SMART OFFICE DOCUMENT MANAGEMENT SYSTEM WITH DESCRIPTIVE AN ALYTICS AND SMS ALERTS

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ABSTRACT

This study aimed to address the inefficiencies of manual document submission and deliver a user-friendly dashboard that presents submitted document data through various visualizations and data analytics. The approach enhances decision-making processes, operational efficiency, communication, and collaboration within organizations. Descriptive data analytics methodology was employed to effectively summarize and present key data points. The project also adopted the Rapid Application Development methodology during its development. As a result, the project received favorable evaluations from its assessors, achieving high overall mean scores of 4.17 for functionality, 3.95 for reliability, and 3.98 for usability. Consequently, by integrating descriptive data analytics and SMS notification system, the implementation notably benefited the Human Resource Management Office of Davao del Sur State College by providing a Web System with dashboard equipped with visualizations such as count metrics, bar graphs, and tables. Additionally, the system facilitated seamless information updates, empowering administrators to make evidence-based decisions and identify trends within their data.

KEYWORDS

Descriptive data analytics, web-based, evidence-based decisions, rapid application development

INTRODUCTION

Data analytics involves the examination of raw data to derive meaningful insights and conclusions. Also, it encompasses a broad array of analytical techniques aimed in improving processes and uncovering latent trends (Frankenfield, 2023). Beyond pinpointing production bottlenecks, data analytics is crucial for enhancing business performance by incorporating it into their operational framework enables companies to streamline processes, manage large datasets efficiently, and ultimately reduce costs. Moreover, data analytics facilitates informed decision-making, enables the analysis of customer trends and satisfaction, fostering the creation of innovative and superior products and services. Kalsbeek (2020) also categorized data analytics into four types: predictive analytics, prescriptive analytics, diagnostic analytics, and descriptive data analytics. This study falls under descriptive data analytics, which provides a retrospective analysis of an organization's operations.

On the otherhand, according to Laukkonen (2023), a notification system comprises a series of protocols and procedures involving both human and computer elements. Its core purpose is to notify individuals about specific events. Simple notification systems are deployed across various devices, including computers, phones, and other gadgets, to alert users about incoming text messages, emails, and other relevant events. Furthermore, notifications are instrumental in keeping individuals informed about pertinent information. Likewise, Santiago (2017) emphasizes that notification design encompasses various types, such as user-generated notifications, push notifications, context-generated notifications, system-generated notifications, and passive notifications.

Currently, the Human Resource Management Office (HRMO) faces significant challenges related to document management, primarily stemming from the inefficiencies of manual processes. Managing documents manually often leads to delays in processing, misplaced or lost files, and increased redundancy in tasks, which impacts the overall productivity of the HRMO. Organizing and tracking documents becomes cumbersome, making it difficult to prioritize tasks and monitor the progress of various submissions. This inefficiency is further compounded by the lack of real-time data, limiting the HRMO's ability to make timely, informed decisions, and reducing operational effectiveness. Additionally, manual systems hinder collaboration and communication among HR personnel, as information is not easily shared or updated. Furthermore, the absence of analytics in traditional document management systems prevents the HRMO from identifying trends, improving workflows, and making data-driven decisions. These challenges also raise concerns about security and compliance, as the manual handling of sensitive employee data increases the risk of unauthorized access and data breaches. Consequently, implementing an automated and efficient Document Management System is essential to streamline operations, enhance decision-making, and safeguard data integrity within the HRMO.

Therefore, the proponent devised and implemented a data analytics-infused web-based document notification system tailored for the Human Resource Management Office.This Web system facilitated easy online document submission for personnel, with documents stored in a MySQL database. Also, data analytics functionality was incorporated to enable administrators to access statistical reports for each semester based on document submission activity. The system visualized data through count metrics, bar graphs, and tables, ensuring administrators could effortlessly stay informed and rely on accurate data. Consequently, this initiative empowered the HR department to make evidence-based decisions and discern patterns or trends within their data.

