CoreID JOURNAL

Vol. 4 No. 2, July 2026 (58-67)
ISSN: 2987-6990
DOI: https://doi.org/10.60005/coreid.v4i2.164

Optimizing Subscription Package Selection Using a Business Intelligence-Based Decision Support System on Customer Payment Data

Moch Mukhsin Nauval[1], Kamaludin[2], Yogi Saputra[3]
[1,2,3]Department of Information Systems, Universitas Kebangsaan Republik Indonesia, Bandung, Indonesia

Article Info

Article history:

Received April 25, 2026
Revised August 03, 2026
Accepted August 04, 2026

Keywords:

AHP
Business Intelligence
Decision Support System
SAW
TOPSIS

ABSTRACT

Subscription-based business models generate large amounts of customer payment data that has the potential to be used to support strategic decision-making. However, in many companies, the use of this data is still limited to presenting descriptive information through Business Intelligence dashboards, thus failing to produce objective decision recommendations. This condition often results in the selection of superior subscription packages being based on subjective assessments. This study aims to design a Decision Support System (DSS) integrated with Business Intelligence to determine the optimal subscription package. The Analytic Hierarchy Process method is used to determine the criteria weights, Simple Additive Weighting is used to rank alternatives, and the Technique for Order Preference by Similarity to Ideal Solution is used to validate the ranking results. The research data comes from customer payment data including the number of customers, number of transactions, total revenue, and average transaction value. The results show that the New Hit package consistently ranks highest in the SAW and TOPSIS methods. These findings demonstrate that the integration of Business Intelligence and Decision Support System (DSS) can produce objective, stable and reliable data-driven recommendations to support a company's strategic decisions.

Corresponding Author:

Kamaludin
Department of Information Systems, Universitas Kebangsaan Republik Indonesia, Bandung, Indonesia
Email: kamaludin1356@gmail.com

1. INTRODUCTION

Data-driven strategic decision-making has become a primary requirement for modern companies facing increasingly complex business competition. Business Intelligence (BI) plays a crucial role in integrating data collection, processing, analysis, and visualization to generate information that supports decision-making through interactive dashboards [1], [2], [3]. By utilizing BI, companies can monitor business performance, customer behavior and transaction trends more quickly and accurately.

However, in practice, most Business Intelligence implementations still focus on descriptive analysis and reporting. The resulting dashboards are able to illustrate current business conditions but do not directly provide prescriptive and operational decision recommendations [1], [4], [5]. As a result, the strategic decision-making process often relies on intuition, experience, or subjective management judgment.

In companies with subscription-based business models, customer payment data has significant potential to be utilized as a basis for determining the most optimal subscription package. This data reflects customer interest, transaction frequency, revenue contribution and average transaction value. However, the selection of superior packages is often done manually without a structured analytical approach, potentially leading to bias and inconsistent decisions.

Integrating Business Intelligence with a Decision Support System (DSS) is a relevant approach to addressing these issues [4], [6], [7]. Decision Support System (DSS) allows historical data to be processed using multi-criteria decision-making methods, resulting in more objective and rational recommendations. The Analytical Hierarchy Process (AHP) method is used to determine the importance weight of each criterion, while Simple Additive Weighting (SAW) and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) are used to rank and validate decision alternatives [8], [9], [10], [11].

Based on previous research, most studies utilizing Business Intelligence only use BI as a data visualization and reporting tool without direct integration with prescriptive decision-making mechanisms [1], [2], [12]. On the other hand, research on Decision Support System (DSS) using AHP, SAW and TOPSIS methods generally stands alone without the support of BI dashboard-based data exploration [6], [8], [13], [14], [15]. In addition, research that combines AHP, SAW and TOPSIS in an integrated manner to determine and validate alternative rankings is still limited, especially in the context of selecting subscription packages based on customer payment data.

Table 1. Comparison of Previous Studies

No	Researcher	Method	Research Focus	Limitation
1	Kusuma et al. [6]	AHP-TOPSIS	Academic recommendation	Without BI
2	Sari et al. [8]	SAW and TOPSIS	Scholarship selection	Not integrated with BI
3	Irsyalina & Santi [1]	BI	Healthcare service quality	No Decision Support System (DSS)
4	Seto et al. [7]	BI-DSS	Replenishment policy	Limited validation
5	Araujo et al. [10]	AHP-TOPSIS	Public procurement	Without BI
6	Nugraha et al. [14]	AHP-TOPSIS	Tourism village priority	BI not discussed

Based on Table 1, no research has comprehensively integrated BI and Decision Support System (DSS) based on AHP, SAW and TOPSIS. Therefore, this study proposes an integrated system to generate optimal subscription package recommendations.

The research questions are as follows:

a. How can we objectively determine the weighting of subscription package criteria using the AHP method?
b. How can we generate an optimal subscription package ranking using the SAW method?
c. How can we validate the subscription package ranking results using the TOPSIS method?

