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Analysis and Development of Job Vacancies Using Web-Based SAW and TOPSIS Methods

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ABSTRACT

The rapid development of information technology has increased the availability of online job vacancy information; however, this condition often makes it difficult for job seekers to select suitable jobs according to their criteria and preferences. This study aims to analyze and develop a web-based job vacancy recommendation system using the Simple Additive Weighting (SAW) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods. The SAW method is applied to calculate initial preference values based on weighted criteria, while the TOPSIS method is used to determine the final ranking of job vacancies based on their closeness to the ideal solution. The system is developed using the Extreme Programming approach and tested through functional black box testing. The results indicate that the proposed recommendation system is able to provide objective, structured, and relevant job vacancy recommendations according to user preferences. The integration of SAW and TOPSIS effectively improves the quality of job ranking and supports job seekers in making better decisions.

Keywords: *Recommendation System, Job Vacancy, SAW, TOPSIS, Web-Based*

ABSTRAK

Perkembangan teknologi informasi mendorong meningkatnya jumlah informasi lowongan kerja yang tersedia secara daring, namun kondisi tersebut sering menyulitkan pencari kerja dalam menentukan pilihan pekerjaan yang sesuai dengan kriteria dan preferensi mereka. Penelitian ini bertujuan untuk menganalisis dan mengembangkan sistem rekomendasi lowongan kerja berbasis web menggunakan metode Simple Additive Weighting (SAW) dan Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). Metode SAW digunakan untuk menghitung nilai preferensi awal berdasarkan bobot kriteria, sedangkan metode TOPSIS digunakan untuk menentukan peringkat akhir lowongan kerja berdasarkan kedekatan terhadap solusi ideal. Sistem dikembangkan menggunakan pendekatan Extreme Programming dan diuji menggunakan pengujian fungsional black box testing. Hasil penelitian menunjukkan bahwa sistem rekomendasi yang dikembangkan mampu memberikan rekomendasi lowongan kerja secara objektif, terstruktur, dan relevan dengan preferensi pengguna. Integrasi metode SAW dan TOPSIS terbukti efektif dalam meningkatkan kualitas perankingan lowongan kerja serta membantu pencari kerja dalam proses pengambilan keputusan.

Kata kunci: *Sistem Rekomendasi, Lowongan Kerja, SAW, TOPSIS, Berbasis Web.*

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INTRODUCTION

The development of information technology and the internet has brought significant changes in various aspects of life, including in the process of searching for and providing information on job vacancies. Digital transformation is driving a shift in job search methods from conventional methods to web-based digital platforms that are able to provide information quickly, broadly, and in real-time. Today, job seekers do not rely on just one source of information, but are faced with thousands of job openings from various online platforms, such as job portals, social media, and company websites (Chawla, 2021). Although the ease of access to information provides advantages, this condition also poses new problems in the form of information overload. Job seekers often have difficulty in screening and determining the job openings that best suit their educational background, work experience, skills, and personal preferences (Parkar et al., 2025). As a result, the job search process becomes inefficient, time-consuming, and has the potential to result in suboptimal decisions. Therefore, a system is needed that is able to help job seekers in making appropriate and objective decisions.

The recommendation system is one of the solutions that has been developed to overcome these problems. The recommendation system aims to provide users with the best alternative suggestions or recommendations based on an analysis of preferences, user characteristics, and certain relevant criteria (Zou et al., 2025). In the context of job vacancies, the recommendation system plays an important role in matching job seeker profiles with available job requirements, thereby increasing the relevance of search results and speeding up the process of determining suitable jobs (Chawla, 2021). The development of a job recommendation system cannot be separated from the concept of a Decision Support System (DSS), especially when the selection process involves many criteria and alternatives. In these conditions, the Multi-Criteria Decision Making (MCDM) approach is a widely used method because it is able to handle complex decision-making problems in a structured and systematic manner (Krishnan, 2023). The MCDM approach allows each criterion to be weighted according to its level of importance, so that the results of the recommendations become more objective and measurable.

