Vicky Salon: A Smart Salon Management System with Prescriptive and Descriptive Analytics for Enhanced Admin Side Experience

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ABSTRACT

This study shows how V-SALON, a smart salon management system, is made and tested. It is made to make small beauty salons like Vicky Salon run more smoothly and make customers happier. To help with datadriven decision-making, the system combines both prescriptive and descriptive analytics. Before, manual booking and record-keeping, which caused difficulties including multiple bookings, missing client data, and poor scheduling are operational issues. To solve these problems, the researchers created a web-based platform that automatically makes appointments, keeps track of customer information, and creates reports that analyze sales trends, client visits, and service performance. The system also has a rules-based suggestion tool that sorts customers by how often they visit and what services they like best. This helps salon owners find loyal customers and tailor their promos to them.

ISO 25010 software quality criteria is used to evaluate the system. The results showed that both technical and user responders agreed that the system is easy to use, safe, and good at controlling operations. The study found that V-SALON may greatly cut down on mistakes made by people, help with time management, and give businesses useful information to help them expand.

It is recommended that future researchers enhance the V-SALON system by adding advanced features not included in the study, such as inventory tracking for salon products and staff performance monitoring. They may also improve the analytics module by integrating predictive financial analysis and deeper customer trend forecasting to support long-term business planning. Furthermore, expanding the system's testing to a larger number of salons and different business types would help validate its effectiveness in broader contexts. Future studies can also explore mobile application development for greater accessibility and real-time notifications, ensuring the system continues to adapt to the needs of both salon staff and clients.

Overall, the study shows how smart management solutions may help small firms become digital and improve their operations.

Keywords: Salon management system, descriptive analytics, prescriptive analytics, ISO 25010, web-based application, data-driven decision-making, usability, reliability, booking automation, customer management, rules-based recommendation, small business technology

INTRODUCTION

Many small firms still conduct their daily activities manually today. This may result in issues including mistakes, hold-ups, and misunderstandings. Vicky Salon, a nearby beauty parlor that provides services including haircuts and treatments, is one example. The company has been in operation for years and has a large clientele, but it still manages reservations and client data using notebooks and verbal updates. As a result, they can run into problems like duplicate reservations, misplaced documents, or forgetting what services a client has already received.

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In 2015, Vicky Salon began as a home-based beauty service and gradually expanded into a full-service salon. However, their approach to handling things remained largely unchanged as the number of clients rose. It became more difficult to oversee everything when the salon had just two employees, including the proprietor. Additionally, there is no method for the salon to monitor its monthly revenue, busiest hours, or most popular treatments. Instead of using actual data, they rely on guesswork for the majority of their decisions.

The goal of the study is to provide Vicky Salon with an online salon administration system. Customers are able to schedule, modify, and cancel appointments online thanks to the system. Features of the system include an appointment dashboard and a report generator that displays revenue trends and consumer visitation patterns. In order for the salon to provide better, more individualized services, it employed clustering algorithms to group clients according to their preferences and frequency of visits. Vicky Salon can use this system to prevent booking issues, have a better understanding of the business's performance, and use actual data to inform improved decision-making. This study also demonstrates how technology may help small businesses expand and improve customer service.

Scope

The focus of the study is on the following essential features: appointment scheduling, customer administration, dashboard visualization, and report generation. Through an easy-to-use interface, the platform enables salon patrons to make, modify, and cancel appointments. At the same time, salon employees are able to effectively manage reservations, view client histories, and arrange schedules. Additionally, the system consists of the following.

1. An appointment dashboard that shows the activity in the salon and scheduled reservations.
2. A reporting module that facilitates data-driven decision-making by producing summaries on revenue trends, service distribution, and peak hours.
3. Revenue reporting using descriptive analytics, which enables salon owners to see and analyze financial trends over time to help them make well-informed business decisions.
4. A safe database where appointment logs and client profiles are kept.

In order to evaluate the platform's usability and efficacy for small to medium-sized salons, the study includes technical development, user interface design, the integration of clustering algorithms to group customer behavior and preferences, and the gathering of user feedback.