2. METHOD

This research uses a quantitative approach by implementing a Multi-Criteria Decision Support System (DSS) to support decision-making in determining the optimal subscription package [16]. The Analytical Hierarchy Process (AHP) method is used to objectively determine the importance weight of each criterion through pairwise comparisons [4], [6]. Next, the Simple Additive Weighting (SAW) method is applied to rank alternative subscription packages based on the predetermined criteria weights [8], [9], [17]. To ensure the consistency and reliability of the ranking results, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is used as a validation stage by evaluating the proximity of alternatives to the positive and negative ideal solutions [10], [11], [18].

To clarify the research stages, a flowchart of the research methodology is used, which systematically depicts the research workflow, from collecting customer payment data to generating optimal subscription package recommendations. This diagram is designed to demonstrate the interrelationships between stages and the roles of Business Intelligence and Decision Support System (DSS) in the overall research process. In addition, the Business Intelligence approach is used as an initial stage to understand the transaction patterns and contribution of each subscription package before the decision-making process is carried out [5], [12].

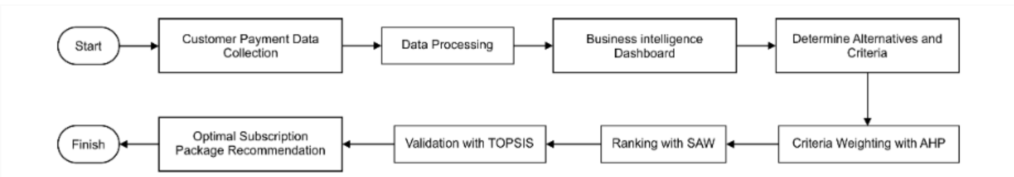

Figure 1. Research Methodology Flowchart

Based on Figure 1, the research starts from data collection and pre-processing, followed by BI visualization, criteria determination, AHP weighting, SAW ranking and TOPSIS validation until optimal package recommendations are obtained.

2.1. System Architecture and Decision Support System Implementation

The system developed in this research is a Decision Support System (DSS) integrated with a Business Intelligence dashboard to support the decision-making process in determining optimal subscription packages [1], [4]. The system is designed by separating data visualization and decision analysis functions, so that each component has a clear role in the overall system flow. The Business Intelligence dashboard is used to visually present customer payment information [1], [2], while the decision-making process is carried out through a Decision Support System (DSS) module based on the AHP, SAW and TOPSIS methods.

In general, the system architecture consists of data management, analytical processing, and information presentation stages. Customer payment data is first processed through a preprocessing process to prepare it for analysis. Next, the data becomes input to the Decision Support System (DSS) module, which carries out criteria weighting, alternative ranking and decision validation stages according to the methods used. All of these processes are designed to ensure that the decision-making process is systematic and structured.

The Business Intelligence dashboard in this system serves as a tool for understanding the business context and patterns of customer payment data. The information presented on the dashboard is used to support the analysis and interpretation process but is not directly involved in the calculation of the decision-making method. With this separation of roles, the system is capable of generating decision recommendations based on analytical calculations, while also supported by a visual understanding of data conditions [4], [5], [12]. In the proposed implementation, the Business Intelligence dashboard is conceptually developed using Microsoft Power BI connected to a relational MySQL database through standard SQL queries. The Decision Support System (DSS) module is implemented using the Python programming language with supporting scientific libraries for AHP, SAW, and TOPSIS calculations. Data exchange between the BI dashboard and the DSS module is performed through the shared database layer, allowing analytical results generated by the DSS to be visualized dynamically in the BI environment without modifying the underlying transactional database.

The system architecture integrates data processing, Decision Support System (DSS) modules and BI dashboards into a single workflow to generate decision recommendations. An overview of the system is shown in Figure 2.

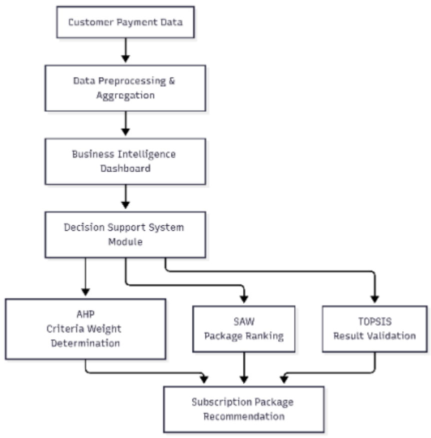

Figure 2. Integrated Business Intelligence Decision Support System (DSS) Architecture