One of the MCDM methods that is widely applied in decision support systems is Simple Additive Weighting (SAW). The SAW method works by normalizing the value of each criterion and multiplying it by a predetermined weight, then adding up all the values to obtain the preference value of each alternative (Wibowo et al., 2020). The advantage of the SAW method lies in the simplicity of the calculation process and the

ease of interpretation of the results, so this method is often used in various applications of recommendation and ranking systems (Setiawan et al., 2025). In addition to SAW, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is also widely used in multicriteria decision-making. The TOPSIS method determines the best alternative based on the relative proximity to the positive ideal solution and the farthest distance from the negative ideal solution (Zulkarnain et al., 2022). This approach provides an advantage in comparing alternatives comprehensively because it considers two extreme conditions at once, so that the ranking results are considered more representative and objective.

Several studies have shown that the application of the SAW and TOPSIS methods separately or integrated can improve the quality of decision-making in various domains. Wibowo et al. (2020) proved that the SAW method is effectively used in a web-based job recommendation system because it is able to produce job rankings that match user criteria. Meanwhile, Pitrasacha and Arriyanti (2020) show that the TOPSIS method is able to produce an objective job match mapping between the needs of the company and the applicant's profile.

Research combining SAW and TOPSIS methods has also begun to be developed to improve the accuracy of recommendation results. Zulkarnain et al. (2022) developed a job recommendation system by integrating the two methods and showed that the combination of SAW-TOPSIS is able to provide more relevant recommendations and has a good level of usability. This result is in line with the research of Setiawan et al. (2025) who stated that the MCDM method is very effective in a website-based job recommendation system. However, based on the existing literature review, most of the research still focuses on the technical implementation of the method without an in-depth analysis of the system development process and the evaluation of the results of recommendations as a whole. In addition, research integrating the analysis of SAW and TOPSIS methods in a comprehensive web-based job recommendation system is still relatively limited, especially in the context of system development that is oriented to user needs and ease of use of the system (Zou et al., 2025). These limitations show that there is a research gap that needs to be further researched, especially related to the development of a job vacancy recommendation system that not only implements the SAW and TOPSIS methods, but also analyzes the performance of these methods in producing recommendations that are relevant, objective, and in accordance with the preferences of job seekers. The development of web-based systems is also an important aspect as it provides flexibility of access and ease of use for users on various devices.

Based on this background, this study aims to analyze and develop a web-based job vacancy recommendation system using the SAW and TOPSIS methods. The developed system is expected to be able to assist job seekers in obtaining job recommendations that are in accordance with their criteria and preferences objectively, as well as increasing the effectiveness and efficiency of the job search process in the digital era.

METHODS

This research is a software engineering research with a quantitative approach that aims to analyze and develop a web-based job recommendation system using the Multi-Criteria Decision Making (MCDM) method, namely Simple Additive Weighting (SAW) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The quantitative approach is used because this research involves a numerical calculation process in determining the value of preferences and job vacancy rankings based on a number of criteria that have been set.

System development is carried out using the Extreme Programming (XP) method because this method is able to support the software development process that is adaptive to changing user needs and allows for continuous feedback. The development stage starts from analyzing system needs by identifying problems faced by job seekers in determining suitable job vacancies, then continues with system design which includes database design, system architecture, and user interface. The implementation stage is carried out by developing a web-based system using the PHP programming language with the CodeIgniter framework and MySQL database. Furthermore, system testing is carried out to ensure that all functions are running according to the needs that have been set.

The object of this research is a web-based job vacancy recommendation system, while the research data is in the form of job vacancy data that is used as an alternative in the recommendation process. Each job vacancy is evaluated based on a number of criteria determined through a literature study and user needs, including education level, work experience, suitability of skills, job location, and salary range. Each criterion is given weight according to its level of importance so that it can represent the preferences of job seekers objectively.

The Simple Additive Weighting method is used in the early stages to calculate the preference value of each job vacancy alternative. This process begins with the formation of a decision matrix based on the value of each criterion, then normalization of the matrix is carried out to equalize the assessment scale. After the normalization process, the preference value is calculated by adding the result of multiplication between the

normalization value and the weight of the criteria, so that the final value is obtained that describes the level of feasibility of each job vacancy alternative.

