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Implementation Of A Profile Matching Based Decision Support System For Selecting Eligible Candidates Of Kip College Scholarships At Sam Ratulangi University

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Abstract

The implementation of the KIP Kuliah scholarship program at Sam Ratulangi University (UNSRAT) faces challenges in ensuring objective, transparent, and accurate recipient selection due to limitations in the verification process. This study aims to develop and implement a web-based Decision Support System (DSS) using the Profile Matching method to support the selection of eligible KIP Kuliah scholarship recipients. The system was developed using the Waterfall methodology, including requirements analysis, system design, implementation, testing, and deployment, and was implemented using PHP, MySQL, and HTML/CSS. The evaluation employed six assessment criteria consisting of three Core Factors (parental income, family asset ownership, and number of family dependents) weighted at 60% and three Secondary Factors (academic performance, parents' employment status, and living condition) weighted at 40%. The Profile Matching algorithm calculates the GAP between applicant profiles and the ideal profile to generate recommendation rankings. Functional evaluation using Black-box Testing confirmed that all system modules operated according to their specifications. Validation using simulated applicant data demonstrated that the proposed system generated objective and consistent recommendation results based on the predefined criteria. The developed DSS improves the efficiency, transparency, and objectivity of the KIP Kuliah scholarship selection process at Sam Ratulangi University.

Keywords: ***Decision Support System, KIP Kuliah, Profile Matching, Scholarship Selection, Web-Based System***

INTRODUCTION

Kartu Indonesia Pintar (KIP) is an educational assistance program for children aged 6–21 years from low-income families or those registered in the Program Keluarga Harapan (PKH) and Kartu Keluarga Sejahtera (KKS). The program, managed by the Ministry of Education through higher education institutions, aims to improve access to higher education for economically disadvantaged students and is implemented under Regulation No. 10 of 2022 (Melingga Milyani et al., 2023; Martins & Toletina, 2024). Although KIP Kuliah has reduced financial barriers and increased students' motivation to pursue higher education (Sinulingga et al., 2025), its implementation still faces challenges, including inaccurate recipient targeting, limited financial assistance, and the underrepresentation of students from low socioeconomic backgrounds at leading public universities (Simanjuntak et al., 2024; Fadhil & Sabic-El-Rayess, 2020). These issues indicate the need for more reliable data verification, coordination, and monitoring mechanisms.

Decision Support Systems (DSS) using the Profile Matching method have been widely applied to support objective decision-making by comparing candidate profiles with predefined ideal criteria (Ritongga, 2023). In scholarship selection, this method has proven effective in replacing subjective and inefficient manual processes, resulting in more transparent and accurate recommendations (Rohman, 2020). Previous studies have successfully implemented Profile Matching for selecting direct cash assistance recipients (Silitonga & Simangunsong, 2020), scholarship recipients at SMA Negeri 2 Kupang (Da Costa et al., 2020), and board member selection at Universitas Negeri Medan (Setiawan et al., 2025).

At Sam Ratulangi University (UNSRAT), the KIP Kuliah selection process begins with the identification of eligible candidates by Puslapdik based on the Integrated Social Welfare Data (DTKS), followed by document verification and home visits conducted by the Bureau of Academic and Student Affairs before the final decision is made. However, the process still relies heavily on manual

verification, increasing the risk of subjectivity, administrative inefficiency, and selection inaccuracies (Puslapdik, 2024). Therefore, this study aims to develop and implement a web-based Decision Support System using the Profile Matching method to support the selection of KIP Kuliah scholarship recipients at UNSRAT. The proposed system evaluates applicants based on socioeconomic and academic criteria to provide objective, transparent, and efficient ranking recommendations. Due to the confidentiality of applicant records, the system is validated using simulated data representing the characteristics of actual KIP Kuliah applicants.

RESEARCH METHODS

This research employed the Waterfall software development methodology, consisting of requirements analysis, system design, implementation, testing, and deployment. Primary data were obtained through structured interviews with officers of the UNSRAT Bureau of Academic and Student Affairs (Biro Akademik dan Kemahasiswaan) to understand the KIP Kuliah selection workflow, assessment criteria, and verification procedures. Because actual applicant records are confidential, access to student data was not permitted. Therefore, system validation was conducted using simulated data representing the characteristics of KIP Kuliah applicants based on the established assessment criteria.