2.2. Research Data and Criteria

The data used in this study consists of customer payment data from a company with a subscription-based business model. The dataset was obtained from the company's internal transaction system and underwent a cleaning and sampling process for analysis. The payment data covers the transaction period from March 2013 to January 2015. This historical data was used as a case study to test the proposed Decision Support System (DSS) approach in a structured and consistent manner, without the aim of analyzing current trends. Although the transaction data were collected during the period from March 2013 to January 2015, the dataset remains relevant for this research because the objective is not to analyze current market conditions or customer behavior trends, but rather to validate the proposed Decision Support System (DSS) architecture and the integration of Business Intelligence with multi-criteria decision-making methods. The AHP, SAW, and TOPSIS algorithms employed in this study are independent of a specific time period and operate on the relationship among evaluation criteria rather than temporal characteristics of the data. Historical transaction datasets are widely used as benchmark case studies in Decision Support System research because they provide complete, stable, and verified transactional records, allowing objective evaluation of the proposed methodology. Therefore, the historical dataset is considered appropriate as an experimental case study for demonstrating the effectiveness and consistency of the proposed BI-DSS framework [19][20].

The data analyzed consisted of 25,000 payment transactions, representing the payment activity of 14,572 customers across 42 different subscription packages. Each transaction included information on the payment date, customer identity, region, payment amount and the type of subscription package used. Customer payment data was selected because it quantitatively reflects subscription package performance and is relevant as a basis for data-driven strategic decision-making [1], [2], [12].

In this study, each subscription package was treated as a decision alternative to be evaluated [6]. The evaluation of alternatives was conducted based on a number of criteria determined to describe the package's overall performance. The criteria used include the number of customers (C1), number of transactions (C2), total revenue (C3), and average transaction value (C4).

The number of customers (C1) was selected based on its ability to represent the adoption rate and popularity of subscription packages, which impact the stability of a company's revenue [6], [14]. The number of transactions (C2) was used to describe the intensity of package usage by customers, reflecting the level of customer engagement and sustainability with the packages offered [8], [10], [17]. The total revenue (C3) was chosen as the primary indicator of each package's financial contribution to the company's business performance [2], [4], [5], [7], while the average transaction value (C4) was used to represent the economic value of each transaction, reflecting the package's effectiveness in generating revenue [11], [18].

All criteria in this study are categorized as benefit criteria, with higher values indicating better subscription package performance [8], [9], [21]. The determination of this type of criteria aims to ensure that the weighting and ranking process carried out in the next stage can run consistently and in accordance with the characteristics of the data used.

2.3. Criteria Weighting Using AHP

The criteria weighting in this study was conducted using the Analytical Hierarchy Process (AHP) method [4], [6]. The AHP method was used because it can accommodate multi-criteria decision-making through a pairwise comparison process between criteria, allowing the relative importance of each criterion to be determined systematically and structured. Using AHP, the resulting criteria weights reflect the priority level of each criterion in supporting decision-making [22], [23].

The criteria weighting process begins with the development of a decision hierarchy structure consisting of objectives, criteria and alternatives. At this stage, the primary objective is to determine the optimal subscription package, while the criteria are determined based on the characteristics of customer payment data. Once the hierarchy structure is established, pairwise comparisons between criteria are conducted to assess the relative importance of each criterion relative to the others.

To formalize the pairwise comparison process between criteria, the relationship between the relative importance of each criterion is expressed in the form of a comparison matrix. Mathematically, the elements of the comparison matrix are expressed as follows.

$$a_{ij} = \frac{w^i}{w_j} \quad (1)$$

The comparison matrix that has been formed is then processed to obtain the importance weight of each criterion using the geometric mean approach, which is then normalized.

$$GM_i = \left(\prod_{j=i}^{n} a_{ij}\right) 1/n \quad (2)$$

$$W_i = \frac{GM_i}{\sum GM_i} \quad (3)$$

To ensure that the comparison matrix is consistent and mathematically acceptable, consistency testing is carried out by calculating the maximum eigenvalue, Consistency Index and Consistency Ratio [4], [6], [24], [25].

$$\lambda_{max} = \frac{1}{n}\sum_{i=1}^{n}\frac{(Aw)_i}{w_i} \quad (4)$$

$$CI = \frac{\lambda_{max} - n}{n-1} \quad (5)$$

$$CR = \frac{CI}{RI} \quad (6)$$

The pairwise comparison scores are then arranged in a comparison matrix. This matrix is then processed to obtain the importance weights for each criterion using eigenvalue calculations or a geometric mean approach. To ensure the reliability of the weighting results, a consistency test is performed on the compiled comparison matrix. The consistency test aims to ensure that the assessments provided are not random and remain within acceptable consistency limits.

The criterion weights obtained from the AHP method are then used as the basis for ranking alternative subscription packages in the next stage. Therefore, criteria weighting using AHP plays a crucial role in ensuring that each criterion contributes proportionally and according to its level of importance in the decision-making process.

