

Analytics

- Offers real-time insights through graphs and charts.
- Displays orders per day, workflow distribution, and priority breakdown.
- Tracks weekly order trends to help with planning and forecasting.
- Assists in identifying busy periods and balancing workloads.

Instructions

- Provides detailed, categorized printing instructions for different products.
- Ensures production consistency and quality control.
- Acts as a guide for staff during each step of the workflow.

Inventory

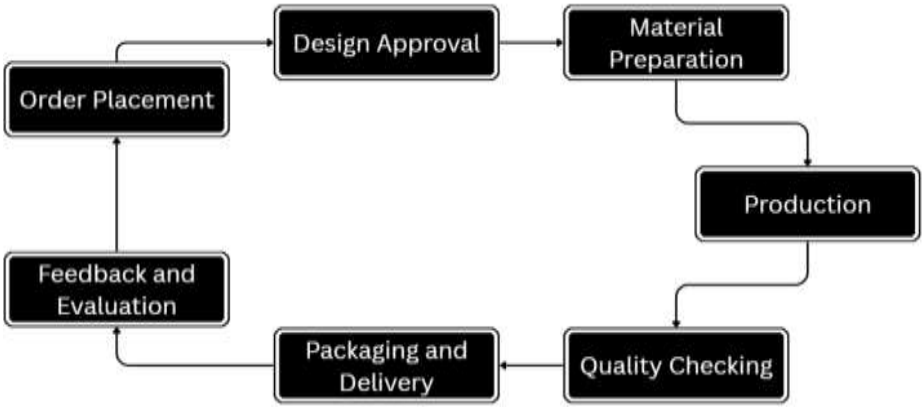
- Monitors stock levels of materials needed for production.
- Tracks usage history and remaining supplies.
- Sends alerts when items fall below the restock threshold.
- Helps prevent delays due to missing materials.

LIMITATION

The creation of a web-based, real-time production status display system tailored for print-on-demand companies is the exclusive focus of this project. To simplify and automate the tracking of printing operations, inventory levels, workflow procedures, and product status, the system makes use of a logistic regression algorithm. The fact that this project will only run online and needs a steady internet connection to work properly is one of its main limitations. This system's primary functionality depends on real-time data processing and cloud-based monitoring, hence it cannot be used offline or deployed standalone. Although this restriction guarantees that data is current and remotely available, it may also limit system usability in places with erratic or inadequate connectivity. Furthermore, features pertaining to marketing or advertising are not supported by the system. Features like sponsored content, banner ads, and product promotions are purposefully left out because the system's main goal is to improve operational efficiency and visibility in the manufacturing setting, not to act as a platform for commerce. Task automation, real-time reporting, and production management are given top priority in this system, which is designed for internal corporate use. Therefore, tasks not directly associated with manufacturing processes are outside the scope of this project's intended design and execution.

THEORETICAL FRAMEWORK

Figure 1: Process of Manufacturing A Customized Product



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The following collection of ideas, theories, concepts, and presumptions aids in comprehending the study question:

Predictive analytics

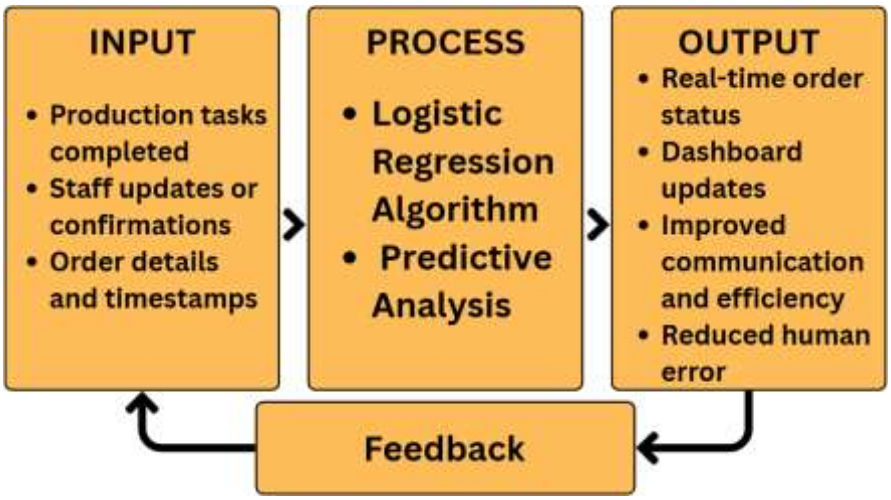
Involves using historical or observed data to forecast future outcomes or classify trends in a dataset. In this study, logistic regression is applied as the primary predictive model to estimate the probability of a specific result based on identified variables. By mapping input data into a sigmoid function, logistic regression converts linear combinations of predictors into probability scores that determine class membership. This approach enables the system to analyze existing patterns, evaluate critical relationships among variables, and generate outcome predictions with measurable accuracy. Through predictive analysis, the research can provide data-driven insights that support informed decision-making and improve system performance.