The selection criteria were determined from three sources: Permendikbudristek No. 10 of 2022, expert consultation with UNSRAT scholarship coordinators, and analysis of scholarship recipient patterns from 2020–2024. The Profile Matching method classified the criteria into Core Factors (60%) and Secondary Factors (40%). Core Factors consisted of Parent/Guardian Income (20%), Ownership of Family Assets (20%), and Number of Family Dependents (20%), reflecting the primary objective of KIP Kuliah to support economically disadvantaged students. Secondary Factors included Academic Performance (20%), Parents' Employment Status (10%), and Living Condition (10%), providing complementary academic and socioeconomic information. The weighting scheme follows the standard Profile Matching framework and was confirmed through expert consultation with UNSRAT scholarship coordinators.

The research stages included literature review, data collection, system development, and evaluation. The literature review examined previous studies on Decision Support Systems, Profile Matching, and KIP Kuliah selection to identify research gaps and appropriate methodologies. Data collection involved gathering and validating applicant information and assessment criteria. The system was developed as a web-based application using PHP, MySQL, and HTML/CSS, while system functionality was evaluated through Black-box Testing to ensure that all features operated according to the specified requirements.

RESULTS AND DISCUSSION

Implementation of the Profile Matching Method

The Profile Matching method was implemented to measure the suitability between an applicant's profile and the ideal profile of a KIP Kuliah scholarship recipient. The method compares each applicant's assessment score with a predetermined target value, where a smaller GAP indicates a higher level of eligibility. This approach provides a more objective assessment than conventional manual selection because it evaluates applicants based on predefined criteria. The implementation consisted of determining the ideal profile, GAP calculation, GAP weight conversion, Core Factor (NCF) and Secondary Factor (NSF) calculation, final score calculation, and recommendation generation.

Ideal Profile

The ideal profile was established by assigning a uniform target value of 3 for each assessment criterion. On the assessment scale of 1–5, a value of 3 represents the minimum eligibility threshold of an ideal KIP Kuliah recipient. The use of a uniform target value simplifies the GAP calculation, ensures comparability across criteria, and produces a symmetric GAP range from −4 to +4.

Table 1. Ideal Profile of KIP Kuliah Scholarship Recipients

Criteria	Target
Parent/Guardian Income	3
Ownership of Family Assets	3
Number of Family Dependents	3
Academic Performance (GPA)/Report Card Grades	3
Parents' Employment Status	3
Living Condition	3

As shown in Table 1, all six criteria use the same target value, allowing the system to consistently measure each applicant's deviation from the expected profile.

GAP Calculation

The GAP value was calculated by subtracting the target value from the applicant's assessment score for each criterion. A GAP value of 0 indicates a perfect match with the ideal profile, while positive and negative values indicate scores above and below the target, respectively. Table 2 presents the GAP calculation results for the sample applicants.

Table 2. Sample GAP Calculation Results

No	Name (NIM)	C1	C2	C3	S1	S2	S3
1	Evan Sapteno (221011060035)	1	0	2	1	2	0
2	Budi Santoso (21101060002)	-1	-1	1	0	1	2
3	Cindy Wulandari (21101060003)	-2	-2	2	1	0	2
4	Deni Kusuma (21101060004)	0	-1	1	0	1	1
5	Eka Putri (21101060005)	-1	-2	2	1	2	2

GAP Weight Conversion

The calculated GAP values were converted into weighted scores according to the standard Profile Matching conversion shown in Table 3.

Table 3. GAP Weight Conversion

GAP	Score	Description
0	5.0	No gap (competency matches exactly what is needed)
1	4.5	Individual's competency exceeds by 1 level
-1	4.0	Individual's competency lacks by 1 level
2	3.5	Individual's competency exceeds by 2 levels
-2	3.0	Individual's competency lacks by 2 levels
3	2.5	Individual's competency exceeds by 3 levels
-3	2.0	Individual's competency lacks by 3 levels
4	1.5	Individual's competency exceeds by 4 levels
-4	1.0	Individual's competency lacks by 4 levels

Core Factor and Secondary Factor Calculation

The weighted GAP scores were grouped into Core Factors (60%) and Secondary Factors (40%) to calculate the Core Factor (NCF) and Secondary Factor (NSF) values. Table 4 presents the weighted GAP scores together with the NCF and NSF results for the sample applicants.