Conceptual Framework of the Study

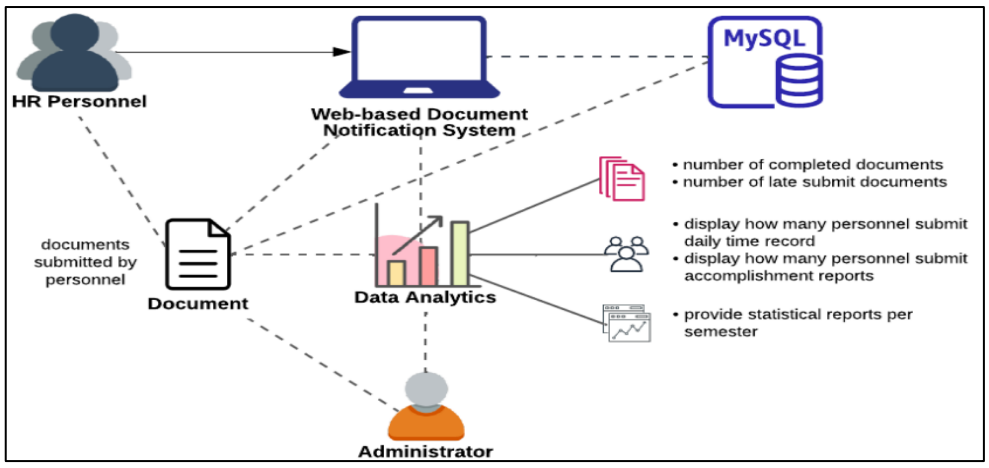

Figure 1. Conceptual Framework of the study

The figure 1 shows the conceptual framework of Data Analytics on Web-based Document Notification System. The figure below shows that the researcher implemented four features: (1) Provide statistical reports on a semester-by-semester basis; (2) Display how many personnel submit each document; (3) Display how many complete documents were submitted; and (4) Display how many late documents were submitted. The data will be visualized using count metrics, bar graph, and tables. In addition, the data of submitted documents will be recorded and displayed on the administrator page where the data analytics was implemented and the results can be viewed by each semester. Furthermore, all data was saved and stored in MySQL database. The technique mentioned above was observed and tested while using the system.

RESEARCH METHOD

Research Design

The Figure 2 illustrates the utilization of the Rapid Application Development (RAD) methodology in the project's development process. This approach proved instrumental in identifying and resolving emerging issues encountered during the research and analysis phases. The selection of the RAD approach for this study stemmed from several advantages it offered: Firstly, it enabled swift delivery of the product. Secondly, by engaging users consistently throughout the product's lifecycle, it ensured product quality. Thirdly, RAD placed lesser emphasis on task planning and prioritized development and prototype creation. As highlighted by Venkata (2020), RAD techniques are particularly beneficial when building customer-facing portals or internal business tools, facilitating a quicker and improved end-user experience.

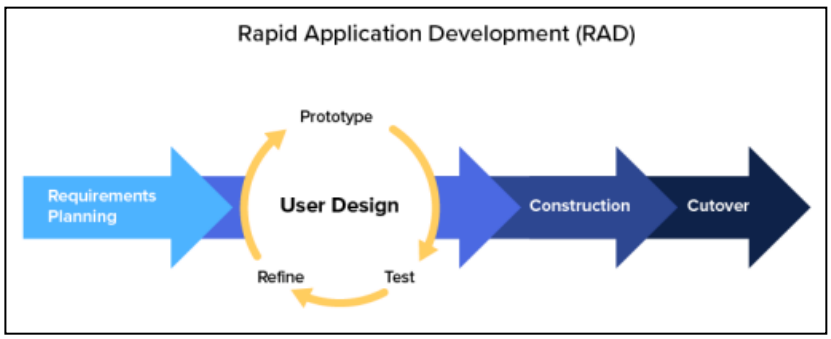

Figure 2. Rapid Application Diagram

System Requirements

Table 1 Software Requirements for System Development.

Software	Specification
Visual Studio 2012	Version 11.0
MySQL Workbench	Version 8.0.36
Windows 10	Version 22H2

Table 1 lists the software used in the project's development. The system required Windows 10 for operation, and Visual Studio was installed to build the web-based application. MySQL was chosen as the database due to its reliability, open-source nature,

compatibility, scalability, and strong security, making it a popular choice for developers and businesses.