Furthermore, the TOPSIS method is used to improve the ranking process by considering the proximity of each alternative to the positive ideal solution and its distance from the negative ideal solution. The TOPSIS process begins with the normalization of the decision matrix that has been weighted, then the ideal positive solution and the ideal negative solution are determined. The distance of each alternative to the two solutions is calculated to obtain the TOPSIS preference value. The alternatives with the highest preference scores are seen as the most recommended job openings.

The integration of SAW and TOPSIS methods in this study aims to combine the advantages of each method, where SAW is used to generate a simple and easy-to-understand initial preference value, while TOPSIS is used to improve ranking accuracy through a distance approach to the ideal solution. The results of the integration of these two methods are expected to be able to provide job vacancies recommendations that are more objective, accurate, and relevant to user preferences.

The job recommendation system developed is based on a client–server architecture and can be accessed through a web browser. This system involves several types of users, namely administrators who are in charge of managing data on criteria and job vacancies, companies who enter job vacancy information, and job seekers who receive the results of recommendations. System testing is carried out using the black box testing method to ensure that all system functions are running properly according to user needs. In addition, additional testing in the form of evaluation of the usability of the system can be carried out to assess the level of ease of use and user comfort in utilizing the developed recommendation system.

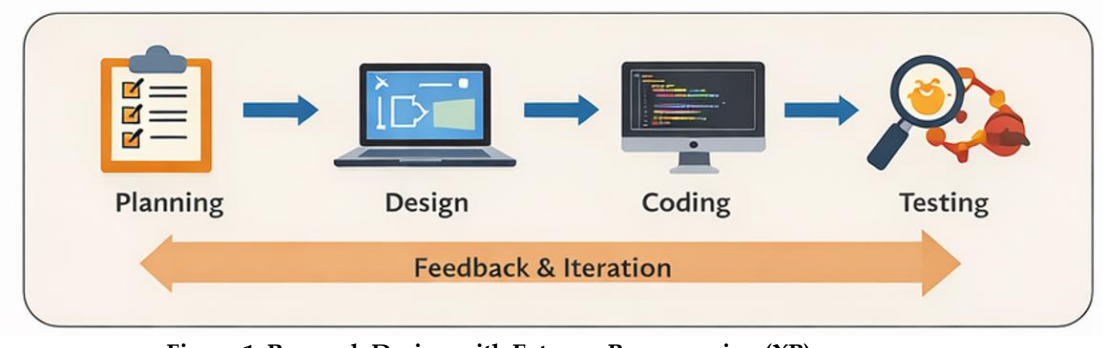

Figure 1. Research Design with Extreme Programming (XP)

Figure 1 illustrates a research design that applies the Extreme Programming (XP) method as an approach to the development of a web-based job recommendation system. The Extreme Programming method is used because it emphasizes software development in an iterative, flexible, and user-oriented manner. The development process starts from the planning stage, which is to identify problems in finding job vacancies and determine the functional and non-functional needs of the system. At this stage, user needs are analyzed to ensure that the system is able to provide job recommendations that meet the criteria of job seekers.

The next stage is design, where system architecture design, database design, and user interface design are carried out that support the ease of use of the system. This design aims to ensure that the system is able to optimally integrate the Simple Additive Weighting (SAW) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods in the recommendation process.

The coding stage is the process of implementing system design into a web-based application. At this stage, all system functions are developed according to predetermined needs, including processing job vacancy data, calculating preference values using the SAW and TOPSIS methods, and presenting the results of recommendations to users. Furthermore, the testing stage is carried out to test the functionality of the system and ensure that all features run well according to the specifications that have been set.

The four stages in Extreme Programming are connected by the feedback and iteration process, which shows that system development is carried out iteratively by involving user feedback. Through this iteration mechanism, the system can be continuously improved and refined so that it is able to produce a job recommendation system that is more adaptive, effective, and in accordance with user needs.