Limitation

The limitations are as follows: (a) Advanced capabilities like staff performance monitoring and merchandise inventory tracking are not included. The system's revenue reports are merely descriptive; they don't contain forecasts or in-depth financial analysis; instead, they only display totals and patterns; (b) Additionally, the results may not be applicable to all salon operations as their requirements may not be the same as that of V-SALON.

THEORETICAL FRAMEWORK

The V-SALON platform's purpose and design for salon operations are made clear by the concepts, theories, and principles that comprise the theoretical basis for this study.

1. Data-Driven Decision Making (DDDM) - This idea is on enhancing commercial decision-making through the use of precise data. In order to assist salon owners in making well-informed decisions about promotions, services, and business planning, V-SALON uses descriptive analytics to monitor revenue, customer visits, and appointment patterns.
2. Rules-Based Algorithm - The system classifies client preferences and booking patterns using a rules-based algorithm according to parameters established by the salon, such as the most popular services and busy

periods. This eliminates the need for sophisticated clustering algorithms and enables the system to produce personalized recommendations and marketing campaigns.

3. Human-Computer Interaction (HCI) - Both employees and clients can easily traverse the platform thanks to HCI's assurance that the system is simple to use and intuitive. Appointment scheduling and customer record management are made quick and easy with V-SALON's intuitive layout and design.
4. Systems Theory Systems - Organizations are seen by theory as interdependent components that cooperate to achieve a common objective. V-SALON streamlines processes and lowers errors in salon operations by combining its analytics, customer management, and booking modules into a single solution.

Conceptual Framework

The Input-Process-Output (IPO) Model explains how the study is conducted.

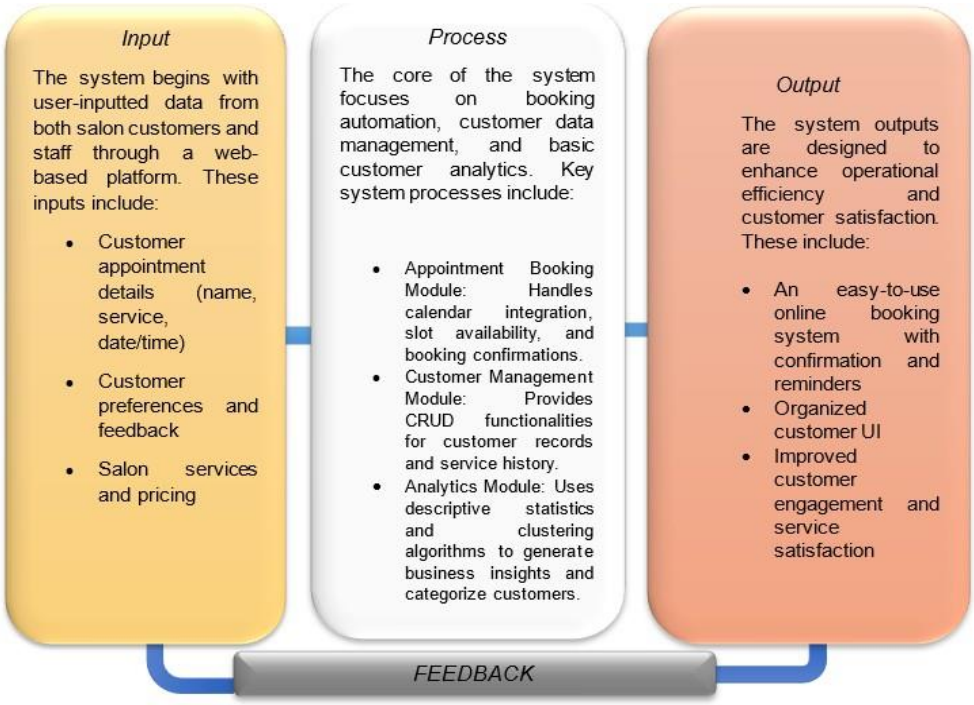

Figure 1: Input-Process-Output Model

Input

Through a web-based platform, the system first gathers data entered by salon employees and clients. Details about the customer's appointment, including name, service selection, and preferred time and day, are entered. Along with the list of salon services and their associated costs, it also collects client choices and feedback.