Table 4. Sample Weight GAP, NCF, and NSF Calculation

No	Name	C1	C2	C3	S1	S2	S3	NCF	NSF
1	Evan Sapteno	4.5	5.0	3.5	4.5	3.5	5.0	4.333	4.375
2	Budi Santoso	4.0	4.0	4.5	5.0	4.5	3.5	4.166	4.500
3	Cindy Wulandari	3.0	3.0	3.5	4.5	5.0	3.5	3.166	4.375
4	Deni Kusuma	5.0	4.0	4.5	5.0	4.5	4.5	4.500	4.750
5	Eka Putri	4.0	3.0	3.5	4.5	3.5	3.5	3.500	4.000

Final Score and Recommendation

The final score was obtained by combining the NCF (60%) and NSF (40%) values. Based on the final score, applicants were ranked and automatically classified into recommendation categories. Table 5 presents the ranking results.

Table 5. Final Score and Recommendation Results

No	Name (NIM)	NCF	NSF	Final Score	Recommendation
1	Evan Sapteno (221011060035)	4.333	4.375	4.350	Recommended
2	Budi Santoso (21101060002)	4.166	4.500	4.300	Recommended
3	Cindy Wulandari (21101060003)	3.166	4.375	3.650	Recommended
4	Deni Kusuma (21101060004)	4.500	4.750	4.600	Highly Recommended
5	Eka Putri (21101060005)	3.500	4.000	3.700	Recommended

The results indicate that the Profile Matching method successfully differentiated applicants according to the established socioeconomic and academic criteria. Applicants with higher final scores were prioritized as scholarship recipients, enabling the system to generate objective, transparent, and consistent recommendations for KIP Kuliah scholarship selection.

System Implementation

This section presents the implementation of the web-based Decision Support System for KIP Kuliah scholarship selection using the Profile Matching method. The system was developed using PHP, MySQL, and Bootstrap, and consists of modules supporting authentication, applicant management, assessment, Profile Matching calculation, recommendation generation, and reporting.

Login Page

The Login page authenticates users using a registered username and password before granting access according to user roles. Invalid credentials are rejected, ensuring system security.

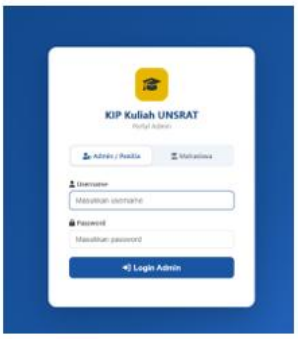

Figure 1. Login Page

Administrator Dashboard

The Administrator Dashboard provides an overview of the scholarship selection process, including the number of applicants, completed assessments, calculation results, and recommendations. It also serves as the main navigation page for all system functions.

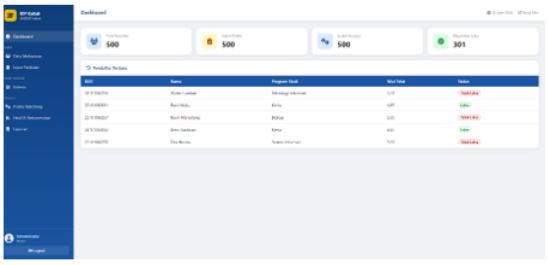

Figure 2. Administrator Dashboard

Student Dashboard

The Student Dashboard displays each applicant's scholarship information, including application status, Profile Matching score, recommendation results, and eligibility status. Students may also update their application data within the permitted submission period.

Figure 3. Student Dashboard

Student Data Management

This module enables administrators to manage applicant data through search, filtering, viewing, and deletion features. It also displays applicant information, recommendation results, and selection status.

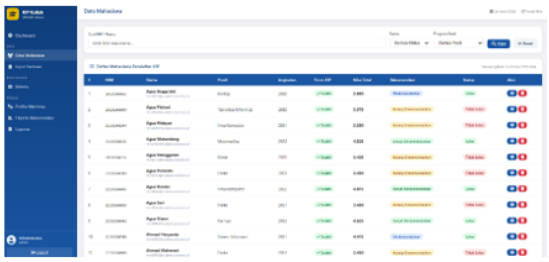

Figure 4. Student Data Management

Assessment Input

The Assessment Input page allows administrators to assign scores based on predefined criteria. The entered data are validated and stored as the basis for Profile Matching calculations.

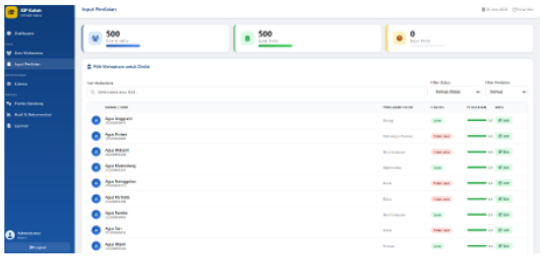

Figure 5. Assessment Input

Criteria Management

This module manages assessment criteria, including criterion weights, target values, and factor classifications as Core Factors (CF) or Secondary Factors (SF), which are used in the Profile Matching process.