Logistic Regression

It is used in the PrinTrack system to predict whether a product or print design will fall into the lowest-selling or highest-selling category by analyzing historical and real-time sales data. It takes different factors such as customer demand, order frequency, and inventory levels, and converts them into probability values using the sigmoid function. Based on these probabilities, PrinTrack can classify which products are likely to perform well and which may underperform. This allows the system to support better inventory planning, avoid stock shortages or excess supplies, and help designers focus on high-demand print items.

CONCEPTUAL FRAMEWORK

Figure 1: Process of Manufacturing A Customized Product



This conceptual framework explains how the proposed system functions using the Input–Process–Output (IPO) model as its structure. It outlines how data flows and transforms throughout the system to deliver its intended results

The PrintTrack system processes collected data through several automated operations:

1. **Input Stage –** The system collects sales data, inventory updates, order frequency, and timestamps to monitor what products are being purchased and how often they are requested in real time.
2. **Process Stage –** PrinTrack uses Predictive Analytics and a Logistic Regression Algorithm to classify products as highest-selling or lowest-selling based on changing demand and sales trends.
3. **Output Stage** – The system provides real-time insights on product performance, sends alerts for low-demand inventory, and updates the dashboard to support faster and smarter decision-making for designers and staff.
4. **Feedback Loop –** Continuous data input helps refine future predictions, ensuring that PrinTrack becomes more accurate over time in managing workflow efficiency and material allocation.

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Significance of The Study

The following collection of ideas, theories, concepts, and presumptions aids in comprehending the study question:

- Employee/Client: This study provides a practical and affordable tool for small to medium manufacturing businesses to track production in real time. Using a logistic regression algorithm, the system automates updates, reduces manual errors, and improves workflow visibility. Through a centralized dashboard, staff and administrators can easily monitor orders, prioritize tasks, and coordinate better, leading to smoother operations. Although customers don't directly use the system, they benefit from faster processing, on-time deliveries, and improved service quality.
- Customers: Customers can view the progress of their orders from design to delivery without editing access. This promotes transparency, builds trust, and keeps them informed in real time, improving satisfaction and confidence in the service.
- Students/Researchers: For students and researchers, this project can serve as a model for future studies in smart manufacturing and real-time monitoring. It encourages further innovation, such as adding IoT integration, customer notifications, or inventory tracking. Academically, it shows how logistic regression programming and system design can solve real business challenges effectively.

REVIEW OF RELATED LITERATURE

The collected foreign and local literature and studies present a cohesive view of the growing relevance and impact of logistic regression, real-time monitoring systems in the context of Industry 4.0. A common thread among these works is the emphasis on intelligent automation, real-time responsiveness, and the reduction of manual intervention in industrial and production settings all of which strongly align with the goals and design of the capstone project, PrinTrack.

The foreign studies reviewed One of the most significant uses in the Industry 4.0 era is smart manufacturing systems (SMS), which have many benefits over conventional production systems and are quickly being adopted by manufacturing companies as a performance-enhancing tactic. SMS is a cutting-edge and well-liked manufacturing setup that creates ever-more-intelligent production systems, but designers still need to adjust to the needs and preferences of businesses. Functional and non-functional, technological, economic, social, and performance assessment components that are critical to SMS evaluation are identified and evaluated in this study using an analytical and descriptive research methodology. In order to evaluate business requirements and prioritize and propose SMS services, a predictive analytics framework, a crucial part of many decision support systems is employed.

