

# Comparison of Steel Construction Costs Between AHSP and Conventional Method at Padalarang Bandung Steel Warehouse

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**Abstract:** Estimating costs too high can burden the project budget, while estimating costs too low can lead to budget shortfalls during implementation. Therefore, optimal planning is necessary, one of which is by comparing construction cost estimates using the AHSP method with conventional calculations from consultants to provide insights into the accuracy and efficiency of both methods in the context of a steel warehouse project. Steel construction has many advantages such as shorter construction duration, a high strength-to-weight ratio making the structure lighter yet still strong, and so on. The research method uses quantitative analysis to estimate the budget plan for steel work by referring to AHSP Cipta Karya and Housing SE Director General of Construction Development No. 68/SE/Dk/2024 and comparing it with the estimates from the consultant. The calculation results show that the more economical estimate for the steel construction work is the conventional calculation from the consultant. The calculation results show that the AHSP estimate is approximately 30.16% higher. This is due to the higher material and equipment costs in the AHSP compared to the consultant's estimate. The suggestion for further research is to conduct calculations on other works, to show the overall construction costs.

**Keywords:** Conventional Method, Steel Material, Unit Price Analysis (AHSP) Method

## Introduction

To develop a country, the size and scale of construction project complexity play an important role in determining its impact on national development (Ratukarangga & Aldino, 2024). A construction project is a series of actions that only occur once or are implemented and have a certain period of time. The length or shortness of the project is influenced by the size of the project, the difficulty of implementation, and other factors (Ervianto, 2023). The main components in construction projects are time, quality, and cost (Kiswati & Chasanah, 2019).

Different industry characteristics make construction projects capital intensive and have many risk factors (Tayefeh Hashemi et al., 2020), so project budget planning plays an important role during the design

stage (Swei et al., 2017). In cost estimation theory, uncertainty or risk can be the reason why project budgets differ between plans and execution (Ekung et al., 2021). Factors that can lead to cost estimation inaccuracies include insufficient time, poor tender documentation, and inadequate analysis of tender documents (Famiyeh et al., 2017). Optimal results in construction contracts can be achieved through accurate estimation, which involves a calculation process to calculate all costs associated with a particular job to reach the total cost.

The calculation of the construction cost estimate carried out by the planner, namely the consultant, is based on the project experience approach or probabilistic method and depends on experts or human resources (Hatamleh et al., 2018), but the more detailed the calculation, the

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higher the human error factor. Cost estimation accuracy can improve a company's ability to submit a lower bid to increase the chances of winning in the bidding process (Fry et al., 2016). The dominant factor in the success of construction projects is accurate cost estimation (Silalahi et al., 2023); (Lendra, 2023). To make the cost budget plan, work data needs to be grouped and done thoroughly, and it is hoped that the cost is the real cost (Imaduddin et al., 2020). Before becoming cost budget plan, for each work item, the calculation of the unit price of work is carried out, which is the result of the unit price analysis including the cost of labor, materials, and equipment needed. To determine the cost estimation using the traditional method based on material and labor costs. However, conventional approaches do not consider other factors, such as the complexity of sustainable building systems, organizational environment, project team capabilities, and others (Hu & Skibniewski, 2021).

Construction cost estimation with the unit price analysis method based on cost standards by the government. The use of the AHSP method not only provides reliable estimates but also highlights the importance of data updates and reserve planning to deal with uncertainty in resource market prices (Oktaviani et al., 2025). The AHSP method is seen as a more economical method that shows significant cost differences, which is an effective tool in planning and decision-making in construction projects in Indonesia (Aprilia et al., 2021). The calculation of the AHSP method can show the efficiency of labor, materials, and equipment. The higher the efficiency of labor, the value of productivity will also increase, and the coefficient value obtained will be smaller (Mulyadi Sugih Dharsono & Siti Hindun, 2024). The basic differences between the AHSP and conventional methods can lead to potentially significant differences between the two methods. Construction cost estimates that are too high can burden the budget, while costs that are too low cause shortcomings during implementation. The object of research in the form of steel warehouse construction is still minimal, where steel construction has characteristics in the form of modular components, prefabrication, and high efficiency (Zuraidah, 2022).