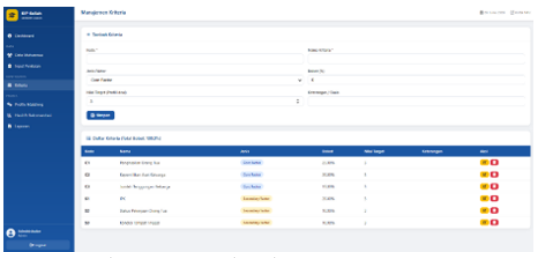

Figure 6. Criteria Management

Profile Matching Process

The Profile Matching module performs GAP calculation, GAP weight conversion, Core Factor and Secondary Factor computation, and final score calculation automatically. The calculated results are stored in the database for recommendation generation.

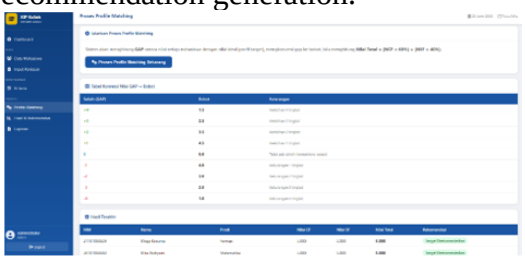

Figure 7. Profile Matching Process

Recommendation Result

This page presents applicant rankings and recommendation categories generated from the final Profile Matching scores, enabling objective and transparent scholarship selection.

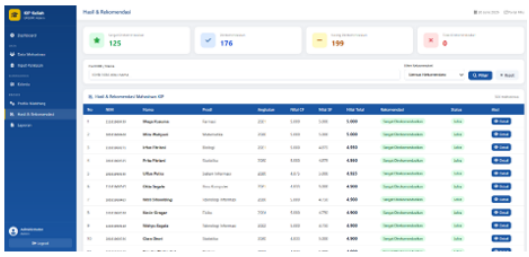

Figure 8. Recommendation Result

Report

The Report module generates printable scholarship selection reports containing applicant information, final scores, rankings, recommendation categories, and selection status for documentation and decision-making purposes.

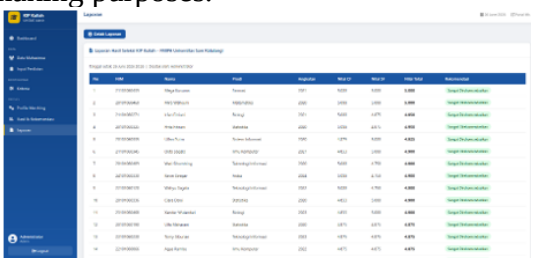

Figure 9. Report Page

System Testing

System testing was conducted using the Black Box Testing method to verify that every function of the proposed Decision Support System operates according to its specifications without examining the internal program code. A total of 42 test cases were executed, covering all major system modules, including administrator authentication, student portal, registration, KIP form submission, criteria management, assessment input, Profile Matching calculation, recommendation generation, reporting, and logout functionality. Each feature was tested using both valid and invalid input scenarios to ensure that the system produced the expected outputs under different operating conditions.

Black Box Testing Results

Table 6. Summary of Black Box Testing Results

No	Module	Number of Test Cases	Test Description	Result
1	Administrator Login	3	Valid login, invalid login, empty input validation	Success
2	Student Login	3	Valid login, invalid NIM, incorrect password	Success
3	Student Registration	7	NIM verification, name validation, password validation, duplicate account, account creation	Success
4	Student Dashboard & KIP Form	5	Dashboard display, form submission, validation, status information	Success
5	Student Data Management	7	Search, filtering, pagination, detail display, data deletion	Success
6	Criteria Management	2	View and update assessment criteria	Success
7	Assessment Input	3	Student selection, score input, input validation	Success
8	Profile Matching Process	3	GAP calculation, weight conversion, NCF, NSF, Final Score calculation	Success
9	Recommendation Results	3	Recommendation generation and recommendation category validation	Success
10	Reporting	2	Report generation and printing	Success
11	Logout	2	Administrator logout and student logout	Success
Total		**42 Test Cases**	All system functions tested	**100% Success**

The Black Box Testing results demonstrate that all 42 test cases produced outputs consistent with the expected system specifications. Authentication, data management, criteria processing, Profile Matching calculations, recommendation generation, reporting, and session management operated correctly under both valid and invalid input conditions. No functional errors were identified during

testing, indicating that the implemented Decision Support System satisfies its functional requirements and is ready for operational deployment.

