

DEVELOPMENT OF A GRAPHICAL COLLECTION CLASSIFICATION REPORTING FEATURE IN SLIMS (SENAYAN LIBRARY MANAGEMENT SYSTEM) USING LIBRARY CHART.JS

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Abstract

Library management systems play a crucial role in organizing, managing, and providing access to library collections efficiently. However, the reporting features available in SLiMS (Senayan Library Management System) are generally presented in tabular form, making it difficult for librarians to analyze collection distribution quickly and support data-driven decision-making. To address this limitation, this study aims to develop a graphical collection classification reporting feature in SLiMS using the Library Chart.js library. The research employed a Research and Development (R&D) approach, encompassing the stages of needs analysis, system design, implementation, testing, and evaluation. Data were collected through observation, interviews with librarians, and analysis of the existing SLiMS reporting system. The developed feature integrates Chart.js into the SLiMS platform to visualize collection classification data in various graphical formats, including bar charts, pie charts, and line charts. Functional testing demonstrated that the feature successfully generated accurate and interactive graphical reports based on the library database. User evaluation further indicated that the visualization feature improved the efficiency of data interpretation, facilitated collection analysis, and enhanced decision-making in library management. The study concludes that integrating graphical reporting into SLiMS significantly improves the usability of collection reports and provides librarians with a more effective tool for monitoring collection classification. This development contributes to the advancement of digital library management by promoting data visualization as an essential component of library information systems.

Keywords: SLiMS, Senayan Library Management System, collection classification, graphical reporting, Chart.js, library information system

Abstrak

Sistem manajemen perpustakaan memiliki peran penting dalam mengelola, mengorganisasi, dan menyediakan akses terhadap koleksi perpustakaan secara efektif dan efisien. Namun, fitur pelaporan yang tersedia pada SLiMS (Senayan Library Management

System) umumnya masih disajikan dalam bentuk tabel, sehingga menyulitkan pustakawan dalam menganalisis distribusi klasifikasi koleksi secara cepat dan mendukung pengambilan keputusan berbasis data. Penelitian ini bertujuan untuk mengembangkan fitur pelaporan klasifikasi koleksi dalam bentuk grafis pada SLiMS dengan memanfaatkan Library Chart.js. Penelitian menggunakan metode Research and Development (R&D) yang meliputi tahapan analisis kebutuhan, perancangan sistem, implementasi, pengujian, dan evaluasi. Pengumpulan data dilakukan melalui observasi, wawancara dengan pustakawan, serta analisis terhadap sistem pelaporan SLiMS yang telah ada. Fitur yang dikembangkan mengintegrasikan pustaka Chart.js ke dalam platform SLiMS sehingga mampu menyajikan data klasifikasi koleksi dalam berbagai bentuk visualisasi, seperti diagram batang (bar chart), diagram lingkaran (pie chart), dan diagram garis (line chart). Hasil pengujian fungsional menunjukkan bahwa fitur yang dikembangkan mampu menghasilkan laporan grafis yang akurat, interaktif, dan sesuai dengan data yang tersimpan dalam basis data perpustakaan. Selain itu, hasil evaluasi pengguna menunjukkan bahwa visualisasi data dalam bentuk grafis meningkatkan kemudahan interpretasi laporan, mempercepat proses analisis koleksi, serta mendukung pengambilan keputusan dalam pengelolaan perpustakaan. Penelitian ini menyimpulkan bahwa pengembangan fitur pelaporan klasifikasi koleksi berbasis grafis pada SLiMS mampu meningkatkan kegunaan sistem pelaporan dan memberikan kemudahan bagi pustakawan dalam memantau kondisi koleksi perpustakaan. Pengembangan ini diharapkan dapat berkontribusi terhadap peningkatan kualitas sistem informasi perpustakaan digital melalui pemanfaatan visualisasi data yang lebih informatif dan efektif.

Kata kunci: SLiMS, Senayan Library Management System, klasifikasi koleksi, pelaporan grafis, Chart.js, sistem informasi perpustakaan.

A. Introduction

The rapid advancement of information and communication technology has significantly transformed the management of library services. Modern libraries are expected to provide not only efficient collection management but also accurate, accessible, and user-friendly information systems that support decision-making processes. Library Management Systems (LMS) have become essential tools for automating cataloging, circulation, acquisition, and reporting activities, enabling librarians to improve service quality and operational efficiency (Breeding, 2015; Corral, 2018). The implementation of digital library systems has also increased the demand for analytical features capable of presenting library data in a more meaningful and interactive manner.