RESULT AND DISCUSSION

This section offers a detailed analysis of the results from the capstone project, "Data Analytics on Web-based Document Notification System," examining their relevance to the research objectives. It forms the basis for drawing conclusions and providing recommendations. The next section outlines the key findings from the study.

Provide statistical reports on a semester-by-semester basis

Figure 3 illustrates how the analytical dashboard provides insights into HR personnel performance over time. By tracking document submissions by type and semester, trends and patterns emerge, guiding decisions on training, development, and policy evaluation. The statistical reports offer a quantitative overview of HR performance, supporting strategic decision-making to enhance organizational efficiency.

Figure 3. Provide statistical reports on a semester-by-semester basis

Display how many personnel submitted an Accomplishment Reports

Figure 4 displays a count metric tracking HR personnel's submission of accomplishment reports to assess department performance. This allows management to monitor engagement, productivity, and effectiveness. Recognizing employee contributions fosters accountability, transparency, and improved engagement, ultimately enhancing organizational outcomes.

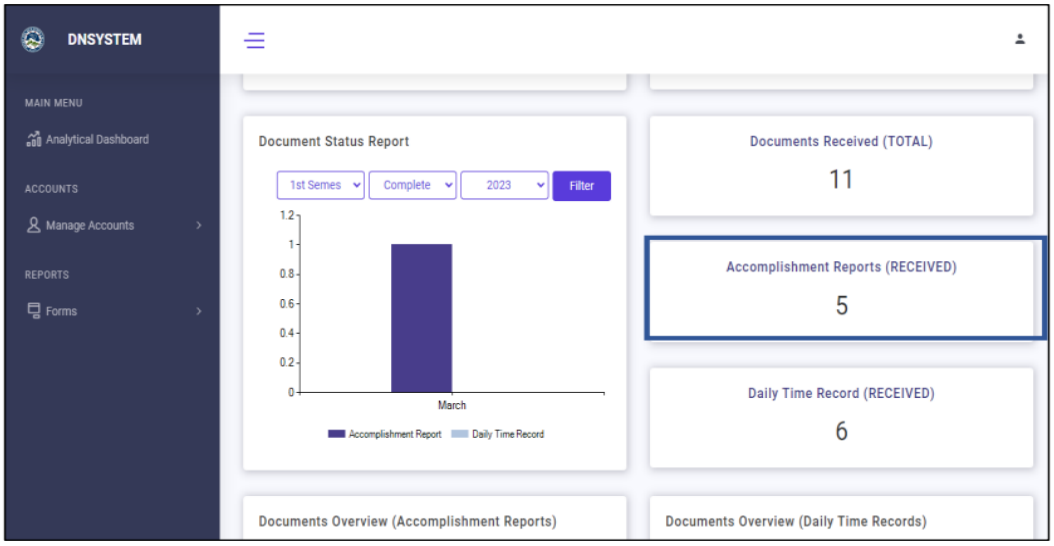

Figure 4. Display how many personnel submit each document such as Accomplishment Reports

Display how many personnel submitted a Daily Time Record

Figure 5 displays a webpage that shows the number of personnel who have submitted their Daily Time Records, providing a visual representation of the process and identifying areas for improvement. This webpage serves as a count metric for evaluating the performance of HR personnel. Management can use it to track engagement, productivity, and overall effectiveness. Recognizing employees' efforts promotes engagement and fosters a culture of accountability and transparency, ultimately leading to positive outcomes for the organization.