Predictive and prescriptive maintenance permits various industries to analyze historical data in real time for the purpose of optimization of industrial operations, such as production, manufacturing, etc. to increase productivity and cumulative outcome. It considers three essential indicators of availability, quality, and performance. This article presents the unique condition-monitoring-based predictive maintenance framework incorporated into the modern world to create a machine-learning-based predictive maintenance approach for automotive industries. The proposed framework has been validated by collecting the raw data from the water pump machine through sensors to preprocess and analyze the performance indicators. The equipment's remaining useful lifetime was calculated based on the data points acquired in real time by calculating the adjacent variation. The developed dashboard has allowed the visible monitoring of all possible anomalies and the remaining useful life of equipment while the machine runs in real time.

Synthesis

In summary, the reviewed materials validate the core design of PrinTrack and highlight areas for future enhancement, including greater automation, predictive analytics, and advanced scheduling mechanisms. The consistency of themes across local and international sources supports the conclusion that PrinTrack is a timely and strategic response to the ongoing digital transformation in manufacturing, offering real-world value even as it evolves toward full smart system integration.

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METHODOLOGY OF THE STUDY

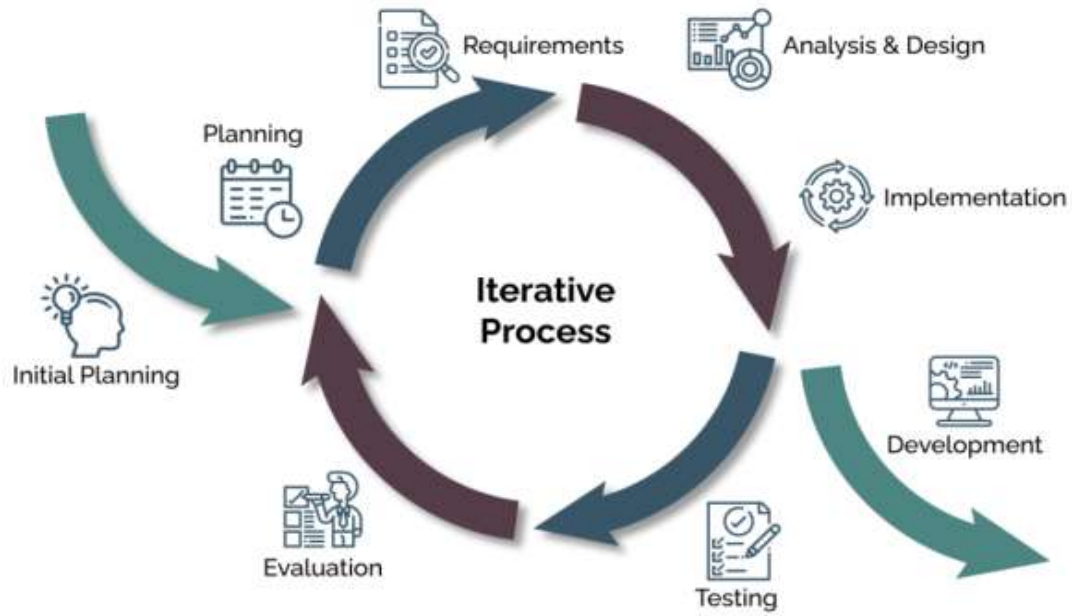
This study uses a Quantitative Research Design, focusing on the development of a web-based platform called PrinTrack, designed to improve production monitoring and inventory management for customizable product manufacturers.

In PrinTrack: Real-Time Workflow Monitoring Management and Inventory using Predictive Analytics and Logistic Regression Algorithm for Designers Print, logistic refers to the effective organization and movement of materials, tasks, and inventory to ensure smooth and timely printing operations. By applying Logistic Regression, the system can also predict workflow outcomes, helping optimize scheduling, reduce delays, and improve overall production efficiency.

The research involves selected company staff and administrators who are directly engaged in daily production activities. Using a purposive sampling method, only participants with relevant experience in managing or monitoring production were included to ensure accurate and meaningful feedback for system development.

To gather data, the researchers used survey questionnaires and informal interviews to understand existing workflows, common production issues, and user requirements. Additional information was collected from order logs, inventory sheets, and production schedules to analyze current processes. This data served as the foundation for designing the system's features and functionality. Feedback from users during testing was used to enhance system performance, reliability, and user experience. All data collection followed ethical standards, including informed consent and data privacy compliance, to ensure the confidentiality and security of participant information.