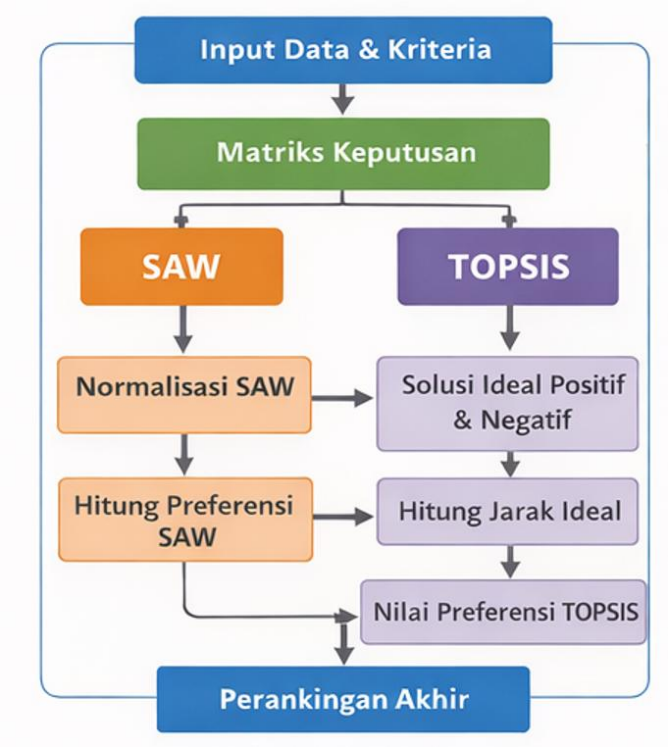

Figure 2. SAW and TOPSIS Method Process Flow

Figure 2 shows the process flow of the application of the Simple Additive Weighting (SAW) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods in the job recommendation system. The process begins with data input in the form of alternative job vacancies and predetermined assessment criteria, such as education level, work experience, suitability of skills, job location, and salary. Each criterion is given weight according to its level of importance to represent the preferences of job seekers.

The first stage in the process flow is the formation of a decision matrix based on the value of each alternative to each criterion. Furthermore, the SAW method is used to normalize the value of the criteria so that all values are on a comparable scale. After the normalization process, the preference value is calculated by adding up the multiplication between the normalization value and the criterion weight. The result of this stage is in the form of an initial preference value that is used to describe the eligibility level of each job vacancy.

The preference value of the SAW method results is then used as the basis for the advanced ranking process using the TOPSIS method. At this stage, the decision matrix that has been weighted is normalized again to

determine a positive ideal solution and a negative ideal solution. The distance of each alternative to the two solutions is calculated to obtain a relative proximity value. The proximity value is used to determine the final ranking of job vacancies, where the highest-rated alternative is considered the most recommended job vacancy.

The integration of SAW and TOPSIS methods in this process flow aims to combine the advantages of both methods, namely the simplicity of SAW calculation and TOPSIS' ability to produce more objective rankings based on proximity to ideal solutions. With this process flow, the recommendation system is able to produce job recommendations that are more accurate, relevant, and in accordance with the preferences of job seekers.

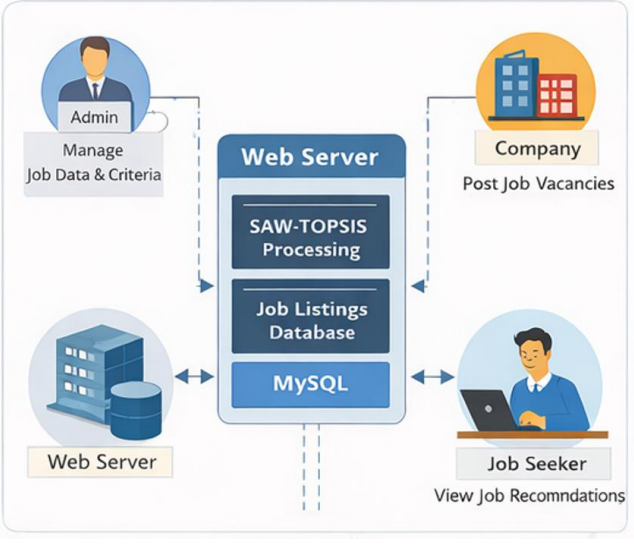

Figure 3. SAW and TOPSIS Method Process Flow

Figure 3 illustrates the architecture of the web-based job recommendation system developed in this study. The system architecture is designed using a client–server approach, where users access the system through a web browser as a client, while the entire process of data processing and application logic is run on the server side. This approach was chosen to provide access flexibility and facilitate centralized system management.