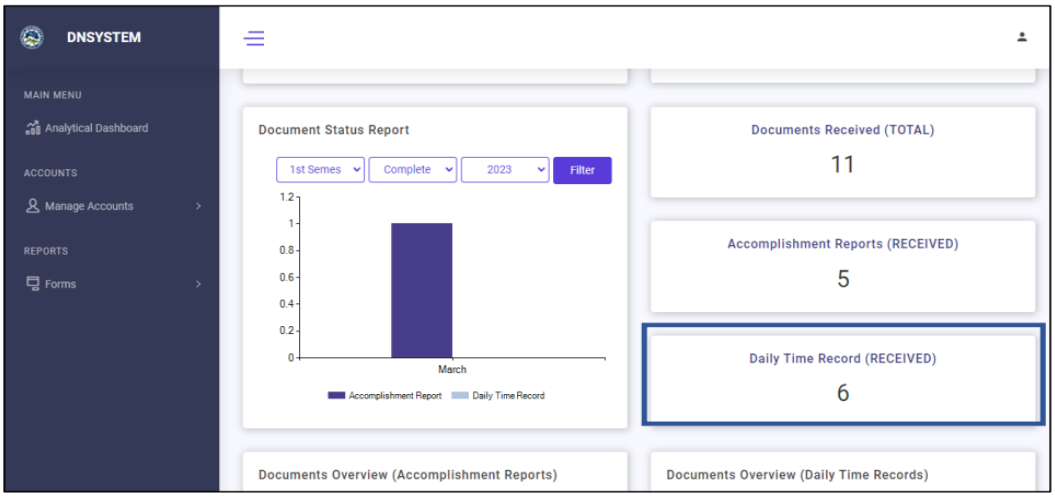

Figure 5. Display how many personnel submit each document such as Daily Time Record

Display how many completed documents were submitted

Figure 6 displays a webpage showing the number of completed documents submitted by personnel, providing insights into an organization's document completion rate. This data helps identify areas for process improvement and supports performance

management. By tracking document submissions, administrators can recognize high-performing employees and identify those who may be struggling to meet expectations.

Figure 6. Display how many complete documents were submitted

Display how many late documents were submitted

Figure 7 displays a webpage offering insights into compliance with document submission deadlines within an organization. By tracking the number of late submissions, administrators can pinpoint areas where compliance issues may arise. Additionally, this data can highlight opportunities for process improvement.

Figure 7. Display how many late documents were submitted

Visualization on data reports using count metrics

Figure 8 presents visualized data using count metrics to give the HR department a clear and concise view of key performance indicators (KPIs) related to the organization, team, or individual performance. KPIs help highlight areas of success and areas needing improvement, enabling the HR department to make informed decisions and take action to enhance performance. Visualizing data through KPIs is crucial as it enhances understanding, promotes efficient communication, supports better decision-making, fosters accountability, and helps set specific, measurable goals.

Figure 8. Visualize data reports using count metrics

Visualization on data reports using Bar graph

The figure 9 shows the webpage that visualized data reports using bar graph. As shown in figure below, the bar graph provides a clear and concise representation of categorical or comparative data, making it easier to identify patterns and trends in the data, compare and analyze different data points, and make data-driven decisions. It was important to visualize data reports using bar graphs because they are a popular and effective way to present data, allowing stakeholders to quickly understand and interpret data insights.

Figure 9. Visualize data reports using bar graph

Visualize data reports using Tables

Figure 10 illustrates the use of tables to visualize data reports, presenting information in a structured and organized format for easy interpretation and analysis, facilitating data-driven decision-making. The importance of this approach lies in its ability to efficiently communicate complex information, highlight patterns and trends, and identify outliers or anomalies, ultimately aiding in a deeper understanding and better utilization of data. Overall, using tables to visualize data is an effective technique for conveying complex

information clearly and concisely, providing valuable insights into large datasets and supporting informed decision-making.