CONCLUSION

This research successfully developed and implemented a web-based Decision Support System for KIP Kuliah scholarship recipient selection at Sam Ratulangi University using the Profile Matching method. The system was developed using PHP, MySQL, and HTML/CSS following the Waterfall methodology, covering the stages of requirements analysis, system design, implementation, testing, and deployment.

The implemented Profile Matching algorithm evaluates six assessment criteria consisting of three Core Factors—parental income (C1), family asset ownership (C2), and number of family dependents (C3)—with a total weight of 60%, and three Secondary Factors—academic performance (S1), parental employment status (S2), and living condition (S3)—with a total weight of 40%. The final recommendation is determined from the weighted combination of the Core Factor (NCF) and Secondary Factor (NSF) values, enabling a more objective, consistent, and transparent scholarship selection process.

Black Box Testing covering 42 test cases confirmed that all system modules, including administrator authentication, student registration and login, KIP form submission, student data management, assessment input, Profile Matching calculation, recommendation generation, and reporting, operated according to their functional specifications. The student portal allows applicants to register, complete the KIP form, and monitor their selection status, while the administrator module supports automated calculations, efficient data management, and report generation, thereby improving the efficiency, transparency, and auditability of the KIP Kuliah selection process at UNSRAT.

This study was conducted using simulated applicant data because access to actual KIP Kuliah records was restricted by the UNSRAT Bureau of Academic and Student Affairs, representing a limitation that can be addressed in future studies through formal institutional data-sharing agreements. Future development is recommended to integrate the system with the national population database (Dukcapil) and the Puslapdik KIP Kuliah portal for automatic applicant verification, incorporate a post-selection monitoring module to evaluate scholarship recipients throughout their academic period, periodically review the criteria weights and GAP conversion values to ensure alignment with current KIP Kuliah policies, strengthen password security by replacing the MD5 hashing algorithm with more secure methods such as bcrypt or Argon2 together with two-factor authentication for administrator accounts, and extend the system into a mobile-responsive or dedicated mobile application to improve accessibility for students, particularly those in remote areas.

REFERENCES

Afifah, N., Kurniawati, I. & Heriyanto. (2022). Penerapan Metode *Profile Matching* pada Sistem Pendukung Keputusan Pemilihan Karyawan Terbaik di PT. Karya Anugrah Teknologi. *Jurnal INTI Nusa Mandiri.*

Costa, J.N., Priadana, A. & Badawi, M.A. (2020). Sistem Pendukung Keputusan Pemberian Beasiswa Kurang Mampu di SMA Negeri 2 Kupang Menggunakan Metode *Profile Matching*. *Jurnal Informatika dan Komputer.* 17–22.

Dinar, S. (2025). *Mahasiswa Kritik Keras: Unsrat Dinilai Lalai Awasi Penerima KIP, Hak Penerima Lain Terabaikan.* Manado: Media Sulut News.

Fadhil, I. & Sabic-El-Rayess, A. (2021). Providing Equity of Access to Higher Education in Indonesia: A Policy Evaluation. *Indonesian Journal on Learning and Advanced Education (IJOLAE).* 3(1):57–75.

Hadidi, S., Al-Rashdan, M. & Hadidi, M. (2020). Impact Web on Decision Support Systems on the Organizations. *International Journal of Scientific & Technology Research.*

Handayani, R.N. & Hariyanti, I. (2022). Sistem Penunjang Keputusan Penentuan Calon Penerima Bantuan Langsung Tunai (BLT) dengan Metode SAW. *Jurnal Responsif.* 4(2):190–195.

Kaloh, A.K., Sompie, S.R. & Ruindungan, D.G. (2022). Rancang Bangun Realitas Maya Interaktif Universitas Sam Ratulangi. *Jurnal Teknik Elektro dan Komputer.* 99–108.

Kerkouche, E., Khalfaoui, K. & Chaoui, A. (2020). A Rewriting Logic-Based Semantics and Analysis of UML Activity Diagrams: A Graph Transformation Approach. *International Journal of Computer Aided Engineering and Technology*.

