

SCENARIO ANALYSIS OF ECONOMIC FEASIBILITY IN THE UTILIZATION OF PUBLIC SPACE (CASE STUDY: KEBUN BUNGA STADIUM MEDAN)

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ARTICLE HISTORY

Received : 20-11-2025

Revised : 07-12-2025

Accepted : 25-01-2026

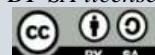
KEYWORDS

ATP,
WTP,
Economic Feasibility,
Scenario,
Kebun Bunga Stadium

ABSTRACT

Kebun Bunga Stadium is one of public spaces provided by the Government of Medan. Over time, there has been a decline in performance including facilities that are starting become obsolete and limited sports infrastructure due to lack of maintenance. Therefore under these conditions, Kebun Bunga Stadium was revitalized as a form of effort to meet the training infrastructure for athletes in order to realize the capital of North Sumatera as a city of athletes. The revitalization is multi-year contract used regional budget (APBD) 2023 and 2024 with a total cost are Rp. 191,665,325,000. Kebun Bunga Stadium has several facilities such as an international-standard soccer field, tennis courts, volleyball courts, rock climbing walls, a skate park, a gym, a playground, an indoor sports field, a water park, a jogging track, and others. After revitalization, there are several sports facilities will be subject to fees, which will be used as a buffer for maintenance costs and a source of regional revenue. However, there is no clear information about public perception of these fees. Furthermore, every project supported by government must generate economic and social benefits for the community. Therefore, the benefits obtained must be greater than the costs incurred in order to support the sustainable facility. To understand this issue, a questionnaire was distributed to determine the public perception fees and scenario analysis of economic feasibility to ensure the feasibility and sustainability of the public space.

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INTRODUCTIONS

Kebun Bunga Stadium is a dutch government owned railway company that is no longer in use and has been requested to be converted into a soccer field. Kebun Bunga Stadium is the first sports stadium and one of the cultural heritage sites and historical witnesses to the development of soccer in Medan. Kebun Bunga Stadium has been the

headquarters of PSMS since 1972. In 2023-2024, the revitalization of the Kebun Bunga Stadium was carried out to support sports infrastructure facilities for athletes to realize the capital of Sumatra province as a city of athletes. Now, various paid and unpaid sports facilities are available. For paid facilities, the tariff has been determined by the manager, namely indoor and outdoor tennis courts, volleyball, soccer and rock climbing. Until now there has been no information regarding public perceptions of these tariffs. Ability To Pay (ATP) is the ability to pay is the ability of users to pay for services used according to income which is considered ideal. Willingness To Pay (WTP) is the willingness to pay is the willingness of users to pay fees for facilities that have been used (Ardela et al., 2025; Hanafi, 2023; Siregar et al., 2025). The relationship between ATP and WTP values can be seen in the following explanation. If ATP > WTP, it means that users have a relatively high income in paying for services that can be utilized. If ATP < WTP, it means that the user's willingness to pay for services tends to be influenced by the services provided. If ATP = WTP, it means that there is a balance between the costs paid by users and the services that can be utilized.

The ideal tariff recommendation is the average result of the respondents' maximum ATP and WTP values. The economic feasibility analysis is conducted with the aim of selecting the most appropriate infrastructure provision. The appropriateness is determined based on the greater improvement in economic and social life that can be generated compared to other infrastructure provision alternatives. To determine the economic feasibility of a project requires several parameters are net present value (NPV), benefit cost ratio (BCR) and internal rate return (IRR) (Firdiansyah et al., 2025; Noviany & Rakhmawati, 2025).

Net Present Value (NPV) is a method used to measure the ability of a business to generate profits on the investment invested. This is the rule of NPV;

$$NPV = \sum (Benefit - Cost)$$

Internal rate of return (IRR) is an interest rate that equates the present value of expected cash outflow with the present value of expected cash inflow (Ekowati et al., 2016). This is the rule of IRR;

$$IRR = i_t \frac{NPV_1}{NPV_1 + NPV_2} \times (i_2 - i_1)$$

Benefit cost ratio (BCR) is a method of comparing the amount of benefit with the costs during service life. (Amrizal & Lisra, 2015). This is the rule of BCR;

$$BCR = \frac{\sum Benefit}{\sum Cost}$$

METHOD

The location of this research was conducted in the Kebun Bunga Stadium area in Medan City. Based on the Urban and Regional Planning (RTRW) of North Sumatra Number 2 of 2017, Kebun Bunga Stadium is included in the area of public facilities and social facilities. The data used consists of primary and secondary data.