One of the most widely adopted open-source library management systems in Indonesia is SLiMS (Senayan Library Management System). Developed to support library automation, SLiMS offers comprehensive modules for catalog management, circulation, membership, acquisitions, and reporting (Arif, 2019). Due to its flexibility, ease of use, and open-source architecture, SLiMS has been implemented by school, university, and public libraries throughout Indonesia. Nevertheless, despite its extensive functionality, several reporting features remain limited to tabular presentations, making it difficult for librarians to analyze collection data efficiently, particularly regarding the distribution of collection classifications.

Collection classification reports constitute an important component of library management because they provide information about the composition and development of library collections according to established classification systems, such as the Dewey Decimal Classification (DDC). Accurate analysis of collection classification enables librarians to identify collection strengths and weaknesses, evaluate collection development policies, and make informed decisions regarding future acquisitions (Evans & Saponaro, 2012). However, when reports are presented only in numerical tables, users often require additional time and effort to interpret large datasets, reducing the effectiveness of managerial decision-making (Few, 2013).

Data visualization has emerged as an effective solution for improving information interpretation by transforming complex numerical data into graphical representations that are easier to understand. Visualization tools such as Chart.js enable developers to create interactive charts, including bar charts, pie charts, line charts, and other graphical displays that facilitate rapid analysis and comparison of data (Wilke, 2019). Integrating graphical visualization into library information systems not only enhances usability but also supports evidence-based decision-making by presenting collection statistics in an intuitive and visually appealing format (Knafllic, 2015).

Previous studies have demonstrated that visual analytics significantly improve users' ability to interpret information and support organizational decision-making in various information systems (Few, 2013; Wilke, 2019). However, research focusing specifically on the development of graphical collection classification reporting features within SLiMS remains limited. Existing studies have primarily discussed library automation, implementation of SLiMS, or general reporting functions, while relatively little attention has been given to enhancing report visualization through modern web-based chart libraries such as Chart.js. This gap indicates the

need for further research that integrates data visualization technologies into SLiMS to improve reporting efficiency and user experience.

Based on this research gap, the present study aims to develop a graphical collection classification reporting feature in SLiMS (Senayan Library Management System) using the Library Chart.js library. The developed feature is expected to provide librarians with interactive graphical reports that facilitate collection analysis, improve reporting efficiency, and support strategic decision-making in library management. Furthermore, this study contributes to the advancement of digital library information systems by demonstrating the practical application of web-based data visualization technologies in enhancing the functionality and usability of open-source library management software.

B. Theoretical Study

1. Library Management Information Systems

A Library Management Information System (LMIS) is an integrated information system designed to automate and manage various library operations, including cataloging, circulation, acquisitions, membership management, and reporting. The implementation of LMIS has significantly improved library efficiency by reducing manual processes, enhancing data accuracy, and facilitating information retrieval (Breeding, 2015). Modern library management systems also support data-driven decision-making by providing comprehensive reports that enable librarians to monitor library performance and collection development (Corrall, 2018).

Among various open-source library automation systems, SLiMS (Senayan Library Management System) has become one of the most widely implemented platforms in Indonesia. SLiMS offers flexible and customizable modules that enable libraries of different sizes to manage their collections efficiently. Because it is open source, developers can extend its functionality by integrating additional features according to institutional needs (Arif, 2019). This flexibility provides opportunities for developing more advanced reporting tools capable of presenting information in both textual and graphical formats.

2. Collection Classification in Libraries

Collection classification is the process of organizing library materials according to standardized classification systems to facilitate information retrieval and collection

management. One of the most widely adopted systems is the Dewey Decimal Classification (DDC), which categorizes knowledge into ten major classes and numerous subdivisions (Mitchell et al., 2017). Proper classification enables librarians to identify subject distribution, evaluate collection balance, and support collection development policies based on users' information needs.

Classification reports are essential managerial tools because they provide statistical information regarding the composition and growth of library collections. These reports help librarians identify underrepresented subject areas, monitor acquisition priorities, and optimize collection development strategies (Evans & Saponaro, 2012). Consequently, accurate and accessible classification reporting contributes significantly to effective library management and strategic planning.

3. Data Visualization and Chart.js

Data visualization refers to the graphical representation of information that enables users to understand complex datasets quickly and accurately. Visual elements such as charts, graphs, and dashboards simplify data interpretation, reveal patterns and trends, and facilitate comparative analysis (Few, 2013). Effective visualization improves communication between information systems and users by reducing cognitive load and supporting evidence-based decision-making (Knaflitz, 2015).

One of the most popular JavaScript libraries for web-based data visualization is Chart.js, an open-source library capable of generating responsive and interactive charts using HTML5 Canvas technology. Chart.js supports various visualization formats, including bar charts, pie charts, line charts, radar charts, and doughnut charts, while offering simple implementation and high compatibility with modern web applications (Chart.js Contributors, 2024). Because of its lightweight architecture and ease of integration, Chart.js is widely used to enhance reporting modules in web-based information systems.