Martins, E.K. & Toletina, N.T. (2024). Evaluasi Pelaksanaan Kebijakan Program KIP-K di Indonesia. *Jurnal Komunikasi & Administrasi Publik.* 331–340.

Milyani, M., Desyanti. & Urva, G. (2023). Implementasi Penentuan Penerima Kartu Indonesia Pintar (KIP) Menggunakan Metode Rank Order Centroid (ROC) dan Multi Objective Optimization on the Basic of Ratio Analysis (MOORA). *Jurnal Teknologi Komputer dan Informasi (JUTEKINF).* 47–55.

Prasetyo, A.T. (2019). *Memperkenalkan HTML dan Membuat Program Berbasis Web yang Sederhana di SMK Cengkareng 2.* Thesis. Jakarta: Universitas Mercu Buana.

Pusat Layanan Pembiayaan Pendidikan (Puslapdik). (2024). *Pelajari dan Pahami Tahapan Pendaftaran KIP Kuliah.* Jakarta: Kemendikbudristek.

Ramadan, A.R., Junaidi, A. & Azis, M.A. (2023). KAI Commuter Employee Development Application Using the Waterfall Method. *Informatics and Software Engineering.* 44–50.

Ritongga, H.I. (2023). Sistem Pendukung Keputusan Rekrutmen Karyawan Baru Menggunakan Metode *Profile Matching* Berbasis Web. *Jurnal Sistem Informasi & Ilmu Komputer.*

Rumbaugh, J., Jacobson, I. & Booch, G. (2020). *The Unified Modeling Language Reference Manual.* California: Addison Wesley.

Sahi, A. (2020). Aplikasi Test Potensi Akademik Seleksi Saringan Masuk LP3I Berbasis Web Online Menggunakan Framework CodeIgniter. *Tematik: Jurnal Teknologi Informasi Komunikasi.*

Saputra, D., Akbar, F., Lisnawanty, L., Martias, M. & Rahman, A. (2021). Decision Support System for Providing Customer Reward Using *Profile Matching* Method: A Case Study at PT. Atlas Jakarta. *Bulletin of Computer Science and Electrical Engineering.*

Setiawan, A. & Afdal, R.N. (2025). Sistem Pendukung Keputusan Pemilihan Perangkat Umum Persmabimed Berbasis Web dengan Metode *Profile Matching*. *Bulletin of Computer Science Research.* 852–863.

Shcherban, S., Liang, P., Li, Z. & Yang, C. (2021). Multiclass Classification of Four Types of UML Diagrams from Images Using Deep Learning. *International Journal of Software Engineering and Knowledge Engineering.*

Silitonga, A.E. & Simangunsong, A. (2020). Sistem Pendukung Keputusan dalam Menentukan Penerima Bantuan Langsung Tunai dengan Metode *Profile Matching* pada Kantor Kepala Desa Narigunung 1. *Jurnal Nasional Komputasi dan Teknologi Informasi (JNKTI).* 275–280.

Simanjuntak, P.N., S., B.S., Simangunsong, M. & Berlianti. (2024). Ketimpangan Distribusi Kartu Indonesia Pintar: Sebuah Kajian Terhadap Akses dan Implementasi di Indonesia. *Jurnal Hukum Islam dan Humaniora.* 803–812.

Sinulingga, L.O., Siregar, N.S. & Batubara, B.M. (2025). Implementation of the KIP Kuliah Program for Aspiration Path for Students of Universitas Mandiri Bina Prestasi. *Journal of Comprehensive Science (ICS).* 4(2):697–707.

Sitompul, H., Matondang, Z., Daryanto, E. & Syahputra, F. (2023). Use Case Diagram Design for Information System Services to Students at the Faculty of Engineering Universitas Negeri Medan. *Proceedings of the 5th International Conference on Innovation in Education, Science, and Culture.*

Sugiarto, I., Diyasa, G.S. & Idhom, M. (2020). Profile Matching Algorithm in Determining the Position of Colleagues. *Journal of Physics: Conference Series.*

Uzayr, S.B. (2023). *HTML The Ultimate Guide*. Boca Raton.

Wahyudi, J., Asbari, M., Sasono, I., Pramono, T. & Novitasari, D. (2022). Database Management in MYSQL. *Jurnal Edusampul.* 2413–2417.

Yanto, R. & Hamidani, S. (2023). Penerapan Metode SMART dalam Menganalisa Keputusan Klasifikasi Badan Usaha Milik Desa. *Jurnal Teknoinfo.* 17(2):426–439.