The secondary data used in this study is the Estimated Project Budget (RAB) of the Revitalization of the Kebun Bunga Stadium and Local Government Regulation of North Sumatera Number. 1 of 2024 on Regional Taxes and Retribution. The primary data used in this study is questionnaire on Community ATP and WTP Toward the tariffs of sport facilities in Kebun Bunga Stadium Medan. The sampling technique uses non-probability sampling techniques, that is quota sampling and purposive sampling because there are no previous records in this study. So, the total of respondents was depended by the researcher as many as 125 respondents and 17th years old were chosen because they are considered legally adults and capable well communication and willing to be interviewed, make it easy to obtain the necessary data.



Figure 1 Kebun Bunga Stadium on Google Maps



Figure 2 Kebun Bunga Stadium before Revitalization



Figure 3 Kebun Bunga Stadium after Revitalization

The methods used to determine the feasibility of tariffs in this study are Ability to Pay (ATP) and Willingness to Pay (WTP). The method to determine economic feasibility is by using economic feasibility analysis scenario. In

this method, the scenarios used are moderate, optimistic and pessimistic scenarios and three determining parameters, namely Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate Return (IRR) in each scenario. In the moderate scenario, all data is assumed to be in accordance with existing conditions. In the optimistic scenario, it is assumed that the demand and tariff conditions each increase by 30%. In the pessimistic scenario, it is assumed that demand conditions decrease by 30%.

Table 1 Analysis Scenario Design

Scenario	Description	Primary Impact
Moderat	Stable demand (realistic) Fixed number of fields	Stable rentals and revenue, optimal field utilization
Optimis	Demand (frequency) and tariffs increased by 30%	Rentals and revenues are increasing, courts are full almost every day. And there is also a need for adequate facility maintenance.
Pesimis	Demand (frequency) down 30% and normal tariffs	Rentals and revenue down, many pitch slots vacant

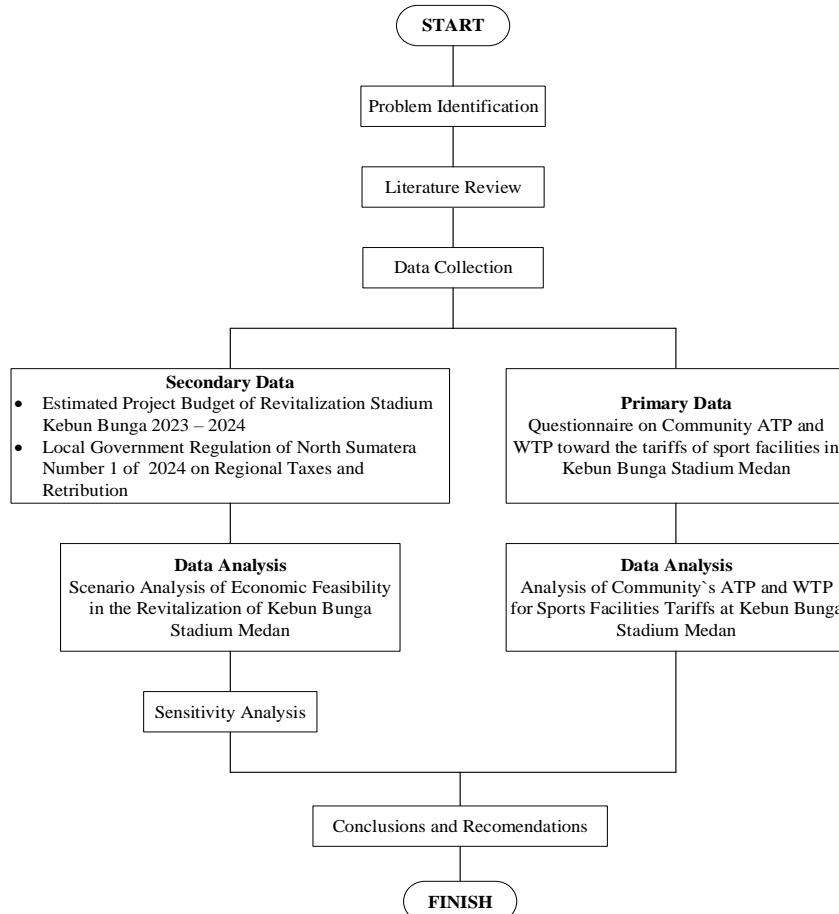


Figure 4 Bagan Alir (Flowchart)