2.4. Ranking Using SAW

The ranking process for alternative subscription packages in this study was conducted using the Simple Additive Weighting (SAW) method [8], [9]. The SAW method was used because it has a simple and effective concept for evaluating alternatives based on a number of criteria that have been weighted by importance [15], [17].

The initial step in the Simple Additive Weighting method is to normalize the decision matrix to equalize the scale between criteria, so that differences in measurement units do not affect the calculation results.

$$r_{ij} = \frac{x_{ij}}{\max_i(x_{ij})} \tag{7}$$

The normalized value is then multiplied by the criteria weight and added up to obtain the preference value for each alternative.

$$S_i = \sum_{j=1}^{n}(w_j r_{ij}) \tag{8}$$

The ranking process using the SAW method begins with the preparation of a decision matrix containing the performance values of each alternative against each criterion. The values in the decision matrix are then normalized to maintain a comparable scale, ensuring that unit differences between criteria do not affect the calculation results. The normalization process is carried out by adjusting the type of criteria used, where all criteria in this study are treated as benefit criteria [8], [9], [21].

After the normalization process is completed, the normalized values are multiplied by the criterion weights obtained from the Analytical Hierarchy Process method. The results are then summed for each alternative to obtain a preference score. This preference score represents the level of suitability of each subscription package alternative based on all criteria used.

The preference score generated using the SAW method is then used to determine the ranking of the subscription package alternatives. The alternative with the highest preference score is considered the most optimal alternative based on the established criteria and weights. This ranking process serves as the initial basis for decision-making before the validation stage using other methods.

2.5. Validation Using TOPSIS

Validation of the ranking results of alternative subscription packages was performed using the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method [10], [11]. The TOPSIS method is used to evaluate the closeness of each alternative to the positive ideal solution and the negative ideal solution to test the consistency of the decision results [18], [22].

The TOPSIS calculation process begins with normalizing the decision matrix using vector normalization to eliminate the influence of scale differences between criteria.

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \tag{9}$$

The normalized decision matrix is then multiplied by the criteria weights to obtain a weighted decision matrix.

$$v_{ij} = w_j r_{ij} \tag{10}$$

Based on the weighted decision matrix, the positive ideal solution and the negative ideal solution are determined.

$$A^+ = \left\{\max_i(v_{ij})\right\}$$
$$A^- = \left\{\min_i(v_{ij})\right\} \tag{11}$$

The distance of each alternative to the positive ideal solution and the negative ideal solution is calculated using the Euclidean distance.

$$D_i^+ = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - A_j^+\right)^2} \tag{12}$$

$$D_i^- = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - A_j^-\right)^2} \tag{13}$$

The relative closeness value of each alternative to the ideal solution is calculated to determine the overall level of preference for the alternative.

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \tag{14}$$

The validation process using the TOPSIS method begins with the creation of a normalized decision matrix and weighting of criteria. This weighted matrix is used to determine the positive ideal solution and the negative ideal solution based on the characteristics of the criteria used. Next, the distance of each alternative to these two ideal solutions is calculated to determine their relative proximity.

The relative proximity values generated by the TOPSIS method are used as the basis for the evaluation and validation of the ranking results. The alternative with the highest proximity to the positive ideal solution and the furthest from the negative ideal solution is considered to have the highest preference level. Through this mechanism, the TOPSIS method ensures that the decision results obtained are objective and not dependent on a single ranking method.

By implementing the TOPSIS method as a validation stage, the consistency of the previously obtained subscription package ranking results can be tested. This process provides assurance that the resulting decision recommendations have undergone multi-method evaluation, making them more reliable in supporting the company's strategic decision-making.

3. RESULTS AND DISCUSSION

3.1. Research Data Description

The data used in this study is customer payment data for a subscription-based business model, reflecting the performance of each subscription package. Each subscription package is treated as a decision alternative that will be evaluated to determine the most optimal package based on criteria established in the methodology phase.

Customer payment data includes information on the number of customers, number of transactions, total revenue, and average transaction value for each subscription package. These four criteria are used to quantitatively represent the level of contribution and performance of the package to support decision-making [1], [2], [12]. A summary of the customer payment data used in this study is presented in Table 2.

Table 2. Customer Payment Data

Package	C1	C2	C3 (Rp)	C4 (Rp)
New Hit	3254	4508	525420729	116552.96
Paket Hit Entertainment	1949	2854	289630501	101482.31
Hit Entertainment 2012	1501	2320	247175056	106540.97
Gold 2012 New	520	900	233191732	259101.92
Trans Gold	1101	1192	219967003	184536.08

Based on Table 2, each package has different characteristics. Therefore, the evaluation needs to consider all criteria simultaneously.

3.2. Criteria Weighting Results Using AHP

Criteria weighting was performed using the Analytical Hierarchy Process method to determine the relative importance of each criterion used in subscription package evaluation. The weighting results indicate that each criterion contributes differently to the decision-making process, depending on the characteristics of customer payment data [4], [6], [22].