Table 1: Data on the Number of Large Industries in Bandung

| Year | Number of Large Industries |
|------|----------------------------|
| 2021 | 447                        |
| 2022 | 222                        |
| 2023 | 410                        |

The case study in this research is steel construction work on a steel warehouse project in Bandung, West Java. Based on data from Table 1, the number of IB's requiring steel warehouses in Bandung has fluctuated sharply in the last three years (Open Data Jabar, 2024). The

significant increase in 2023 indicates a return to the increasing need for industrial infrastructure, especially warehouses. Budget analysis and comparison with the AHSP method is a commonly used method in Indonesia to calculate construction costs (Nugraha et al., 2023), but it is still rare to discuss steel material construction. Steel warehouse construction has an increasing need along with industrial needs. Building structures with steel materials is analytically safer (Edi W et al., 2017). The steel warehouse is a place to store raw materials, semi-finished goods, and finished products. Steel construction, with ease of manufacture and fast implementation duration, is very suitable for warehouse planning that requires efficient implementation time (Septiani Amalia et al., 2020). Comparison of estimates using the AHSP method with consultant estimates can provide insight into the accuracy and efficiency of both methods in the context of steel warehouse projects. The use of the AHSP method and supporting technology can answer the demands of an increasingly complex and dynamic construction industry (Wibawanto Sunarwadi, 2023). This research can also be a comparison for project owners in deciding estimation methods in the planning stage and can be an evaluation of AHSP updates, especially in steel construction.

## Method

The research method uses quantitative analysis to estimate the cost budget plan for the steelworks of the warehouse project by referring to the AHSP for Human Settlements and Housing SE Director General of Bina Konstruksi No. 68/SE/Dk/2024 and comparing it with conventional calculations from the consultant. The stages of analysis begin with calculating the volume of steelwork according to specifications, calculating the unit price of each work (labor, materials, and equipment) according to AHSP, estimating the total cost, and comparing the calculation results with estimates from consultants. In general, material cost estimation is calculated by multiplying the total weight by the unit price per kilogram. The research object in the form of a warehouse is planned in the Bandung area with a land area of  $\pm 3,143 \text{ m}^2$  and a building area of  $\pm 1,796 \text{ m}^2$ . The building is dominated by steel material construction. The research data was obtained from the plan drawings, regulations required by the planner in the RKS, and cost estimates in the cost budget plan from the consultant.

## Result and Discussion

Plan drawings as research data are used to calculate the volume of steel construction work. Furthermore, the calculation of unit price analysis is carried out on each item of steel structure work. The source of the price list for labor, materials, and equipment was obtained from

the Bandung Regency Government Unit Price Standard for Fiscal in 2024 and accompanied by a survey of the construction site. The prices of wages, materials, and equipment were then included in the AHSP calculation based on the AHSP for Human Settlements and Housing SE Director General of Bina Konstruksi No. 68/SE/Dk/2024. The following is a sample of the AHSP calculation for WF200 steel column work (Director General of Bina Konstruksi, 2024) (Regent of Bandung, 2024).

Table 2: AHSP Steel Column Work WF200x150x5.5x8 mm

| Description |                                     | Unit     | Coefficient | Unit Price (IDR) | Total Cost (IDR) |
|-------------|-------------------------------------|----------|-------------|------------------|------------------|
| 1           | Labor                               |          |             |                  |                  |
|             | Worker                              | Man-hour | 0,0375      | 133.000          | 4.987,50         |
|             | Steelworker                         | Man-hour | 0,0125      | 157.500          | 1.968,75         |
|             | Welder                              | Man-hour | 0,0125      | 157.500          | 1.968,75         |
|             | Foreman                             | Man-hour | 0,0025      | 172.200          | 430,50           |
|             | Supervisor                          | Man-hour | 0,0008      | 181.300          | 145,04           |
| Total (1)   |                                     |          |             |                  | 9.500            |
| 2           | Materials                           |          |             |                  |                  |
|             | Steel Section-WF200                 | kg       | 1,150       | 16.900           | 9.435            |
|             | Welding Rod                         | kg       | 0,053       | 40.000           | 2.120            |
| Total (2)   |                                     |          |             |                  | 21.555           |
| 3           | Equipment                           |          |             |                  |                  |
|             | Electric Welding Tool               | hour     | 0,0330      | 18.750           | 618              |
|             | 7 ton – Mobile Crane                | hour     | 0,0013      | 3.000.000        | 3.900            |
| Total (3)   |                                     |          |             |                  | 4.518            |
| 4           | (1) + (2) + (3)                     |          |             |                  | 35.574           |
| 5           | Overhead and Profit (10%) = (4)*10% |          |             |                  | 3.557            |
| 6           | Total Unit Price = (4) + (5)        |          |             |                  | 39.131           |