RESULT AND DISCUSSIONS

Expert Validation Analysis

The overall economic performance of Kebun Bunga Stadium demonstrates very strong and convincing results. The Net Present Value (NPV) of Rp 69,245,510,382.65, the Benefit–Cost Ratio (BCR) of 1.57 and the Internal Rate of Return (IRR) of 10.15% clearly confirm that the revitalization project is not only financially feasible, but also generates a very large economic surplus. The BCR of 1.57 implies that every Rp 1 invested by the government is able to generate Rp 1.57 in economic and social benefits. This reflects an exceptionally high efficiency of public investment and indicates that the stadium project creates value far beyond its initial cost. From a financial standpoint, these indicators show that the project has a strong foundation for long-term sustainability. However, as a public facility funded by public resources, the success of Kebun Bunga Stadium cannot be measured solely by financial performance. The stadium carries a social mandate to provide equitable access to sports and recreational facilities for the wider community. Therefore, the interpretation of strong economic indicators must be accompanied by an analysis of social affordability. This is where the concepts of Ability to Pay (ATP) and Willingness to Pay (WTP) become crucial. ATP represents the real financial capacity of users based on their income and expenditure patterns, while WTP reflects their perceived value and psychological readiness to pay for the service provided. In a socially sustainable public facility, the applied tariff should ideally lie between ATP and WTP. If tariffs are set too low, financial sustainability may be weakened; if tariffs are set too high, social accessibility will be compromised (Rifaldi et al., 2025; Yusuf, 2025).

For the indoor tennis facility, the average ATP is Rp 117,500 and the WTP is Rp 128,900, while the applied tariff is Rp 100,000. This means that the tariff is approximately 15% lower than ATP and more than 22% lower than WTP. In social terms, this indicates a very inclusive pricing policy. Users are not financially burdened by the tariff, and at the same time, they perceive the value of the facility to be higher than the price they pay. This condition reflects a strong level of user satisfaction and accessibility. Economically, it also suggests that there is still room for tariff adjustment if required, without significantly reducing demand or excluding users. Thus, the indoor tennis facility already demonstrates a healthy balance between social and economic considerations. A similar situation is found for the outdoor tennis facility. With an ATP of Rp 91,800 and a WTP of Rp 86,700, and a tariff of Rp 75,000, the applied price is about 18% lower than ATP and 13% lower than WTP. This confirms that the outdoor tennis court is also socially affordable and accessible to the community. The tariff structure for this facility reflects a pricing strategy that prioritizes public access while still maintaining potential economic sustainability. Both tennis facilities therefore serve as good examples of how public sports infrastructure can be managed in a socially inclusive manner. The rock climbing (panjat tebing) facility shows a comparable pattern. The ATP is Rp 36,000 and the WTP is Rp 37,300, while the tariff is Rp 30,000. The tariff is around 17% lower than ATP and nearly 20% lower than WTP. This indicates that the facility is highly affordable and accessible. From a social perspective, this is an ideal condition, as economic barriers to participation are minimal. Such pricing encourages greater utilization, supports community engagement in sports activities, and strengthens the role of the stadium as a public space that promotes healthy lifestyles (Aswin & Permono, 2025; Saputra & Nurjayanti, 2025).

In contrast, the volleyball court presents a different social condition. The ATP is Rp 84,500 and the WTP is Rp 82,900, while the applied tariff is Rp 100,000. This means that the tariff is approximately 18% higher than ATP and more than 20% higher than WTP. In this case, users are neither financially capable nor psychologically willing to sustainably pay the existing price. This creates a clear affordability problem and suggests that the current tariff structure may discourage usage. Over time, such a condition could lead to a decline in utilization rates, undermining both the social function of the facility and its long-term economic performance. The volleyball court therefore represents a facility where tariff adjustment is necessary to restore balance between financial feasibility and social accessibility. The most critical situation is observed for the soccer field facility. The ATP for soccer is Rp 530,000, while the WTP is even lower at Rp 437,000. However, the applied tariff is Rp 700,000 per session. This means that the tariff is about 32% higher than ATP and more than 60% higher than WTP. This large gap indicates a serious

affordability issue. In practical terms, many users are not financially capable of paying the tariff, and even fewer are willing to do so. This creates a strong risk of social exclusion, especially because soccer is the most popular sport and attracts users from diverse socio-economic backgrounds, including low- and middle-income groups. When access to soccer facilities becomes restricted by high tariffs, the stadium risks losing its identity as a public facility and instead becomes a semi-exclusive space accessible only to higher-income groups (Nugroho et al., 2025; Sheehan et al., 2025).