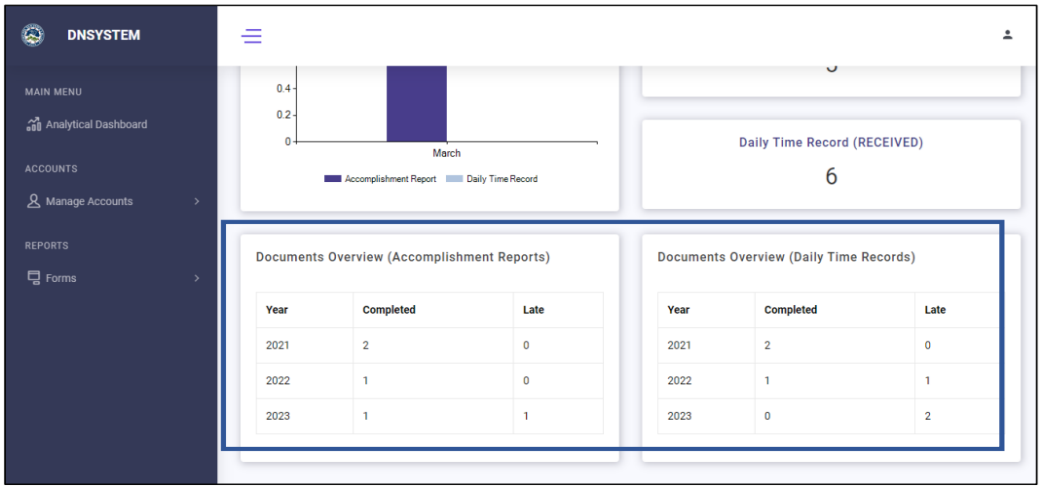

Figure 10. Visualizing data reports using tables

Table 2. Descriptive ratings from the respondents in terms of functionality of the system.

Particular	IT Expert	Panel	IT Student	HR personnel	Total Mean	Remarks
statistical reports on a semester-by-semester basis.	4	4.33	4.4	3.5	4.06	Good
Display how many personnel submit each document such as Accomplishment Report.	4	4.33	4.4	4.25	4.25	Good
Display how many personnel submit each document such as Daily Time Record.	4	4.33	4.4	4.25	4.25	Good
display how many complete documents were submitted.	4	4.67	4.6	3.75	4.26	Good
Can display how many late documents were submitted.	4.4	4	4.2	3.75	4.09	Good
Visualize data reports using count Metrics	4.2	4.33	4.2	3.75	4.12	Good
Visualize data reports using Bar graph.	4.2	4	4.6	3.75	4.14	Good
Visualize data reports using Table.	4.4	4	4.4	4	4.2	Good
Average	4.15	4.25	4.4	3.88	4.17	GOOD

As shown in Table 2, the overall mean descriptive rating for functionality provided by respondents is 4.17, classified as "Good" (G). This indicates that the measured item is satisfactory and meets most requirements, though there is still room for improvement. Notably, HR personnel gave a lower rating to the project's functionality, suggesting that including a wider variety of document types in the report would enhance the value of the data analytics. This highlights the importance of expanding the report's scope to cover additional document types relevant to the organization, thereby providing a more comprehensive view of its data.

Likewise on the study of Selvam and Ponnusamy (2023) emphasize also that the successful implementation of business intelligence (BI) depends on effective data management and analytics practices is essential for businesses to use tools and methodologies that enable the extraction of valuable insights from data, which involves establishing robust processes for data collection, storage, and analysis.

Table 3. Descriptive ratings from the respondents in terms of reliability of the system.

Particulars	**HR Personnel**	**Total Mean**	**Remarks**
The system's statistical reports provided on a semester-by-semester basis is accurate.	3.5	3.69	Agree
The system can display the number of personnel who submit Accomplishment Reports accurately.	3.5	3.73	Agree
The system can display of the number of personnel who submit Daily Time Records accurately.	3.75	3.94	Agree
The system can display the total number of complete documents submitted accurately.	3.75	4.04	Agree
The system can display of the total number of late documents submitted accurately.	3.75	4.09	Agree
The system can accurately visualized data using count metrics.	3.75	3.91	Agree
The system can accurately visualized data using bar graph.	4	4.12	Agree
The system can accurately visualized data using tables.	4	4.07	Agree
Average	3.75	3.95	AGREE

The respondents' evaluations of the project's reliability resulted in an overall mean score of 3.95, indicating that it was generally perceived as satisfactory, though with some reservations. Areas for improvement remain to better meet user requirements. Feedback from the IT panel highlighted perceived shortcomings in the system's data analytics capabilities, suggesting the need for enhancements to meet expectations. Additionally, the IT panel stressed the importance of improving system performance and reducing response times to facilitate more efficient data analysis. Similarly, the HR staff rated the system lower, noting the need for a broader range of document types to better capture the organization's data. This feedback underscores the need to expand the system's document type capabilities to provide a more comprehensive view of the organization's data landscape.