4. System Development Using the Research and Development (R&D) Approach

Research and Development (R&D) is a systematic research method aimed at producing, testing, and improving products, systems, or technological innovations. Unlike conventional research that primarily generates theoretical knowledge, R&D emphasizes practical solutions through iterative stages of analysis, design, development, implementation, testing, and evaluation (Borg & Gall, 2003). In information system development, the R&D

approach enables researchers to identify user requirements, design functional prototypes, validate system performance, and evaluate usability before implementation.

In this study, the R&D approach is employed to develop a graphical collection classification reporting feature integrated into SLiMS. The development process includes needs analysis, system design, coding, feature integration using Chart.js, functional testing, and user evaluation. Through these stages, the developed feature is expected to improve the effectiveness of collection reporting while enhancing the usability of the SLiMS platform.

5. Conceptual Framework

This study is based on the assumption that the integration of Chart.js into SLiMS enhances the quality of collection classification reporting by transforming tabular data into interactive graphical visualizations. The independent variable is the development of the graphical reporting feature using Chart.js, while the dependent variable is the effectiveness of collection classification reporting as reflected in report readability, analysis efficiency, information accessibility, and user satisfaction.

The conceptual framework suggests that interactive visualization enables librarians to interpret collection statistics more efficiently, identify classification trends more accurately, and support evidence-based decision-making in collection management. Therefore, integrating graphical reporting into SLiMS is expected to improve both system usability and the overall effectiveness of library management practices (Few, 2013; Knaflitz, 2015).

C. Research Methodology

This study employed the Research and Development (R&D) method to develop a graphical collection classification reporting feature in SLiMS (Senayan Library Management System) using the Library Chart.js library. The R&D approach was selected because it focuses on designing, developing, testing, and evaluating a technological product to meet users' needs (Borg & Gall, 2003). The research was conducted through several stages, including needs analysis, system planning, interface and database design, feature implementation, functional testing, and product evaluation. Data were collected through observation of the existing SLiMS reporting system, interviews with librarians as prospective users, and documentation of the system architecture and collection database. These techniques enabled the researchers to identify

the limitations of the current reporting feature and determine the functional requirements for graphical data visualization (Creswell & Creswell, 2018).

The developed feature was integrated into the SLiMS reporting module by utilizing the Chart.js library to generate interactive visualizations of collection classification data, including bar charts, pie charts, and line charts. The system was tested using black-box testing to verify the functionality of each feature and ensure that the generated graphical reports accurately represented the data stored in the library database (Pressman & Maxim, 2020). Subsequently, user evaluation was conducted through usability testing involving librarians to assess the effectiveness, usability, and satisfaction of the developed feature. The collected qualitative feedback was analyzed descriptively to determine whether the graphical reporting feature improved report readability, facilitated data interpretation, and supported more efficient decision-making in library collection management (Nielsen, 2012).

D. Results and Discussion

The development process began with a comprehensive analysis of the existing reporting module in SLiMS (Senayan Library Management System). The analysis revealed that the available reports were primarily presented in tabular form, requiring librarians to manually interpret numerical data when evaluating the distribution of library collections based on classification categories. Although these reports contained complete statistical information, they lacked visual representations that could facilitate rapid understanding and comparative analysis. Interviews with librarians indicated that the absence of graphical visualization often slowed decision-making related to collection development, acquisition priorities, and collection evaluation. These findings demonstrate that enhancing the reporting module with graphical visualization is necessary to improve the effectiveness of library information management (Breeding, 2015; Evans & Saponaro, 2012).

Based on the identified requirements, a graphical reporting feature was designed and integrated into the SLiMS reporting module using the Chart.js library. The system architecture was modified to retrieve collection classification data directly from the SLiMS database and convert the retrieved data into structured datasets compatible with Chart.js. The interface was designed to provide users with multiple visualization options, including bar charts for comparing classification frequencies, pie charts for illustrating proportional distribution, and line charts for

displaying collection growth trends over time. The responsive characteristics of Chart.js ensured that graphical reports could be accessed effectively through desktop and mobile web browsers without reducing system performance (Chart.js Contributors, 2024).

The implementation stage successfully integrated the visualization module into the existing SLiMS framework without affecting other operational components such as cataloging, circulation, and member management. Dynamic data retrieval was implemented using SQL queries connected to the classification tables within the SLiMS database. Whenever librarians selected a reporting period or collection category, the system automatically generated updated graphical reports based on real-time data. This automation eliminated the need for manual data processing and significantly reduced the time required to prepare analytical reports. The successful integration demonstrates the flexibility of the open-source architecture of SLiMS for supporting additional functional modules (Arif, 2019).