This condition becomes particularly paradoxical when it is viewed against the very strong economic performance of the project. With an NPV exceeding Rp. 69,245,510,382.65 and a BCR of 1.57, Kebun Bunga Stadium does not rely on high tariffs to remain financially viable. On the contrary, the large economic surplus provides a strong justification for adopting more socially oriented pricing policies. The financial strength of the project can be used as a foundation to support affordability and inclusiveness, rather than as a reason to maximize tariffs. In this sense, the economic success of the stadium should be interpreted as an opportunity to strengthen its social role, not to limit access. To bridge the gap between economic sustainability and social accessibility, this study proposes that the ideal tariff should be determined using the midpoint between ATP and WTP, expressed as:

$$Tarif_{ideal} = \frac{ATP + WTP}{2}$$

Applying this formula yields an ideal tariff of Rp 123,200 for indoor tennis, Rp 89,250 for outdoor tennis, Rp 83,700 for volleyball, Rp 36,650 for rock climbing, and Rp 483,500 for the soccer field. When compared with existing tariffs, it becomes clear that the most urgent adjustments are needed for the volleyball and soccer facilities. The volleyball tariff should be reduced from Rp 100,000 to approximately Rp 85,000, while the soccer field tariff should be adjusted downward from Rp 700,000 to around Rp 480,000–Rp 500,000 per session. These adjustments would significantly reduce the affordability gap and align tariffs more closely with the socio-economic conditions of users. Such tariff adjustments carry important social implications. Lowering the tariff for volleyball and soccer facilities would broaden access to sports activities, encourage higher participation rates, and reinforce the stadium's function as a public welfare facility. Increased utilization could also create positive secondary effects, such as stronger community interaction, improved public health, and greater vibrancy of the stadium area. In the long run, higher utilization may even compensate for lower tariffs by increasing total revenue through greater demand. In narrative terms, the revitalization of Kebun Bunga Stadium can be seen as a major economic success that still requires refinement in its social dimension. Some facilities, such as tennis and rock climbing, already demonstrate inclusive and socially sensitive pricing policies. Others, particularly volleyball and soccer, reveal significant affordability problems that must be addressed. True sustainability of a public sports facility is achieved not merely through financial profitability, but through the integration of economic strength with social equity. By aligning tariff policies with ATP and WTP, especially for the most socially significant facilities such as soccer fields, the economic surplus generated by the project can be transformed into tangible social benefits. This transformation is essential to ensure that Kebun Bunga Stadium remains a genuinely public space: accessible, inclusive, and capable of serving the broader community in a fair and sustainable manner.

Recapitulation of ATP and WTP analysis results along with based rates, which will then be compared to determine recommended rates as presented in Table 2.

Table 2 Recapitulation ATP, WTP and Based Tariffs

No	Type Of Sport Field	ATP	WTP	Based Tariffs	Tariff Recommendation
1	Tennis Indoor	Rp. 117,500.00	Rp. 128,900,00	Rp. 100,000.00	Rp. 116,261.11
2	Tennis Outdoor	Rp. 91,800.00	Rp. 86,700.00	Rp. 75,000.00	Rp. 92,233.28
3	Volleyball	Rp. 84,500.00	Rp. 82,900.00	Rp. 100,000.00	Rp. 94,506.91
4	Rock Climbing	Rp. 36,000.00	Rp. 37,300.00	Rp. 30,000.00	Rp. 81,373.115
5	Soccer	Rp. 530,000.00	Rp. 437,000.00	Rp. 700,000.00	Rp. 271,039.48