Criteria with higher weights reflect aspects considered more dominant in assessing subscription package performance. This indicates that factors directly related to transaction activity and financial contributions play a significant role in supporting the company's strategic decisions. The results of the criteria weighting using the AHP method are presented in Table 3.

Table 3. Criteria Weights Using AHP

Criteria	Weight
C1	0.4773
C2	0.2879

Criteria	Weight
C3	0.1539
C4	0.0808

Based on Table 3, the number of customers (C1) is the most dominant criterion, while the average transaction value (C4) has the lowest weight.

Table 4. Criteria Consistency Measure

Consistency Measure	Value
λmax	4.118
CI	0.039
RI	0.90
CR	**0.043**

The consistency of the pairwise comparison matrix was evaluated by calculating the maximum eigenvalue (λmax), Consistency Index (CI), and Consistency Ratio (CR). The obtained Consistency Ratio was 0.043, which is below the acceptable threshold of 0.10. Therefore, the pairwise comparison matrix is considered sufficiently consistent, indicating that the resulting criteria weights are valid and reliable for the subsequent SAW ranking process.

3.3. Subscription Package Ranking Results Using SAW

Based on the criteria weights obtained from the AHP method, the ranking of alternative subscription packages was performed using the Simple Additive Weighting method [15], [17]. This method generates a preference score for each subscription package, representing the package's suitability level based on all criteria used.

The ranking results indicate differences in preference scores between subscription packages. The package with the highest preference score is considered the most optimal because it meets the assessment criteria better than other alternatives. Based on the calculation results using the SAW method, the New Hit package ranked highest, indicating its overall best performance based on customer payment data. The results of the subscription package ranking using the SAW method are presented in Table 4.

Table 4. Subscription Package Ranking Results Using SAW

Package	SAW Score	Rank
New Hit	0.955447	1
Paket Hit Entertainment	0.584632	2
Hit Entertainment 2012	0.473957	3
Trans Gold	0.359599	4
Gold 2012 New	0.282856	5

Based on Table 4, the New Hit package ranks highest, while the Gold 2012 New package ranks lowest. These results indicate that package performance is influenced by the number of subscribers and transactions.

3.4. Ranking Validation Results Using TOPSIS

To ensure the stability and objectivity of the ranking results obtained from the SAW method, validation was performed using the Technique for Order Preference by Similarity to Ideal Solution. The TOPSIS method is used to evaluate the proximity of each alternative to the positive ideal solution and the negative ideal solution [10], [11], [22].

The validation results show that the ranking order of subscription packages generated using the TOPSIS method is consistent with the ranking results using the SAW method. The New Hit package again holds the top position, indicating its closest proximity to the ideal solution. This consistency between the two methods strengthens the reliability of the resulting decision recommendations. The results of the subscription package ranking using the TOPSIS method are presented in Table 5.

Table 5. Subscription Package Ranking Results Using TOPSIS

Package	Closeness Score	Rank
New Hit	0.919854	1
Paket Hit Entertainment	0.512364	2
Hit Entertainment 2012	0.357301	3
Trans Gold	0.188827	4
Gold 2012 New	0.088257	5

Based on Table 5, the TOPSIS ranking results are consistent with SAW, so the resulting recommendations are stable and reliable.

The results of this study indicate that the integration of the AHP-SAW-TOPSIS methods is capable of producing consistent and stable subscription package rankings, as demonstrated by the similarity in ranking order between the SAW and TOPSIS methods. This finding aligns with research by Kusuma et al., which stated that the combination of AHP and TOPSIS is effective in producing objective and consistent multi-criteria decision recommendations [5]. Furthermore, research by Sari et al. also demonstrated that the SAW method is capable of producing clear and easily interpretable ranking results when used in a quantitative criteria-based Decision Support System (DSS) [8].

Compared to studies using only one ranking method, the multi-method approach used in this study offers advantages in validating decision results. Research by Nugraha et al. showed that the use of AHP-TOPSIS can produce stable priority recommendations, but it was not yet complemented by a SAW-based initial ranking stage [14]. By adding the SAW method as an initial ranking stage and TOPSIS as a validation stage, this study strengthens the reliability of decision-making results through a multi-method evaluation.

Furthermore, unlike previous studies that generally separate Business Intelligence analysis and Decision Support System (DSS), this study integrates a Business Intelligence dashboard as an initial data exploration stage before prescriptive decision-making is undertaken. This approach extends the contributions of previous studies that utilized BI solely as a descriptive visualization tool [1], [2], [5], [12], by making BI part of the data-driven strategic decision-making process.

The validation results using the TOPSIS method in this study align with previous studies that implemented AHP-TOPSIS in multi-criteria Decision Support System (DSS). The multi-method approach has been shown to increase the stability and reliability of the system's decision-making results [18], [22].