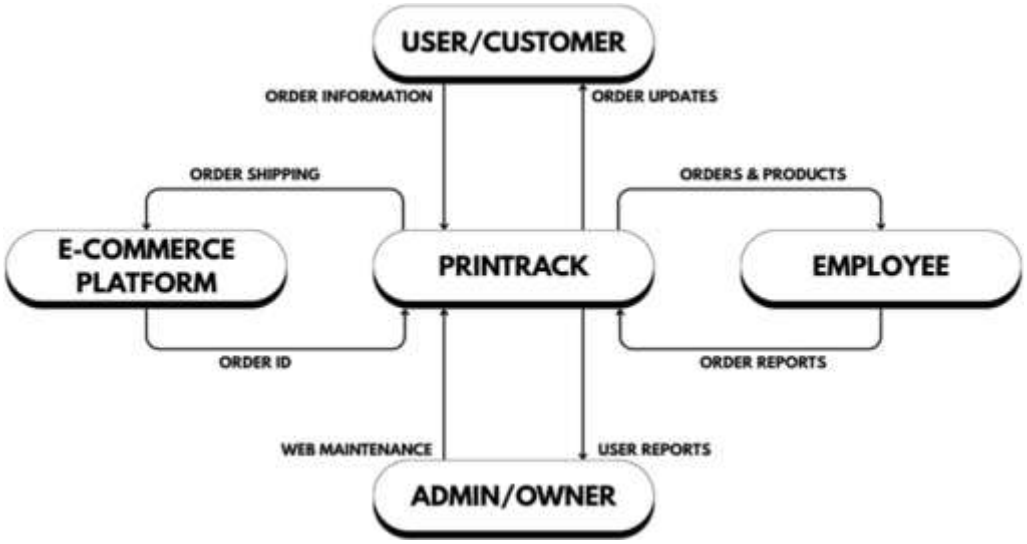
Figure 3: SDLC Iterative Model



The PrinTrack system follows the Iterative Model of the System Development Life Cycle (SDLC). This approach allows the system to be developed in multiple stages, where each iteration includes planning, designing, coding, and testing. Feedback from every cycle is used to make continuous improvements before moving to the next stage. The iterative model is ideal for PrinTrack because it supports gradual refinement, early detection of errors, and real-time adjustment of features.

The database design for PrinTrack is structured to store and manage data efficiently, including customer orders, production status, inventory levels, and staff activities. Relationships between database tables ensure data consistency and reliability across all modules. Below is a simplified context diagram illustrating the main data flow and interaction within the PrinTrack system.

Figure 4: Context Diagram



The PrinTrack Context Diagram shows how the system communicates with outside parties including administrators, production workers, and e-commerce platforms. It acts as a high-level summary, illustrating the data flow between users and the PrinTrack system. The system receives orders from sites such as Shopee and TikTok Shop, and uses logistic regression updates to track and manage them in real time. Updates from production workers are processed and displayed on real-time dashboards that administrators and the company owner can view. Additionally, an internal inventory database that tracks material levels and sends out notifications when supply is low is connected to the system. Overall, the graphic shows how PrinTrack facilitates effective, real-time production monitoring and inventory control, centralizes processes, and improves cooperation.

Respondents of the Study

The respondents of the study are divided into two groups:

- Users: The 40 users were customers or employees from small to medium-sized businesses that make customized products. They used the system in their daily work to track orders and manage tasks. They tested PrinTrack and gave feedback on its ease of use, clarity of updates, and usefulness in their jobs.
- Technical Experts: The 10 technical experts were IT professionals and developers with at least one year of experience. They evaluated the system's design, security, speed, and potential for future improvements.

The researchers used purposive sampling to ensure that all participants were relevant to the study. This means participants were chosen based on their experience and role rather than at random. The goal was not to represent a large population but to gather accurate and meaningful feedback from people directly involved in production and system development.

In total, 50 respondents participated in the evaluation.

Development And Evaluation Procedure

The development of "PrinTrack_ Real-Time Workflow Monitoring Management and Inventory using Predictive Analytics and Logistic Regression Algorithm for Designers Print " is guided by the Agile methodology, allowing the system to evolve through continuous feedback and testing. The researchers used several programming languages and development tools to ensure that the system is functional, user-friendly, and efficient. Each tool played an important role in building and testing both the frontend and backend components.

The main development tools include:

- HTML5: Structured the system's web pages and interface layouts.
- CSS: Designed a responsive, modern, and user-friendly interface for both administrators and members.