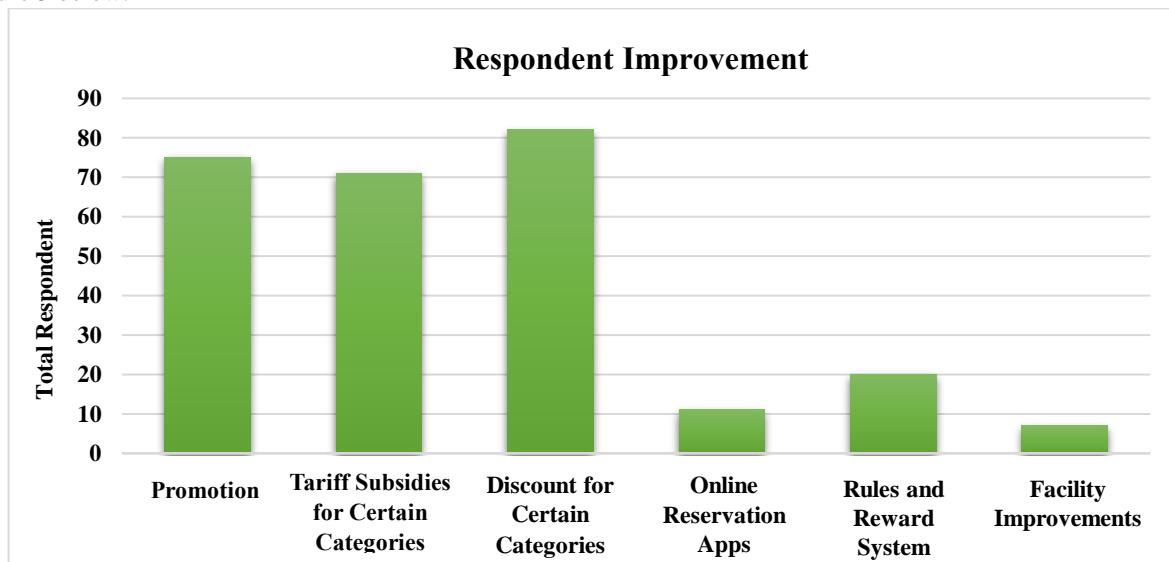
Recapitulation of the economic feasibility analysis based on 3 scenarios as presented in Table 3.

Table 3 Recapitulation of NPV, BCR and IRR Values

No	Economic Feasibility	NPV	BCR	IRR	Status
1	Moderate Scenario	(Rp. 52,314,186,184.15)	0.57	(10.71%)	Unfeasibility
2	Optimistic Scenario	Rp. 69,245,510,382.65	1.57	10.15%	Feasibility
3	Pessimist Scenario	(Rp. 80,330,423,528.50)	0.34	(20.01%)	Unfeasibility

Service Improvement

Service improvement in sports fields can be carried out to increase the WTP value and the number of sports field renters. Based on the research, data on the desired service improvement by respondents was obtained, as shown in Figure 5 below.

**Figure 5** The Required Service Improvement

The respondents' preferences for service improvement presented in Figure 3 reinforce the findings of the Ability to Pay (ATP) and Willingness to Pay (WTP) analyses and provide empirical support for the assumptions underlying the optimistic scenario. A substantial proportion of respondents (approximately 70–85%) identified promotional programs, targeted tariff subsidies, and tariff discounts as the most effective service improvement strategies. This preference is consistent with the ATP–WTP results, which indicate a disparity between the existing tariffs and users' economic capacity and willingness to pay, particularly for football facilities. Accordingly, flexible and incentive-based tariff policies have strong potential to enhance affordability, increase WTP, and expand the user base of sports facilities (Hidayat et al., 2025; Rani et al., 2025).

In addition, around 40–50% of respondents considered the implementation of an online reservation application and a reward system for tenants to be relevant supporting measures. These service management innovations contribute to improved operational efficiency, scheduling certainty, and user loyalty, which in turn positively affect facility occupancy rates. Increased occupancy constitutes a key determinant distinguishing the optimistic scenario from the pessimistic and moderate scenarios in the economic feasibility analysis (Ratman et al., 2025).

Conversely, additional physical facility development received a relatively lower preference level (approximately 20–30%), indicating that the post-revitalization infrastructure quality is generally perceived as

adequate by users. This finding underscores that, in the context of the Kebun Bunga Stadium, economic sustainability is driven more by management strategies and tariff policies than by further physical expansion. Therefore, service improvements focusing on ATP–WTP–based tariff adjustments and service management innovation are critical instruments for realizing the optimistic scenario and ensuring the long-term sustainability of public sports facilities (Putriana & Fatahillah, 2025; Salim & Teh, 2025).