Process

The system's primary functions are booking automation, customer data management, and basic customer analytics. Booking confirmations, slot availability, and calendar integration are all managed by the appointment booking module. Customer records and service history can be created, read, updated, and deleted using the customer management module. The analytics module also creates business insights and categorizes clients using clustering techniques and descriptive statistics.

Output

The outputs produced by the system are intended to boost customer happiness and operational effectiveness. These results include a well-structured customer interface, improved customer involvement, and overall service satisfaction, as well as an easy-to-use online booking system with automated confirmations and reminders.

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SIGNIFICANCE OF THE STUDY

The following individuals and groups are expected to benefit from the study:

1. Salon Staff and Administrators - Salon owners and employees benefit from this initiative since it makes it simpler for them to keep track of client information, schedule appointments, and review business data. They will no longer have to rely on paper records, which lowers the possibility of data loss and scheduling errors. They may also assess how well the business is performing financially and which services are in demand.
2. Salon Customers - Additionally, clients will gain from the ease with which they may schedule appointments. They can choose the time and service they want online rather than having to call or visit the salon. They find the entire procedure quicker, easier to access, and more convenient as a result.
3. Students and Future Researchers - This initiative is an excellent educational opportunity for us students. The opportunity to put what we've learned in class into practice and develop a system that addresses a real-world issue is provided. It can also be used as a model or guidance for future research projects of a similar nature by other students.
4. Small Business Owners and Professionals - Finally, this study has lessons for other small firms. It demonstrates how, even for tiny businesses like beauty salons, technology can enhance daily operations and customer service.

In summary, a wide range of people, including salon employees, students, and aspiring business professionals, can benefit from this study. It demonstrates how important digital solutions are for enhancing services and expanding a company.

REVIEW OF RELATED LITERATURE

Zhang et al. (2020) emphasized the role of digital transformation in improving operational efficiency and customer satisfaction within service industries through online booking systems and automated customer data management. Similarly, Wang and Chang (2018) examined the implementation of web-based appointment systems among small and medium enterprises (SMEs), revealing a 60% reduction in scheduling errors and a noticeable increase in customer retention. In the same context, Lee, Kim, and Park (2019) explored usability factors in mobile salon booking applications in Korea, noting that user-friendly design, clear navigation, and mobile responsiveness are key contributors to client satisfaction and sustained system adoption. Likewise,

Kumar and Bansal (2020) highlighted that service-based businesses integrating digital tools experience significant improvements in workflow coordination and customer engagement by automating bookings and notifications. Thompson (2021) conducted a study on the Fresha platform, a popular salon and spa management system in the United Kingdom, and found that its integrated appointment scheduling, customer tracking, and analytics features improved both administrative efficiency and service personalization. Moreover, the Vagaro Salon Software Study (2018) in the United States showed that automation through cloud-based systems reduced appointment no-shows and enhanced real-time customer interaction. Collectively, these international studies demonstrate that web-based management systems significantly improve operational efficiency, customer satisfaction, and business decision-making by combining usability, analytics, and automation—principles that underpin the development of the V-SALON system.

Locally, Sena (2014) emphasized that customer satisfaction in beauty salons is largely influenced by the quality of service, the organization of booking systems, and prompt responsiveness to client needs. Similarly, students from Jose Rizal University (2020) developed a salon management system designed to streamline appointment scheduling and service tracking, which led to reduced waiting times and better workflow management. The Polytechnic University of the Philippines (2019) implemented an online appointment system for salons that incorporated automated text reminders and client feedback collection, minimizing missed appointments and

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enhancing customer convenience. In addition, STI College (2021) developed a mobile salon booking application that improved booking accessibility and reduced manual scheduling errors by allowing clients to view available time slots and staff schedules in real time. These local studies collectively highlight the growing trend of digital adoption among small beauty businesses in the Philippines, showing that automation and online systems significantly enhance operational performance and customer relations.