On the client side, there are three main types of users: administrators, companies, and job seekers. Administrators are responsible for managing criterion data, assessment weights, and maintaining overall system data. The company plays a role in entering and updating job

vacancy information which includes requirements, qualifications, and job descriptions. Job seekers use the system to enter their preferences and desired criteria and receive the results of job recommendations generated by the system.

On the server side, the web-based application system functions to process requests from users, manage data, and run recommendation algorithms. The recommendation processing module implements the Simple Additive Weighting (SAW) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods to calculate preference values and rank job vacancies. All data used in the process is stored and managed in a database, allowing for structured and consistent data retrieval and processing.

The interaction between the client and the server is carried out through the HTTP protocol, where every request from the user is processed by the system and produces a response in the form of an information display or the results of job recommendations. With this architecture, the recommendation system is able to provide responsive, integrated, and accessible services, as well as support the job seeker's decision-making process effectively and efficiently.

RESULTS AND DISCUSSION

The result of this research is in the form of a web-based job recommendation system that is able to provide job recommendations to job seekers based on determined criteria and preferences. The system is developed using a client–server architecture and can be accessed through a web browser, allowing users to access the system flexibly without device and location restrictions.

The developed system provides features for managing job vacancy data, managing criteria and assessment weights, and job vacancy recommendation features. Administrators have access rights to manage the criteria and weights of assessments used in the calculation process, while companies can enter job vacancy data independently. Job seekers can input their preferences and get recommendations in the form of a list of job openings that have been ranked based on the level of suitability.

Results of the Implementation of the SAW and TOPSIS Methods

The implementation of the Simple Additive Weighting (SAW) method and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is carried out in accordance with the design of the method that has been set. The calculation process begins with the formation of a decision matrix containing the value of each alternative job

vacancy against each criterion. Furthermore, the SAW method is used to normalize the criteria value and calculate the initial preference value of each alternative based on the predetermined weight.

The results of the SAW calculation show that each job vacancy obtains a different preference value, reflecting the degree of suitability of the vacancy to the criteria chosen by the job seeker. These preference values are then used as the basis for the advanced ranking process using the TOPSIS method. At this stage, the system calculates the distance of each alternative to the positive ideal solution and the negative ideal solution, so that the relative proximity value is obtained which is used to determine the final ranking.

The end result of the integration of the SAW and TOPSIS methods is in the form of a more structured and objective ranking of job vacancies, where the vacancies with the highest proximity value are displayed as the main recommendations for job seekers. The integration of these two methods is able to reduce subjectivity in the selection process and produce more relevant recommendations than using one method separately.

Table 1. Results of Job Vacancy Ranking Using SAW and TOPSI Methods

Vacancy Code	SAW Preference Value	Positive Ideal Distance (D^+)	Negative Ideal Distance (D^-)	TOPSIS Preference Value (Ci)	Ratings
L001	0,78	0,21	0,42	0,67	1
L002	0,72	0,26	0,38	0,59	2
L003	0,69	0,29	0,35	0,55	3
L004	0,65	0,34	0,31	0,48	4
L005	0,61	0,38	0,28	0,42	5

Based on Table 1, the results of the job vacancy ranking show that each alternative has a different preference value. The SAW preference value describes the initial eligibility level of each job vacancy based on the weight of the criteria that have been determined. Job vacancies with the code L001 obtained the highest SAW preference score, indicating that they had the highest level of suitability for job seekers' criteria.

The results of the calculation using the TOPSIS method show that the L001 job vacancy has the highest preference value of 0.67, which means that the alternative has the closest distance to the positive ideal solution and the farthest distance from the negative ideal solution. Thus, L001 is set as the main recommendation for job seekers. In contrast, job vacancies L005 obtained the lowest TOPSIS preference score, so it was ranked last.