- JavaScript: Added interactivity, enabling form validation, dynamic content, and smooth navigation.
- PHP: Served as the main backend language responsible for handling logic, user authentication, and database interaction.
- MySQL: Functioned as the database system for storing user records, attendance logs, and payment transactions.
- XAMPP: Provided the local testing environment integrating Apache, MySQL, and PHP.
- Visual Studio Code: Used as the main programming editor for writing and managing code.

The evaluation procedure followed a structured approach to determine the system's functionality, usability, and reliability. The assessment is based on the ISO 25010 software quality standard, which evaluates the following aspects:

Functionality

PrinTrack ensures long-term efficiency and flexibility through modular design and logistic regression mechanisms. It uses real-time tracking and widely supported technologies like PHP, MySQL, and JavaScript for scalability, easy maintenance, and sustainable performance.

Reliability

PrinTrack prioritizes stable performance and minimal downtime through early issue detection and continuous testing. Regular updates and quality assurance maintain system reliability and address bugs based on user feedback.

Efficiency

PrinTrack focuses on fast processing, responsive performance, and optimal resource use. The system evaluates algorithm speed, platform responsiveness, and practical usefulness to ensure smooth operation and effective results.

Usability

PrinTrack is designed to be simple, intuitive, and user-friendly for all types of users. Continuous user feedback and testing ensure that the interface remains easy to navigate and aligned with user needs.

Security

PrinTrack protects user data through strong authentication, data encryption, and access control. It ensures accountability and data integrity by tracking user actions and maintaining secure communication.

Portability

PrinTrack runs efficiently on different devices, browsers, and operating systems. Its cross-platform design allows easy installation, updates, and scalability for businesses with multiple locations.

Data Analysis Plan

The evaluation of the system is guided by the ISO/IEC 25010 Software Quality Model. This model is chosen because it aligns with the objectives of PrinTrack in ensuring functionality, security, and usability for both gym administrators and members.

To interpret the responses gathered from the evaluation forms, the researchers utilized appropriate statistical tools that helped analyze and validate the system's performance. These methods provided a clear and structured understanding of the overall user perception of the system's effectiveness.

- Weighted Mean: This tool is used to determine the overall level of agreement among respondents for each ISO 25010 criterion. It allowed the researchers to identify how strongly users and technical experts agreed

on the quality aspects of the system.

- Frequency Percentage: This statistical tool presented the distribution of responses in percentage form, providing a visual understanding of how often a particular rating was chosen.

Figure 5: Likert Scale and Interpretation

Weighted Point	Scale	Difference	Verbal Interpretation
4	4.00 – 3.01	1.00	Strongly Agree
3	3.00 – 2.01	0.99	Agree
2	2.00 – 1.01	0.99	Disagree
1	1.00 – 0.99	0.01	Strongly Disagree

A four-point Likert Scale is employed to evaluate respondents' level of satisfaction with the system's usability, efficiency, and reliability. This scale provided a structured way for users to express their perception of system quality.

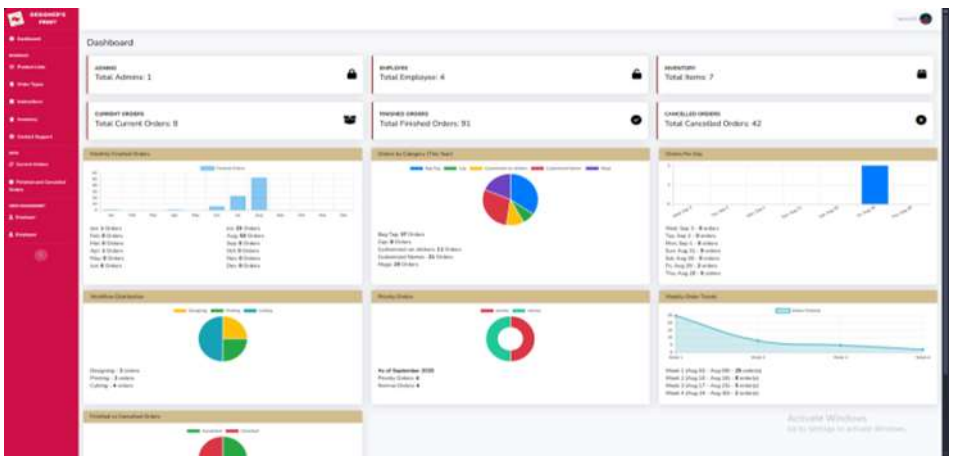
- The scale ranged from 1 to 4, representing Strongly Disagree (1), Disagree (2), Agree (3), and Strongly Agree (4).
- Each statement in the evaluation form corresponded to one of the ISO 25010 characteristics, enabling the researchers to assess each software quality attribute objectively.
- Responses are then interpreted statistically to determine the overall level of satisfaction and system acceptability.