Taken together, both international and local studies affirm that integrating digital platforms with analytics and automation can greatly improve business operations, customer service, and decision-making. These insights support the objectives of V-SALON: A Smart Salon Management System with Prescriptive and Descriptive Analytics for Enhanced Admin Side Experience, which seeks to provide a comprehensive, user-friendly, and data-driven platform for small salons like Vicky Salon. By incorporating features such as appointment automation, customer record management, and descriptive analytics, the system aligns with proven strategies that optimize efficiency, strengthen client engagement, and promote data-informed business growth in the beauty and wellness industry.

SYNTHESIS

The analysis of relevant research and literature emphasizes how urgently salon operations must undergo digital transformation in order to overcome inefficiencies brought on by manual appointment scheduling and client data management. Studies and literature from other countries, like those by Wang and Chang (2018) and Kumar and Bansal (2020), show how data analytics, online booking systems, and user-friendly interfaces can greatly improve service quality, operational effectiveness, and customer satisfaction in small and medium-sized businesses. These results are corroborated by local literature and research from Philippine universities, which highlight the advantages of putting in place online appointment systems with mobile accessibility, notification capabilities, and well-organized record management for enhancing workflow and cutting down on client wait times in salon settings. These insights are combined to create the V-SALON system which combines a rules-based recommendation system, secure customer data management, descriptive and prescriptive analytics, and easy online booking into a single, integrated platform. In order to improve operational workflows, customer engagement, and decision-making for small salon businesses in the Philippines, this system combines the best features of both domestic and international research. In the end, it helps the beauty and wellness sector grow and modernize by offering a data-driven, well-organized, and easily accessible digital tool.

METHODOLOGY OF THE STUDY

This study used a research strategy that combines developmental and prescriptive methodologies. Understanding Vicky Salon's current operations, problems, and difficulties in manually handling reservations and client records is the main goal of the descriptive component. The V-SALON Booking and Customer

Management System, a web-based platform with analytics capabilities, appointment scheduling, and customer information handling capabilities tailored for small to medium-sized salon enterprises, is designed, developed, and implemented during the developmental phase.

Interviews with Vicky Salon's owner and employees and owner as well as evaluation of the system are used to gather primary data. The current procedures, difficulties, and particular needs of the salon's operation are revealed by these data sources. Reviews of analogous systems, pre-existing records like appointment logs, and citations to earlier research and literature that influenced the creation of the suggested platform are examples of secondary data.

The development of the V-SALON system used the conventional System Development Life Cycle (SDLC) paradigm.

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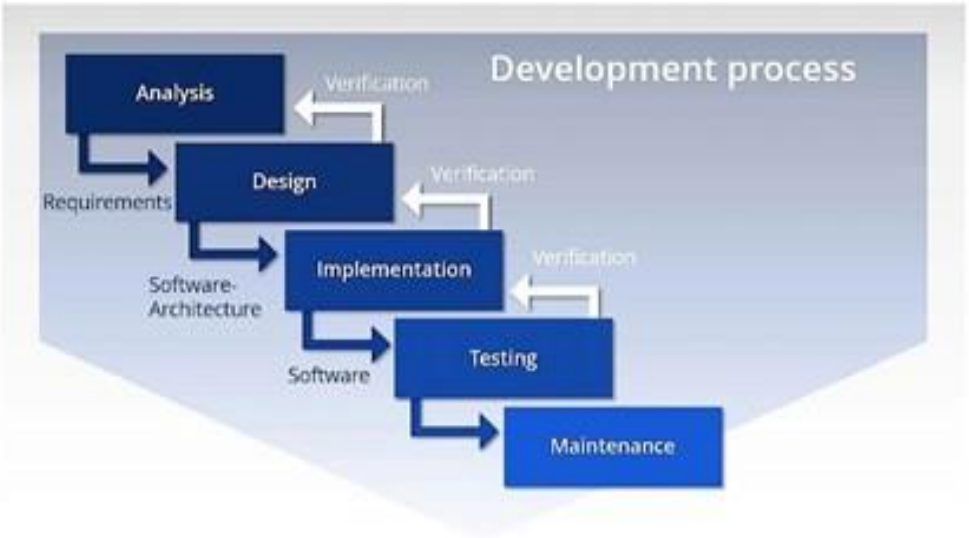