These results show that the integration of SAW and TOPSIS methods is able to produce a more objective and structured ranking of job vacancies. The SAW method plays a role in providing an initial value based on the weight of the criteria, while the TOPSIS method improves the ranking by considering the relative proximity to the ideal solution. Thus, the recommended system developed is able to provide job recommendations that are more relevant and in accordance with user preferences.

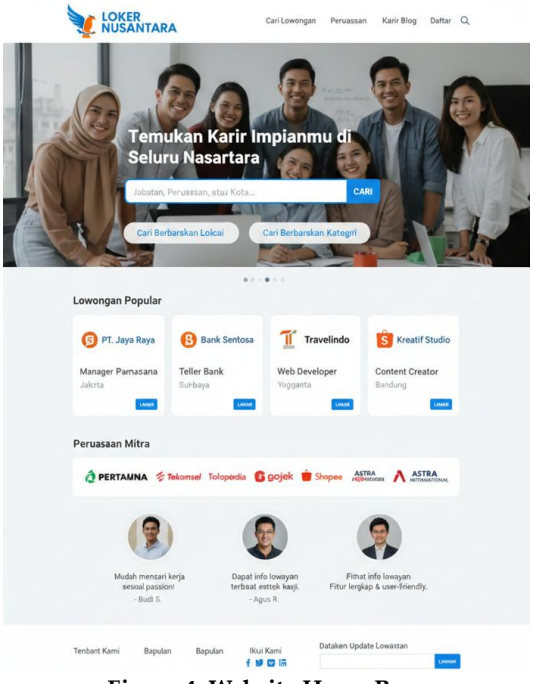

Figure 4. Website Home Page

Figure 4 shows the main page of the web-based job recommendation system developed in this study. The main page serves as the initial interface accessed by the user and is designed to provide an overview of the features and services available in the system. The main page view provides brief information about the system's objectives, which are to help job seekers obtain job recommendations that match their criteria and preferences.

On the main page, users can access a navigation menu that leads to the main features of the system, such as job vacancy information, the recommendation process, as well as the login and user registration pages. The interface design is made simple and responsive to make it easy to use by different types of users. The layout of the interface elements is structured to make it easier for users to understand the flow of using the system from the first time they access the website.

The main page also serves as a starting point for interaction between users and the system, so it's designed to improve convenience and ease of access. With an informative display and clear navigation, the main page supports the effectiveness of using the job recommendation system and improves the user experience in utilizing the developed system.

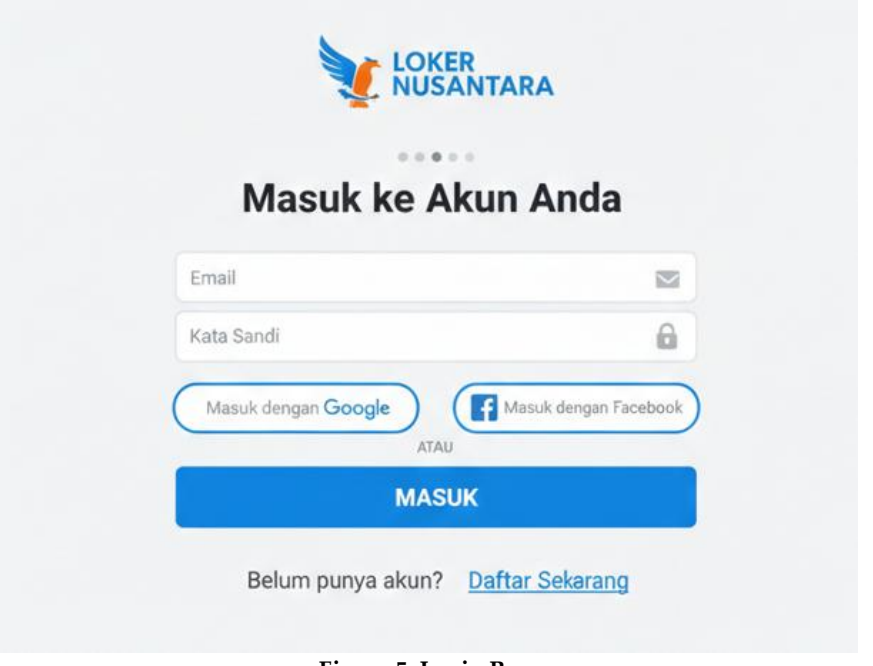

Figure 5. Login Page

Figure 5 shows the view of the login page on the web-based job recommendation system. The login page serves as a user authentication mechanism before accessing the main features of the system. Through this page, users are required to enter account information in the form of a username and password to ensure that only registered users who have access rights can use the system.