This rating approach ensured that the evaluation results of the PrinTrack system were presented objectively and could be analyzed to measure how effectively the system fulfilled its intended functions based on user and technical feedback.

The System

The PrinTrack: A Real-Time Manufacturing Status Display with logistic regression is a web-based system designed for print-on-demand businesses to efficiently track and manage production. It automates order updates across all stages of design, printing, quality check, packaging, and delivery through a centralized dashboard and notification system. This allows staff and admins to monitor real-time progress, reducing delays and human errors while improving transparency. Developed using PHP, JavaScript, HTML, CSS, and MySQL, PrinTrack ensures smooth workflow management and accurate order tracking. The system can also integrate with e-commerce platforms like Shopee and TikTok Shop for automatic order syncing. Evaluated under ISO 25010 standards, PrinTrack demonstrates high reliability, usability, and efficiency, making it a practical and effective solution for small to medium print-on-demand businesses. ISO 25010 standards, the system ensures reliability, security, accuracy, efficiency, and portability.

Figure 5: Likert Scale and Interpretation



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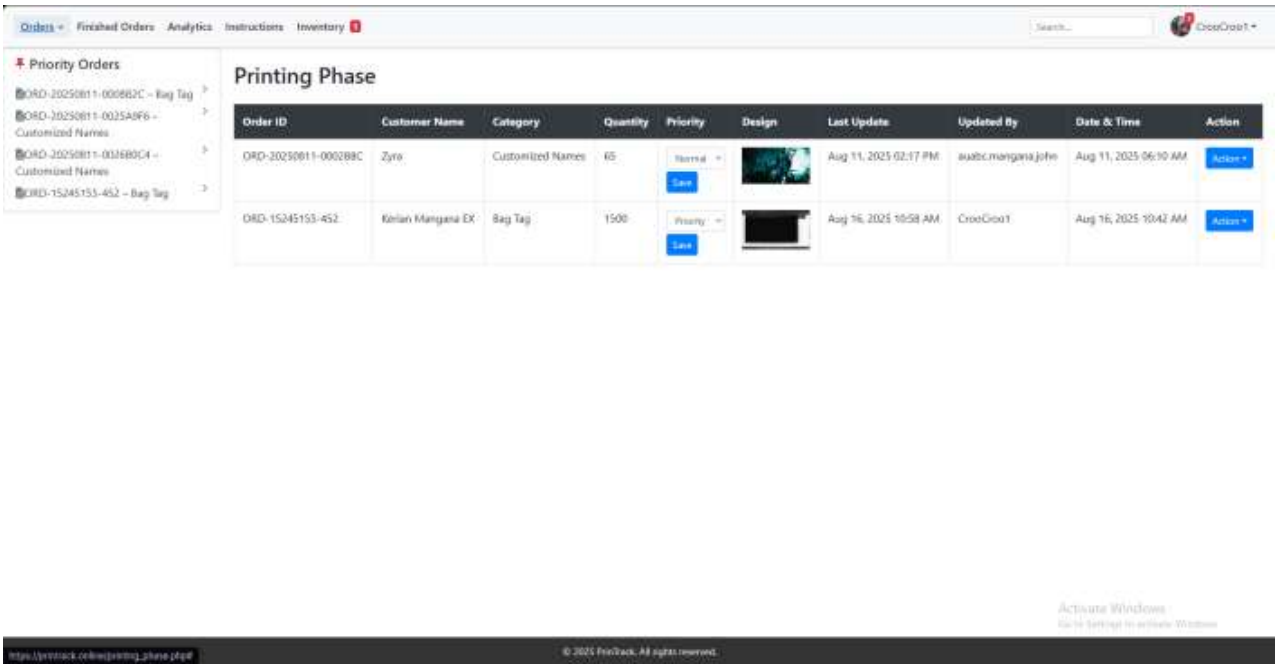
The Admin Dashboard serves as the central hub where administrators can oversee and control the entire system. Its purpose is to manage users, monitor activities, and maintain smooth system operations.