Figure 2: SDLC Waterfall Model

The stages of the SDLC consist of:

1. Planning & Analysis – Define the scope, identify user requirements, and assess technical feasibility.
2. Requirement Specification – Gather detailed system requirements from stakeholders.
3. Design – Create user interface mockups, system architecture, and database schema.
4. Development – Implement system modules such as booking, customer records, and reports using the selected development tools.
5. Testing – Perform unit testing, system testing, and user acceptance testing.
6. Deployment – Launch the system in a live environment and provide initial user training.
7. Maintenance – Monitor performance, address bugs, and update the system as needed.

A context diagram is a high-level visual representation of the connections between a system and its external elements, such as users, other systems, or processes. It provides a broad overview of the system's interactions with its environment without getting into specifics.

Figure 3: Context Diagram

Figure 3 illustrates how the V-SALON system interacts with external users such as customers and salon staff. It includes data flows such as booking submissions, customer information management, and system generated reports.

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RESPONDENTS OF THE STUDY

Users and technical specialists made up the two groups of respondents in the study. There are fifty (50) responders in all.

1. User Respondents – Thirty (30) user-respondents are selected since they have experience with the system and are familiar with its operation. They comment on how user-friendly the system is and how happy they are.
2. Technical respondents - Twenty (20) technical professionals are selected due to their exposure to system administration, development, and IT understanding. They used ISO 25010 standards to test the system's functionality.

DEVELOPMENT AND EVALUATION PROCEDURE

The following development tools are used in the study:

Tool/Technology	Purpose
Backend: PHP (Laravel Framework)	Web application framework
Frontend: HTML, CSS, (Livewire)	For development of Website
Database: MySQL	Relational database system
Editor: Visual Studio Code	Source code editor for system development

Table 1: Development Tools & Purposes

Table 1 shows the various development tools to create the V-SALON system and their use.

According to Patton (1987), evaluation is the methodical process of examining a product's attributes, capabilities, and outcomes in order to determine its efficacy and direct future developments.

Two approaches of evaluation are used in the study:

1. User Experience Evaluation – Focused on how satisfied users are and how the system is easy to use.
2. Technical Expert Evaluation – Focused on how well the system worked and how useful it is.

Even though two categories are used, only one evaluation form is given to respondents. This form is

based on the ISO 25010 standards which helps evaluate software quality in a clear and structured way. The system is evaluated using the following criteria:

ISO 25010 Quality Model, which includes:

1. Functionality – Refers to the system's ability to deliver the expected features and operations correctly and completely according to user requirements.
2. Usability – Measures how easy and convenient the system is to use, including its design, accessibility, and overall user experience.
3. Efficiency – Evaluates how well the system utilizes time and computing resources to perform tasks quickly and effectively.
4. Security – Assesses how the system protects user data and prevents unauthorized access, ensuring data privacy and safe transactions.

These evaluation criteria ensured that the final version of the system achieved high-quality performance, operated smoothly, and successfully addressed the operational needs and challenges of Vicky Salon.

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Data Analysis Plan

The evaluation of the system is guided by the ISO/IEC 25010 Software Quality Model, which provides a comprehensive framework for assessing the overall quality of software systems. This model is chosen because it aligns with the objectives of the V-SALON system in ensuring functionality, usability, reliability, security, and maintainability. It serves as the primary reference in evaluating the system's performance and determining its effectiveness from both user and technical perspectives.

To analyze the collected data from the respondents' evaluations, the researchers utilized appropriate statistical tools to interpret and validate the system's performance and user satisfaction. These tools enabled a quantitative understanding of how well the system met the ISO 25010 quality standards.