As Stedman and Vaughan (2022) argued that the, data quality involves factors such as accuracy, completeness, consistency, reliability, and timeliness. With the growing integration of data processing in business operations and the increased use of data analytics for decision-making, there is a heightened focus on ensuring data quality in enterprise systems.

Table 4. Descriptive ratings from the respondents in terms of usability of the system.

Particulars	HR Personnel	Panel	Total Mean	Remarks
It was easy to find the statistical reports provided on a semester-by-semester basis.	3.25	4	3.96	Agree
It was easy to understand the information presented in the statistical reports provided on a semester-by-semester basis.	3	4.67	3.82	Agree
It was easy to find the display of the number of personnel who submit Accomplishment Reports.	3.5	4.67	4.09	Agree
It was easy to find the display of the number of personnel who submit Daily Time Records.	3.75	4.67	4.16	Agree
It was easy to understand the information presented in the display of the total number of complete documents submitted.	3	4.33	3.98	Agree
It was easy to understand the information presented in the display of the total number of late documents submitted.	3.5	4.33	4.06	Agree
It was easy to find the count metrics in the data reports.	3.5	4.33	4.06	Agree
It was easy to understand the information presented in the visualization of data reports using bar graphs.	3.25	4.33	4	Agree
It was easy to understand the information presented in the visualization of data reports using tables.	3.25	4.33	4	Agree
Average	3.28	4.41	3.98	AGREE

The ratings provided by respondents offer insights into the project's interface design and user experience, highlighting areas that need improvement to enhance usability. Analyzing these ratings allows developers to make informed decisions and increase user satisfaction. The overall mean usability rating from respondents was 3.98, indicating that the system is generally good and easy to use, though with minor areas for improvement. HR staff rated the system lower due to its lack of integration with their existing workflow. They currently use another system daily for recording documents, and using our system as a backup or storage solution adds extra steps, such as scanning and uploading documents, which increases their workload. Despite this, they find our system useful for backup and storage but prefer a more integrated solution that streamlines their workflow.

According to Poursaba (2021), implementing a Document Management System (DMS) offers organizations several advantages, including reduced storage needs, enhanced security measures, better regulatory compliance, simplified document retrieval, and improved collaboration. By optimizing document workflows, protecting sensitive data, ensuring regulatory adherence, facilitating efficient information retrieval, and fostering teamwork, a DMS can significantly boost productivity and operational efficiency.

Table 5. Overall ratings of the system.

Particular	Total Mean	Remark
Functionality	4.17	Agree
Reliability	3.95	Agree
Usability	3.98	Agree
Average	4.03	AGREE

The Table 5 shows the overall mean ratings for functionality, reliability, and usability, as indicated in the table above, reflect a positive sentiment among respondents. With an overall mean rating of 4.03, respondents expressed high satisfaction with the Data Analytics on Web-based Document Notification System, deeming it reliable, user-friendly, and functional. Nevertheless, there remains scope for improvement based on feedback from various user groups. The constructive criticism provided by respondents will inform future enhancements aimed at ensuring better functionality, reliability, and usability of the system.

CONCLUSION

This study demonstrated a significant benefits and potential of integrating data analytics ans SMS Notification within a web-based document management framework. The project aimed to address inefficiencies associated with manual document submission by providing a user-friendly system that delivers comprehensive data insights through various visualizations and metrics.

The positive ratings for functionality, reliability, and usability reflect its general effectiveness, although feedback highlights areas for improvement, particularly in expanding document type capabilities and integrating more seamlessly with existing workflows.The Web System notably provides an analytical dashboard equipped with visualizations such as count metrics, bar graphs, and tables. The findings indicate that the system effectively enhances the HR department's ability to track document submissions, monitor compliance, and evaluate performance. By incorporating feedback from users and continuously refining the system, future iterations can further enhance its effectiveness and integration, leading to even greater benefits for the organization.

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