3.5. Integration of Decision Support System Results with Business Intelligence Dashboard

The subscription package ranking results obtained through the Decision Support System (DSS) are then integrated with the Business Intelligence dashboard to support interpretation and understanding of the business context. The Business Intelligence dashboard serves as a visualization tool for customer payment data, helping users visually identify patterns, trends, and the contribution of each subscription package [1], [2], [5], [12].

The Business Intelligence dashboard helps users visually understand contribution patterns and performance differences between subscription packages. However, this visual information does not directly generate objective decision recommendations. Integration with the Decision Support System (DSS) allows the information obtained from the dashboard to be formalized into a structured evaluation process, so that the analysis results are not only informative but can also be used as a basis for strategic decision-making [3], [7].

The Business Intelligence dashboard is not used as a calculation tool in the AHP, SAW or TOPSIS methods, but rather serves as a support for the analysis and interpretation of decision results. The visualizations presented on the dashboard help strengthen the understanding of the ranking results generated by the Decision Support System (DSS). Examples of visualizations of subscription package trends and contributions are shown in Figures 3 and 4.

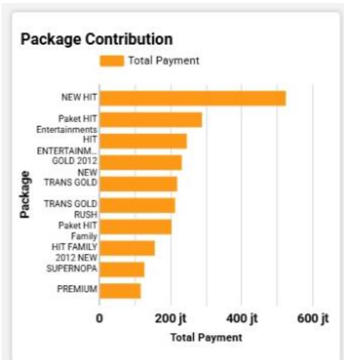

Figure 3. Revenue Contribution of Each Subscription Package

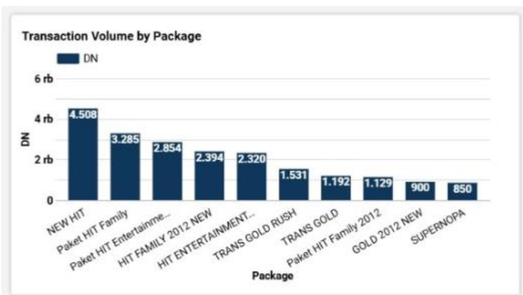

Figure 4. Transaction Volume Comparison for Each Subscription Package

In addition, the Business Intelligence dashboard also presents a visualization of performance comparisons between subscription packages and a summary of key performance indicators, making it easier for users to understand the comparative position of each package. This visualization provides a comprehensive overview of subscription package performance and strengthens the interpretation of decision-making results generated by the Decision Support System (DSS). Examples of the visualization of the comparison and summary of subscription package performance are shown in Figures 5 and 6.

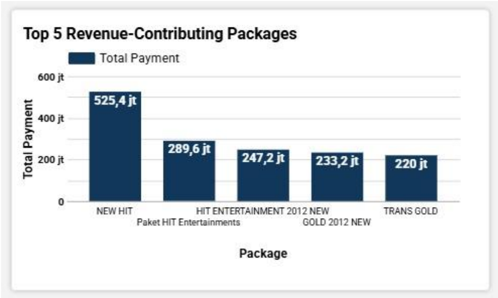

Figure 5. Top Five Subscription Packages with the Highest Revenue Contribution

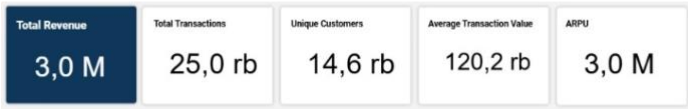

Figure 6. Customer Payment Indicator Summary on the Business Intelligence Dashboard

The subscription package ranking results obtained in this study have practical implications for company management in strategic decision-making. The highest-ranking subscription package can be prioritized in marketing and service development strategies, as it has been shown to contribute the best performance based on customer numbers, transaction intensity, and total revenue. Conversely, packages with lower rankings can be further evaluated to determine improvement strategies, such as price adjustments, service feature enhancements or package repositioning to better suit customer needs [26], [27].

The integration of Decision Support System (DSS) and BI dashboards helps management visually understand package performance and obtain objective, data-driven recommendations to support decision-making.

4. CONCLUSION

This research successfully developed a Decision Support System (DSS) integrated with Business Intelligence to determine the optimal subscription package using the AHP, SAW and TOPSIS methods. The applied approach allows for systematic and measurable processing of customer payment data, so that the decision-making process no longer relies on intuition but is instead based on objective multi-criteria analysis [1], [4], [8], [10].

The results of the study indicate that the New Hit package is the most optimal subscription package based on all criteria used. The consistency of the ranking results obtained from the SAW and TOPSIS methods indicates that the resulting decisions are stable and reliable, thus the multi-method approach used can increase confidence in decision recommendations [6], [14], [22].