CONCLUSION

This study proposes a novel approach to assessing the feasibility of public sports infrastructure by integrating economic feasibility scenario analysis—covering pessimistic, moderate, and optimistic conditions—with an Ability to Pay (ATP) and Willingness to Pay (WTP) framework based on user preferences within a single, integrated evaluation model. Unlike conventional feasibility studies, which typically rely on a single projection assumption and focus primarily on financial indicators, this approach provides a more comprehensive depiction of public facility sustainability by simultaneously considering financial performance and social affordability.

The results indicate that the economic feasibility of utilizing Kebun Bunga Stadium in Medan City is not static but is highly dependent on facility utilization levels and the applied pricing policy. Under the optimistic scenario, all feasibility indicators are satisfied, with a positive Net Present Value (NPV) of Rp. 69,245,510,382.65 at 6% discount rate, a Benefit–Cost Ratio (BCR) greater than one, and an Internal Rate of Return (IRR) of 10.15%. In contrast, under the pessimistic and moderate scenarios, these indicators are insufficient to ensure long-term sustainability. These findings emphasize that the success of public infrastructure revitalization is determined not only by the scale of initial investment but also by the effectiveness of post-construction facility management.

Another significant contribution of this study lies in revealing a consistent disparity between the prevailing tariffs and users' ATP and WTP values, particularly for football field facilities. This mismatch indicates a potential inefficiency in public asset utilization if pricing policies are not aligned with the economic conditions of the community. In this context, the study underscores the necessity of more responsive tariff-setting policies that reflect users' ability and willingness to pay in order to prevent a decline in facility utilization.

Furthermore, the analysis of various facility types shows that for football fields, the base tariffs set by management tend to exceed the average ATP and WTP values of respondents, leading to perceptions of unaffordability among a large portion of users. Conversely, for rock-climbing facilities, the applied tariffs generally fall within a range considered reasonable and consistent with the community's ability and willingness to pay.

Based on a comprehensive review of the literature, questionnaire survey results, and in-depth interviews, this study identifies several strategies to prevent Kebun Bunga Stadium from experiencing economic neglect. These strategies include enhancing facility promotion accompanied by selective subsidy policies, such as discounted tariffs for students and during national holidays. In addition, improvements to supporting sports facilities outside the main field are necessary, including the provision of sports equipment to reduce the need for users to bring their own equipment into the stadium area.

Other recommended measures include the provision of affordable sports equipment rental services, the empowerment and development of micro, small, and medium enterprises (MSMEs) to support economic activities within the Kebun Bunga Stadium area, and the restructuring of rental tariff schemes into a more systematic framework. The implementation of structured tariff patterns is expected to optimize annual benefits, ensure continued public use of the facilities, and promote the sustainable management of public sports infrastructure.

REFERENSI

Amrizal, A., & Lisra, J. (2015). Kajian Kelayakan Ekonomi Pembangunan Jembatan Layang Simpang Selayang Kota Medan. *Jurnal Teknik Sipil Unaya*, 1(1), 29–34. <https://doi.org/10.30601/jtsu.v1i1.3>

Ardela, I., Saifudin, A. P., & Fadillah, E. (2025). *Analisis Tarif Angkutan Perkotaan di Kota Bengkulu (Analysis of Urban Transport Fares in Bengkulu City)*.

Aswin, M., & Permono, P. S. (2025). Studi Kepuasan Pemain Sepakbola terhadap Fasilitas Latihan di Sekolah. *Jurnal Edukasi Citra Olahraga*, 5(3), 546–558. <https://doi.org/10.38048/jor.v5i3.5898>

Ekowati, T., Prasetyo, E., Sumarjono, D., & Setiadi, A. (2016). Buku Ajar Studi Kelayakan dan Evaluasi Proyek. In *Media Inspirasi Semesta*.

Firdiansyah, M. F., Tohar, I., & Hastijanti, R. (2025). Evaluasi Kelayakan Perancangan Rusunawa di Kota Madiun berdasarkan Standar Hunian yang Layak. *SADE : Jurnal Arsitektur, Planologi Dan Teknik Sipil*, 4(1), 19–24. <https://doi.org/10.29303/sade.v4i1.112>

Hanafi, H. (2023). *Perancangan Football Training Camp PSMS Medan dengan Tema Arsitektur Post Modern*. Universitas Medan Area.