1. Weighted Mean - This statistical tool is used to compute the average responses of participants for each quality attribute in the ISO 25010 model. By applying the weighted mean, the researchers are able to summarize overall feedback and determine the general acceptability of the system based on user and technical evaluations.
2. Frequency Percentage - This method is applied to identify the distribution of respondents according to specific classifications, such as user type or technical background. The results are expressed as percentages to provide a clearer understanding of respondent demographics and their corresponding feedback.
3. These analyses helped assess whether the system achieved the expected level of quality and met the ISO 25019 standards. A four-point Likert Scale is also employed to measure the respondents' level of agreement with each system quality characteristic.
4. The scale ranged from "1" (Strongly Disagree) to "4" (Strongly Agree), allowing the researchers to quantify responses.
5. Each statement in the evaluation form is directly associated with one of the ISO 25010 quality attributes, ensuring that every aspect of system performance is systematically assessed.

The integration of the Likert Scale, weighted mean, and frequency percentage provided a structured and objective way to analyze user feedback. Through these statistical tools, the researchers are able to determine the effectiveness, quality, and overall acceptability of the V-SALON system in addressing the operational needs of small salon businesses like Vicky Salon.

The System

The system, titled "V-SALON: A Smart Salon Management System with Prescriptive and Descriptive Analytics for Enhanced Admin Side Experience," is a web-based platform developed to optimize and modernize salon operations through data-driven management and automation. It replaces the salon's traditional manual processes with a centralized digital solution designed to handle customer bookings, manage client records, and generate analytical reports. By integrating both descriptive and prescriptive analytics, the system enables salon administrators to visualize trends, monitor business performance, and make informed decisions based on actual operational data.

Developed using web technologies such as PHP (Laravel Framework), MySQL, HTML, CSS, and JavaScript, the system ensures smooth, reliable, and scalable performance for day-to-day salon operations. Its functionalities are tailored for small to medium-sized beauty salons, focusing on efficiency, accuracy, and enhanced customer experience. Through its intelligent analytics features, the system not only automates appointment scheduling but also provides actionable insights into customer preferences, popular services, and revenue patterns enabling salon owners to develop targeted promotions and improve service quality.

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Key features of the system include:

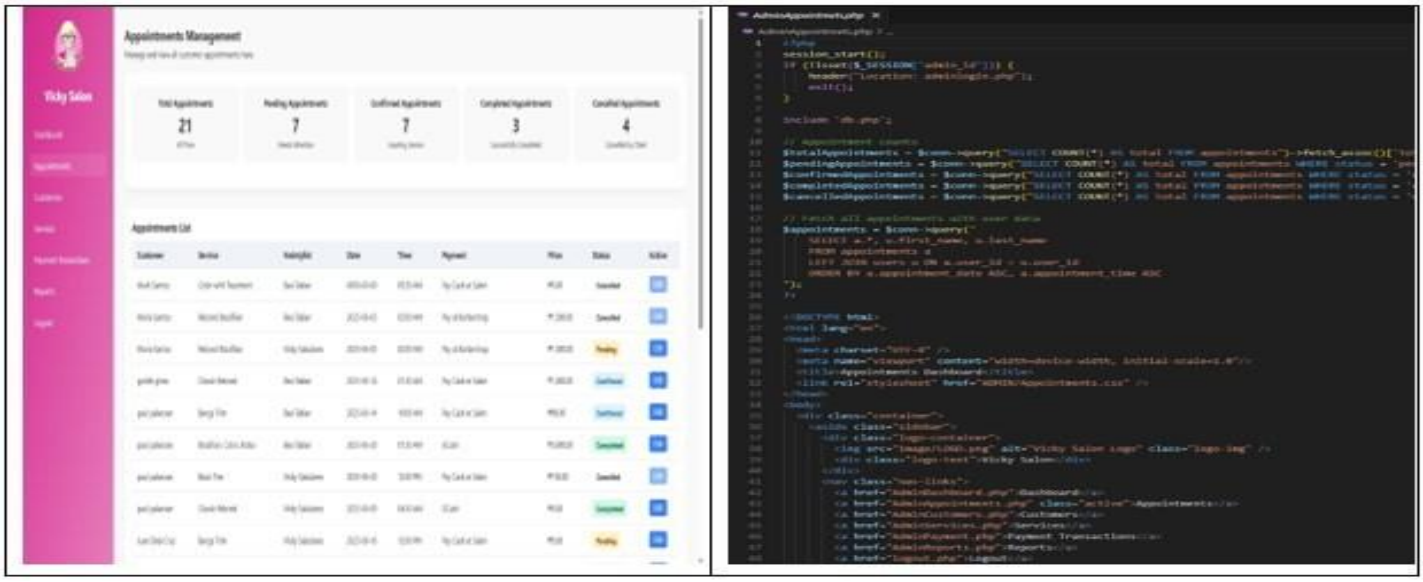

Figure 4: Appointment Management Interface

The Appointment Management Interface lets both the customers and salon staff easily handle bookings in real time. They can add, edit, or cancel appointments depending on their needs. It also shows the total, pending, confirmed, completed, and cancelled appointments, which helps the admin keep track of all activities.

Figure 5: Analytics Dashboard Interface

The Analytics Dashboard Interface offers a visual summary of the salon's overall performance, including daily appointments, revenue trends, and customer visit frequency. It utilizes descriptive analytics to display historical data and prescriptive analytics to suggest strategies for improving service delivery and customer retention. Through interactive charts and real-time data visualization, salon administrators can easily monitor performance metrics, assess peak hours, and track the most in-demand services.

By integrating automation with analytics, the V-SALON system empowers small salon businesses like Vicky Salon to transition toward digital efficiency. It enhances operational workflows, improves customer service, and supports strategic decision-making — all contributing to the growth and modernization of salon management practices.

Assessment: Summary Of Respondents On The System

Moreover, the inclusion of predictive analytics allows administrators to anticipate client demand, forecast revenue trends, and identify high-value customers. Prescriptive analytics can then recommend optimized scheduling or promotional strategies based on historical data patterns, enhancing the strategic value of the platform for business growth.

The table of respondents' distribution is shown:

Respondents	Size (n)	Percentage
Users	30	50%
Technical	20	40%
Total (n)	50	100%

Table 2: Distribution of Respondents

The table shows the total number and percentage of respondents who participated in the evaluation.

The combined summary of responses from both user and technical participants is also shown:

Criteria (ISO25010)	Respondents (50)			
	Users (30)		Technical (20)	
	WM	VI	WM	VI
1. Functionality	3.11	Strongly Agree	3.62	Strongly Agree
2. Usability	3.18	Strongly Agree	3.75	Strongly Agree
3. Efficiency	3.07	Strongly Agree	3.54	Strongly Agree
4. Security	3.03	Strongly Agree	3.69	Strongly Agree
Overall Average Mean	3.07	Strongly Agree	3.70	Strongly Agree

Table 3: Summary ang Comparison of Evaluations of Respondents

Table 3 shows a summary and comparison of the evaluations of respondents based on the ISO/IEC 25010 Software Quality Model. The results show that the average score for user respondents was 3.07, which means "Strongly Agree," and the average score for technical respondents was 3.70, which also means "Strongly Agree." Usability had the greatest score from both users (3.18) and technical respondents (3.75) out of all the factors that were looked at. This means that the system's interface is easy to use, easy to browse, and helps salon operations well. Security got the lowest average score from both groups (3.03 for users and 3.69 for technical respondents). This means that the system does a good job of protecting data and controlling access, but more security improvements might be made to make sure that user data is kept private.

In general, both technical and user responders agreed that the V-SALON: A Smart Salon Management System with Prescriptive and Descriptive Analytics met the ISO 25010 software quality criteria. The results show that the system works, is safe, is easy to use, and is trustworthy. It improves the way things are done at Vicky Salon and makes it easier to manage the business.

To further strengthen data protection, the system employs encryption techniques such as hashed passwords and secure database storage. Access control is implemented through role-based authentication, ensuring that only authorized salon staff can modify sensitive records such as financial reports and client details. Each transaction is logged for audit purposes to detect and prevent unauthorized data manipulation. These measures collectively enhance data privacy, integrity, and system security.