` The login page is designed with a simple and easy-to-understand interface, making it easier for users to log in to the system. In addition, this page also provides input validation features to ensure the data entered is in accordance with the specified format as well as improve system security. If the authentication process is successful, users will be redirected to the main page according to their respective roles, such as administrators, employers, or job seekers.

The existence of a login page on this system aims to maintain data security and manage user access rights in a structured manner. With a good authentication mechanism, the job recommendation system can

provide a safer, more controlled, and appropriate service according to the role of the registered user.

CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that a web-based job recommendation system has been successfully developed by integrating the Simple Additive Weighting (SAW) method and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The developed system is able to provide job recommendations that are in accordance with the criteria and preferences of job seekers in an objective and structured manner, so that it can help users in the decision-making process.

The application of the SAW method allows the system to calculate the initial preference value of each job vacancy based on the weight of the predetermined criteria. Furthermore, the TOPSIS method is used to improve the ranking process by considering the proximity of each alternative to the positive ideal solution and its distance from the negative ideal solution. The integration of the two methods has been proven to be able to produce more accurate and relevant job vacancy rankings compared to using one method separately.

The results of the functional test show that all system features are running well according to the needs that have been set. The system is able to manage job vacancy data, process calculations of the SAW and TOPSIS methods, and display the results of recommendations accurately and easily understood by users. Thus, the recommended system developed is considered effective in improving the efficiency of the job search process.

This research contributes to the development of a decision support system in the field of employment, especially in the application of the MCDM method in a web-based job recommendation system. The resulting system has the potential to be further developed by adding assessment criteria, other decision-making methods, or integration with advanced technologies to improve the quality of recommendations in the future.

REFERENCES

Chawla, B. (2021). Job Recommendation System. International Journal for Research in Applied Science and Engineering Technology, 9(3). DOI: http://dx.doi.org/10.22214/ijraset.2021.33256

Parkar, A., Deshmukh, M., & Deshmukh, G. (2025). Job Recommendation System. Intl Journal of Basic and Applied Sciences, 14(3). DOI: https://doi.org/10.14419/mhjxnq18

Pitrasacha, & Arriyanti, E. (2020). Desain dan Implementasi Job Matching System Menggunakan Metode Kombinasi WSM-TOPSIS. METIK Jurnal. DOI: https://doi.org/10.47002/metik.v4i2.180

Setiawan, M. I., Sundari, J., & Andriansyah, D. (2025). Rekomendasi Pekerjaan yang sesuai pada Situs Lowongan Kerja dengan Penerapan SAW. Jurnal Ilmiah Informatika Global. DOI: https://doi.org/10.36982/jiig.v10i2.856

Wibowo, D. W., Mentari, M., Chandra, A. D., Kuddah, A. A., & Putra, R. W. (2020). Sistem Pendukung Keputusan Berbasis Web Rekomendasi Pekerjaan Bagi Lulusan JTI Polinema Dengan Metode SAW. JASIEK. DOI: https://doi.org/10.26905/jasiek.v2i1.3724

Zou, Z., Huspi, S. H., Amerhaider Nuar, A. N., & Zhu, K. (2025). A Conceptual Framework of Career Move Recommendation System. Journal of Advanced Research Design, 126(1). DOI: https://doi.org/10.37934/ard.126.1.9198

Zulkarnain, M. F., Dwidasmara, I. B. G., Raharja, M. A., Astawa, I. G. S., Supriana, I. W., & Bayu Atmaja Darmawan, I. D. M. (2022). Penerapan Metode SAW dan TOPSIS dalam Sistem Rekomendasi Lowongan Kerja Bali. JELIKU. DOI: https://doi.org/10.24843/JLK.2022.v11.i02.p02