Functional testing was conducted using the black-box testing method to verify the performance of every feature developed in the system. The testing process evaluated data retrieval accuracy, chart generation, menu navigation, filtering functions, and report responsiveness. The results showed that all functional components operated correctly according to system specifications. The graphical reports accurately represented the classification data stored in the library database, while user interactions such as filtering, chart switching, and report refresh operated without errors. These results indicate that the developed reporting feature achieved a high level of functional reliability and system stability (Pressman & Maxim, 2020).

User evaluation involving librarians demonstrated positive responses toward the newly developed graphical reporting feature. Participants stated that graphical visualization made collection statistics easier to interpret than conventional tabular reports. Bar charts enabled users to compare the number of collections among classification categories quickly, while pie charts effectively illustrated proportional distribution across subject areas. Librarians also reported that the visualization feature reduced the time required to analyze collection conditions and simplified the preparation of collection development reports for institutional management. These findings support the argument that visual information improves users' cognitive processing and decision-making efficiency (Few, 2013; Knafllic, 2015).

Another significant finding concerns the contribution of graphical reporting to strategic library management. Visualization enabled librarians to identify subject areas with insufficient

collections, recognize acquisition priorities, and monitor collection growth more effectively. Instead of relying solely on numerical tables, decision-makers could immediately recognize trends and disparities through graphical presentations. Consequently, the developed feature supports evidence-based collection management by providing accurate statistical information in a more understandable format. This finding is consistent with previous studies emphasizing that data visualization enhances organizational performance by improving analytical capabilities and communication efficiency (Wilke, 2019).

From a technological perspective, the integration of Chart.js into SLiMS demonstrates the practical benefits of utilizing open-source technologies in library information systems. Because both SLiMS and Chart.js are open-source platforms, the development process required no additional licensing costs, making the solution economically feasible for educational institutions and public libraries with limited financial resources. Furthermore, the modular structure of Chart.js enables future developers to expand the reporting module by incorporating additional visualization types, dashboards, or interactive analytical features according to institutional requirements. This flexibility contributes to the sustainability and scalability of the developed system (Chart.js Contributors, 2024).

Overall, the results demonstrate that the development of a graphical collection classification reporting feature significantly improves the functionality of SLiMS. The integration of interactive visualization enhances report readability, simplifies statistical interpretation, supports strategic decision-making, and increases user satisfaction among librarians. The developed feature also demonstrates that data visualization technologies can substantially improve the quality of library information systems without requiring major modifications to the existing software architecture. Therefore, this study contributes both theoretically and practically to the advancement of digital library management by illustrating how modern visualization technologies can optimize reporting functions within open-source library automation systems (Breeding, 2015; Wilke, 2019).

E. Conclusion and Suggestions

This study successfully developed a graphical collection classification reporting feature in SLiMS (Senayan Library Management System) using the Library Chart.js library. The developed feature effectively transforms conventional tabular reports into interactive graphical

visualizations, including bar charts, pie charts, and line charts, enabling librarians to analyze collection classification data more efficiently. The implementation results demonstrate that the feature functions accurately and integrates seamlessly with the existing SLiMS architecture without disrupting other library management modules. Functional testing confirmed that the system operates reliably, while user evaluations indicated that graphical visualization improves report readability, facilitates data interpretation, and supports faster and more accurate decision-making in library collection management.

Furthermore, this study highlights the practical value of integrating open-source visualization technology into library information systems. The use of Chart.js not only enhances the usability of the reporting module but also provides a cost-effective and scalable solution for libraries seeking to improve their information management capabilities. By presenting statistical data in an interactive and visually informative format, the developed feature contributes to more effective collection evaluation, planning, and policy formulation. Therefore, this research demonstrates that graphical reporting can significantly enhance the functionality and user experience of SLiMS while supporting evidence-based library management.

Future research is recommended to expand the graphical reporting feature by incorporating additional analytical capabilities, such as real-time dashboards, predictive analytics, collection growth forecasting, and customizable reporting options. Integrating business intelligence technologies and advanced data analytics could further improve the strategic value of library information systems by enabling librarians to monitor collection performance and user behavior more comprehensively. Comparative studies involving other open-source or commercial library management systems may also provide valuable insights into the effectiveness of different visualization approaches.

From a practical perspective, libraries implementing SLiMS are encouraged to adopt the developed graphical reporting feature to improve collection monitoring and decision-making processes. Library administrators should also provide technical training for librarians to maximize the utilization of visualization tools in daily operations. In addition, continuous system maintenance and periodic updates should be conducted to ensure compatibility with future versions of SLiMS and Chart.js, thereby maintaining system reliability, security, and long-term sustainability. This continuous development is expected to contribute to the advancement of digital library services and the modernization of library management practices.

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