Ethical Considerations

The researchers made sure that all ethical rules were followed during the trial. Before taking part in the research, all participants were told what it was about and why it was being done. People who took part in the review

process did so of their own free will, and no one is compelled or pressured to do so. We took great care to keep all of the data we collected private and safe, and we made sure that any personal or sensitive information is kept private. The data gathered is only used for research and academic reasons. Respondents are told that their answers and comments would be kept private and only used to evaluate the system. The researchers also made sure that the results are correct, valid, and unbiased by not changing or misrepresenting the data in any way. By following these moral rules, the researchers kept the study's honesty, dependability, and openness intact while also making sure that everyone involved in the system evaluation process is treated with respect and safety.

SUMMARY

Moreover, the inclusion of predictive analytics allows administrators to anticipate client demand, forecast revenue trends, and identify high-value customers. Prescriptive analytics can then recommend optimized scheduling or promotional strategies based on historical data patterns, enhancing the strategic value of the platform for business growth.

A web-based program called "V-SALON: A Smart Salon Booking and Customer Management Platform" is created by the researchers specifically for small salons like Vicky Salon. Its primary goals are to securely manage client records, automate appointment scheduling, and deliver data-driven insights via descriptive and prescriptive analytics. Online appointment scheduling, rescheduling, and cancellation are all made possible by the system, which also gives salon employees access to client records and the ability to create reports on service consumption and income trends. The platform suggests engagement tactics and promotions based on user behaviour by utilizing rules-based algorithms.

The ISO 25010 software quality standards are used to evaluate the system, with an emphasis on functionality, usability, efficiency, and security. Participants in the evaluation included both technical experts and salon owner, staff and customers grouped as users. Results indicated that by offering structured reports and insights, the platform greatly decreased scheduling conflicts, boosted decision-making, and improved customer record management.

Because it increases efficiency, reduces errors from manual booking, and streamlines operations, the study is important to salon owners and employees. Customers gain from a quicker, easier, and more convenient booking procedure as well. Additionally, the study shows how digital tools may modernize traditional operations and foster corporate growth through technology, making it a useful resource for scholars, students, and small business owners.

In addition, system performance was analyzed under higher user loads through stress testing, simulating multiple concurrent users accessing the booking and analytics modules. Results indicated that the system maintained stable response times and consistent performance, demonstrating scalability and reliability for small to medium sized salons during peak hours.

CONCLUSION

The respondents, who included both technical experts and user respondents are identified by the study. Based on the ISO 25010 software quality standards, the evaluation's findings demonstrated that the V-SALON system satisfied respondents' expectations. User respondents overwhelmingly concurred that the system is user-friendly, practical, and efficient for scheduling and appointment scheduling. Technical experts also concurred that the system followed software quality requirements, preserved data security, and operated dependably. The V-SALON system effectively enhanced appointment scheduling, streamlined client record administration, and offered data-driven insights to support salon operations, according to the overall results.

RECOMMENDATION

A comparative analysis between V-SALON and existing salon management tools such as Fresha and Vagaro shows that V-SALON’s integration of prescriptive analytics and rule-based recommendations provides unique

value for small local businesses. Unlike these commercial systems, V-SALON is designed for localized implementation and cost-effectiveness while maintaining data control within the salon's database.

Future enhancements can also include integrating mobile applications for real-time client notifications and accessibility, inventory management for monitoring product usage, and staff performance tracking to optimize workflow and service quality. These features would further extend the system's usability and provide administrators with comprehensive operational insights.

Future researchers are advised to improve the V-SALON system by incorporating sophisticated functions not included in the study, like staff performance monitoring and salon product inventory management. In order to help long-term business planning, they might also enhance the analytics module by incorporating deeper customer trend forecasts and predictive financial analysis. Additionally, testing the system on a wider range of salons and related businesses would help confirm its efficacy in more diverse settings. In order to increase accessibility and provide real-time notifications, future research can also look into developing mobile applications. This will guarantee that the system keeps evolving to meet the needs of both salon employees and customers.

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