Hidayat, A. O. putri, Rahmawati, D., & Astuti, D. (2025). Membangun Restoran Sukses di Kota Surabaya: Studi Kelayakan Bisnis yang Komprehensif. *Jurnal Ekonomi Dan Bisnis Digital*, 2(3), 1369–1372. <https://jurnal.ittc.web.id/index.php/jebd/article/view/2111>

Noviany, L. D., & Rakhmawati, D. Y. (2025). Pengaruh Fanatisme, Kualitas Produk dan Harga terhadap Keputusan Pembelian Official Merchandise Klub Sepak Bola Persebaya Surabaya. *Jurnal Pendidikan Tata Niaga (JPTN)*, 13(1), 148–162. <https://doi.org/10.26740/JPTN.V13N1.P148-162>

Nugroho, B. A., Maarif, S., Yulivan, I., & Prayitno, A. (2025). Pembentukan Kawasan Ekonomi Khusus (KEK) di Perbatasan Wini, Indonesia dengan Oecusse, Timor Leste Guna Meningkatkan Kesejahteraan, Ketahanan Pangan dan Keamanan di Perbatasan. *Ranah Research : Journal of Multidisciplinary Research and Development*, 7(3), 1694–1702. <https://doi.org/10.38035/rrj.v7i3.1412>

Putriana, A., & Fatahillah, I. A. (2025). Urgensi Pengembangan Ruang Terbuka Hijau di Kota Bandung dalam Upaya Mewujudkan Kota Layak Anak. *Dialogia Iuridica*, 17(1), 22–40. <https://doi.org/10.28932/di.v17i1.10241>

Rani, N., Ruliansyah, F. P., Nuraini, C., & Andriana, M. (2025). Kajian Kelayakan Adaptive Reuse pada Bangunan Tua di Koridor Jalan Kesawan Kota Medan. *JAUR (JOURNAL OF ARCHITECTURE AND URBANISM RESEARCH)*, 9(1), 124–136. <https://doi.org/10.31289/JAUR.V9I1.14837>

Ratman, M. N., Amanda, N. N., Oktapia, S., & Pangestoe, W. (2025). Program Kelas Rawat Inap Standar (KRIS): Analisis Ekonomi Publik atas Pemerataan Layanan Kesehatan Nasional. *Jurnal Ilmu Komunikasi Dan Sosial Politik*, 2(4), 1303–1308. <https://doi.org/10.62379/jiksp.v2i4.2924>

Rifaldi, M. A., Estikhamah, F., & Alfiansyah, A. D. (2025). Studi Kelayakan Tarif Commuter Line Arjonegoro Rute Sidoarjo Bojonegoro. *Jurnal Civil Engineering Study*, 5(2), 124–134. <https://doi.org/10.34001/ces.v5i02.1443>

Salim, W., & Teh, S. W. (2025). Integrasi Ruang Literasi Lingkungan dan Wisata Pertanian Mina Padi Sebagai Strategi Regenerasi Ruang Hijau di Pluit. *Jurnal Sains, Teknologi, Urban, Perancangan, Arsitektur (Stupa)*, 7(2), 1049–1062. <https://doi.org/10.24912/STUPA.V7I2.35602>

Saputra, T. B., & Nurjayanti, W. (2025). Identifikasi Fasilitas Stadion Joyo Kusumo Pati sebagai Home Base Persipa. *Prosiding (SIAR) Seminar Ilmiah Arsitektur*, 1537–1545. <https://proceedings.ums.ac.id/siar/article/view/5681>

Sheehan, S. D., Padilla, H. A., & Hakiki, A. (2025). Analisis Kelayakan Bisnis terhadap Usaha PYRO SHOP Kota Bandung. *Jejak Digital: Jurnal Ilmiah Multidisiplin*, 1(1), 1–11. <http://indojurnal.com/index.php/jejakdigital/article/view/9>

Siregar, R. V., Silfani, D., Sari, A., Nanda, D. B., & Hidayat, N. (2025). Evaluasi Efektivitas dan Fungsionalitas dari Kegagalan Skybridge Lapangan Merdeka Sebagai Proyek Infrastruktur di Pusat Kota Medan. *J-CEKI : Jurnal Cendekia Ilmiah*, 4(2), 2729–2737. <https://doi.org/10.56799/JCEKI.V4I2.6463>

Yusuf, N. (2025). *Perancangan Stadion Djayati di Kediri dengan Pendekatan Arsitektur Futuristik*. UIN Maulana Malik Ibrahim.