The integration of the Decision Support System (DSS) with the Business Intelligence dashboard provides a significant contribution by bridging visual data analysis and calculation-based decision-making processes. Business Intelligence serves not only as a descriptive visualization tool but also as part of the strategic decision-making process by supporting understanding of data context [2], [5], [7], [12].

Overall, this research contributes to showing that the use of Business Intelligence integrated with a multi-criteria Decision Support System (DSS) can be an effective solution in determining superior subscription packages objectively, consistently and based on data, so that it is relevant to support strategic decision making in companies with subscription-based business models.

ACKNOWLEDGEMENTS

The authors would like to thank the reviewers for their very constructive suggestions and input. All reviewer comments have been followed up and used to improve the quality of the substance, methodological clarity and scientific contribution of this article. The author hopes that the revised article will meet the quality standards and suitability for publication in CoreID Journal.

REFERENCES

[1] R. Irsyalina and R. P. Santi, "Penerapan Business Intelligence dan Prescriptive Analytics pada Mutu Pelayanan Kesehatan Rumah Sakit di Kota Pekanbaru," *Jurnal Nasional Teknologi dan Sistem Informasi*, vol. 10, no. 1, pp. 27–35, May 2024, doi: 10.25077/teknosi.v10i1.2024.27-35.

[2] D. Larasati, N. D. Tanzil, A. Alfian, and L. Wardani, "Business Intelligence Dashboard for Financial Performance Analysis of Public Service Agency Using Microsoft Power BI," *JASa (Jurnal Akuntansi, Audit dan Sistem Informasi Akuntansi)*, vol. 8, no. 2, pp. 491–499, Aug. 2024, doi: 10.36555/jasa.v8i2.2649.

[3] E. Turban, R. Sharda, and D. Delen, *Decision Support and Business Intelligence Systems*, 9th ed. Pearson Education, 2011. [Online]. Available: https://books.google.co.id/books/about/Decision_Support_and_Business_Intelligenc.html

[4] S. Chaube *et al.*, "An Overview of Multi-Criteria Decision Analysis and the Applications of AHP and TOPSIS Methods," *International Journal of Mathematical, Engineering and Management Sciences*, vol. 9, no. 3, pp. 581–615, Jun. 2024, doi: 10.33889/IJMEMS.2024.9.3.030.

[5] Y. Harakay and M. El Khaldi, "Augmented Business Intelligence: A Multi-Criteria Approach," *International Journal of Science, Applications and Prosperity*, vol. 3, no. 1, pp. 38–48, 2025, doi: 10.5281/zenodo.15858813.

[6] T. P. P. Kusuma, P. V. Lestari, and R. Waluyo, "Sistem Pendukung Keputusan dengan AHP-TOPSIS untuk Rekomendasi Konsentrasi Program Studi," *Jurnal Sistem dan Teknologi Informasi*, vol. 13, no. 4, 2025, doi: 10.26418/justin.v13i4.91424.

[7] F. C. P. Seto, Y. Daryanto, and R. D. Astanti, "Business Intelligence for Decision Support System for Replenishment Policy in Mining Industry," *International Journal of Industrial Engineering and Engineering Management*, vol. 5, no. 1, pp. 51–60, Jun. 2023, doi: 10.24002/ijieem.v5i1.7245.

[8] W. E. Sari, M. B, and S. Rani, "Perbandingan Metode SAW dan Topsis pada Sistem Pendukung Keputusan Seleksi Penerima Beasiswa," *Jurnal Sisfokom (Sistem Informasi dan Komputer)*, vol. 10, no. 1, pp. 52–58, Feb. 2021, doi: 10.32736/sisfokom.v10i1.1027.

[9] K. G. H. K. Putra, I. M. Candiasa, and G. Indrawan, "Analysis of the AHP-WP Method in the Decision Support System for the Assessment of Outstanding Students at ITEKES Bali," *Jurnal Informatika dan Teknologi Informasi*, vol. 19, no. 1, pp. 59–76, 2022, doi: 10.31515/telematika.v19i1.6878.

[10] J. V. G. A. Araujo *et al.*, "Multi-criteria Decision Support Method AHP-TOPSIS-2N applied in bids to improve the control of public expenses," in *Procedia Computer Science*, Elsevier B.V., 2023, pp. 362–369. doi: 10.1016/j.procs.2023.07.049.

[11] M. Nazim, C. W. Mohammad, and M. Sadiq, "A comparison between fuzzy AHP and fuzzy TOPSIS methods to software requirements selection," *Alexandria Engineering Journal*, vol. 61, no. 12, pp. 10851–10870, Dec. 2022, doi: 10.1016/j.aej.2022.04.005.

[12] S. S. Rao and G. Anuradha, "Design and Implementation of a Business Intelligence System Using Microsoft Power BI," *Int. Educ. Res. J.*, vol. 12, no. 3, pp. 328–338, Mar. 2026, doi: 10.5281/zenodo.19248637.