Figure 6: User/Customer Dashboard

The Customer's Dashboard serves as the main interface where customers can view and manage their personal information, activities, or transactions. Its purpose is to give users quick access to important features and updates in a centralized location.

Figure 7: Employee Dashboard



The Employee Dashboard serves as the main workspace where employees can access tools, tasks, and information related to their role. Its purpose is to help staff manage operations efficiently and monitor their responsibilities in one place.

Assessment: Summary of Respondents on The System

The table presents the distribution of respondents involved in the system evaluation, categorized into user and technical groups. The assessment is conducted following the ISO 25010 Software Quality Model to ensure a fair and reliable evaluation of the system's usability and technical performance. This classification provides a clear overview of the participants who contributed feedback based on their experience and expertise.

Table 1: Distribution of the Respondents

Respondents (groupings)	Size (n)	Percentage
Users	40	80%
Technical	10	20%
Total (n)	50	100.0%

Table 1 presents the total number and percentage of participants who took part in evaluating the system. Among the 50 respondents, 40 individuals or 80% are users, and 10 persons or 20% are technical evaluators. This indicates that the majority of the feedback is gathered from users, while the technical group contributed expert assessments to ensure the system's functionality and performance are properly reviewed.

Table 2. Summary of Respondents' Assessment on the PrinTrack System Based on ISO 25010 Standards

CRITERIA ISO 25010	RESPONDENTS (50)			
	USERS (40)		TECHNICAL (10)	
	WM	VI	WM	VI
1. Functionality	3.5	SA	3.5	SA
2. Reliability	3.5	SA	3.7	SA
3. Efficiency	3.6	SA	3.6	SA
4. Usability	3.5	SA	3.6	SA
5. Security	3.5	SA	3.5	SA
6. Portability	3.6	SA	3.6	SA
OVERALL AVERAGE MEAN	3.5	SA	3.6	SA

Table 2 presents the overall summary and comparison of evaluations from both user and technical respondents based on the ISO 25010 criteria. The user group obtained an overall average mean of 3.5, interpreted as Strongly Agree, while the technical group achieved an average mean of 3.6, also interpreted as Strongly Agree. Among all the criteria, Portability received the highest rating from users with a weighted mean of 3.6, whereas Accuracy received the top score from technical respondents with a weighted mean of 3.7, showing strong confidence in the system's accessibility and stable performance. Meanwhile, Efficiency earned the lowest rating from users with a weighted mean of 3.5, indicating slight areas for enhancement in system speed and responsiveness. In general, both groups agreed that the system satisfies the ISO 25010 standards, reflecting overall confidence in its functionality, reliability, and ease of use.

Ethical Considerations

The development of PrinTrack focuses on keeping data accurate, private, and secure. All information is used only to monitor and improve production. The developers make sure the system is fair and that no company data is shared or misused. Regular updates and maintenance are done to keep it safe, reliable, and ethical for manufacturing use.

Summary

PrinTrack is a web-based system that helps print-on-demand businesses track orders in real time. It automates updates for each production stage from design and printing to checking, packing, and delivery. The system has a dashboard and notification feature so staff and admins can easily monitor progress. It helps prevent delays, reduce errors, and improve transparency. PrinTrack can also connect with e-commerce sites like Shopee and TikTok Shop to sync orders, making production faster, more accurate, and easier to manage.

CONCLUSION

The study had both users and technical respondents evaluate PrinTrack's performance using the ISO 25010 quality model. Results showed that both groups gave high ratings in all six areas: functionality, reliability, efficiency, usability, security, and portability, with average scores of 3.5 to 3.6 (Strongly Agree). This means PrinTrack is reliable, efficient, and easy to use. Technical respondents focused on system performance, while users valued its simplicity and navigation. Overall, both groups agreed that PrinTrack meets its goals and is effective for monitoring production in print-on-demand businesses.

RECOMMENDATION

Future developers are encouraged to improve PrinTrack by adding offline features so it can still work without a strong internet connection. They can also expand its connection to platforms like Shopee and TikTok Shop to automatically sync orders. Adding features like inventory tracking, mobile access, and detailed reports can make it more useful for managing production. Collecting feedback from users will also help keep PrinTrack easy to use and effective for businesses.

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