[13] A. Diana and D. Achadiani, "Penerapan metode Analytical Hierarchy Process dan Simple Additive Weighting untuk Pemilihan Supplier pada Bengkel," *Jurnal Teknik Informatika dan Sistem Informasi*, vol. 8, no. 1, Apr. 2022, doi: 10.28932/jutisi.v8i1.4077.

[14] J. P. Nugraha, D. Surahmat, W. P. Astiyani, M. Tumpu, N. M. Tumanduk, and R. F. Larasati, "Decision Support System For Determining Smart Fishery Village Tourism Development Priorities Using Ahp And Topsis Methods," *Dinasti International Journal of Education Management and Social Science (DIJEMSS)*, vol. 6, no. 2, 2024, doi: 10.38035/dijemss.v6i2.

[15] G. S. Mahendra and K. Y. Ernanda Aryanto, "SPK Penentuan Lokasi ATM Menggunakan Metode AHP dan SAW," *Jurnal Nasional Teknologi dan Sistem Informasi*, vol. 5, no. 1, pp. 49–56, Apr. 2019, doi: 10.25077/teknosi.v5i1.2019.49-56.

[16] Ardiansyah *et al.*, *Buku Ajar Sistem Pendukung Keputusan*. Sonpedia, 2024.

[17] E. Rante, S. Paembonan, M. Muhallim, Dasril, H. Abduh, and V. I. Wahyuni, "Sistem Pendukung Keputusan Pemilihan Smartphone Menggunakan Metode Simple Additive Weighting (SAW)," *JITET (Jurnal Informatika dan Teknik Elektro Terapan)*, vol. 13, no. 3, pp. 1642–1665, 2025.

[18] K. A. Chrysafis, "F-DeNETS: A Hybrid Methodology for Complex Multi-Criteria Decision-Making Under Uncertainty," *Systems*, vol. 13, p. 1019, 2025, doi: 10.3390/systems13111019.

[19] M. Hasanuzzaman and P. Shit, "Assessment of gully erosion susceptibility using four data-driven models AHP, FR, RF and XGBoosting machine learning algorithms," *Natural Hazards Research*, vol. 5, no. 1, pp. 36–47, Mar. 2025, doi: 10.1016/j.nhres.2024.05.001.

[20] Q. A'yun and B. Hendrik, "Literature Review: Analisis Komparatif Algoritma CNN, KNN, dan SVM untuk Klasifikasi Penyakit Kelapa Sawit," *Journal of Education Research*, 2024.

[21] S. Ulubeyli and A. Kazaz, "Fuzzy Multi-Criteria Decision Making Model for Subcontractor Selection in International Construction Projects," *Technological and Economic Development of Economy*, vol. 22, no. 2, pp. 210–234, 2016, doi: 10.3846/20294913.2014.984363.

[22] A. Saoud, M. Lachgar, M. Hanine, R. El Dhimni, K. El Azizi, and H. Machmoum, "decideXpert: Collaborative system using AHP-TOPSIS and fuzzy techniques for multicriteria group decision-making," *SoftwareX*, vol. 29, Feb. 2025, doi: 10.1016/j.softx.2024.102026.

[23] S. H. Aldi W, Mardewi, I. Leppang, Zulkarnain, L. Indrayanti, and S. R. N. Christy, "Perancangan Sistem Pendukung Keputusan Pemilihan Laptop Berbasis Web Metode Analytical Hierarchy Process," *Journal of Artificial Intelligence and Digital Business (RIGGS)*, vol. 4, no. 3, pp. 2001–2007, 2025.

[24] A. Nurwidayat, B. Sudarsono, K. Pratiwi, and M. D. Havity, "Implementation of Information System in Submitting Employees' Annual Leave at PT. Tesco Indomaritim," *SinkrOn*, vol. 3, no. 2, p. 97, Mar. 2019, doi: 10.33395/sinkron.v3i2.10030.

[25] S. K. Singhai and V. K. Awasthi, "Stock Index Ranking and Performance Evaluation of Shanghai Stock Exchange (SSE) Using AHP and TOPSIS Method," *International Journal of Computer Sciences and Engineering*, vol. 7, no. Special Issue 3, pp. 19–23, Feb. 2019.

[26] B. Mohanty, S. Champati, and S. K. Barisal, "Conflict aware retail recommendation decision support system," *Discover Applied Sciences*, vol. 8, p. 303, 2026, doi: 10.1007/s42452-026-08262-4.

[27] D. Rachmatulloh, F. Natsir, and A. Fitriansyah, "Sistem Pengambilan Keputusan Penentuan Karyawan Tetap di Sumber Cipta Multiniaga dengan Metode TOPSIS," *IC-Tech: Majalah Ilmiah*, vol. 20, no. 2, pp. 24–30, Oct. 2025.