Table 2 shows the AHSP sample for WF200x100x5.5x8 mm steel column work. The calculation includes the cost of labor, materials, and equipment according to the coefficient of the AHSP guideline for Human Settlements and Housing SE Director General of Bina Konstruksi No. 68/SE/Dk/2024 and the Bandung Regency Government Unit Price Standard for Fiscal 2024. This data is used to determine the unit price, which is the basis for preparing the cost budget plan accurately and according to applicable standards. A recapitulation

of the cost budget plan comparison for steel structure work is shown in Table 3 below.

Table 3: Steel Structure Budget Plan Recapitulation

| Steel Work Description                                 |                                            | Total Price - AHSP Method | Total Price - Conventional Method |
|--------------------------------------------------------|--------------------------------------------|---------------------------|-----------------------------------|
| 1.                                                     | Steel Column Works                         | Rp 526.834.858            | Rp 362.214.188                    |
| 2.                                                     | Steel Roof Frame Works                     | Rp 949.656.702            | Rp 677.254.805                    |
| 3.                                                     | Steel Canopy Frame Works                   | Rp 83.437.542             | Rp 60.940.962                     |
| 4.                                                     | Purlin Work for Roof, Cladding and Canopy  | Rp 287.436.105            | Rp 210.034.209                    |
| 5.                                                     | Frame Work for Roof and Canopy             | Rp 4.885.585              | Rp 22.446.856                     |
| 7.                                                     | Bolt Installation Work                     | Rp 37.739.436             | Rp 26.212.080                     |
| 8.                                                     | Column Baseplate Grouting Works            | Rp 15.065.407             | Rp 13.500.000                     |
| 9.                                                     | Covering Works for Roo, Cladding and Facia | Rp 611.897.028            | Rp 584.267.381                    |
| Total Cost of Steel Structure Works                    |                                            | Rp 2.546.952.667          | Rp 1.956.870.483                  |
| Cost variance between AHSP and conventional estimation |                                            | Rp 590.082.184            |                                   |
| Percentage Variance                                    |                                            | 23,17%                    | 30,15%                            |

Table 3 shows a comparison of the cost budget plan for each steel structure work item, based on the volume of work, unit price from the AHSP Cipta Karya and Housing guidelines SE Director General of Bina Konstruksi No. 68/SE/Dk/2024, and unit price of conventional calculation from the planning consultant. The total price of each method is calculated from the result of multiplying the volume by each unit price. The calculation results show that the total cost of the AHSP method is Rp 2.546.952.668, while for the consultant estimation method it is Rp 1.956.870.483. In addition, the calculation results show a cost difference of Rp 590.082.184,69 and these results show that the AHSP method is higher by about 30,15%. The significant difference is due to the assumptions of calculating work units, material prices, and wages or the efficiency of work methods used by consultants based on field experience. The percentage becomes a measure in

making budget decisions and evaluating the feasibility of construction project costs.

## Conclusion

Based on the calculations carried out, it is found that the more economical steelwork construction cost estimate is the conventional method from consultant's calculation. The calculation results show that the AHSP estimate is higher by about 30.16%. This is due to higher materials and equipment costs in AHSP compared to estimates from consultants. Suggestions for further research to perform calculations on other work to show the overall cost of construction.

## References

- Aprilia, K., Ratag, Malingkas, G. Y., & Tjakra, J. (2021). Perbandingan Rencana Anggaran Biaya Antara Metode SNI Dengan Metode AHSP Pada Proyek Gedung Pendidikan Fakultas Teknik Jurusan Teknik Sipil Universitas Sam Ratulangi. *TEKNO*, 19, 299–305. <https://ejournal.unsrat.ac.id/>
- Bupati Bandung. (2024). Standar Harga Satuan Pemerintah Kabupaten Bandung Tahun Anggaran 2024 (Nomor 56).
- Direktur Jenderal Bina Konstruksi. (2024). Analisa Harga Satuan Pekerjaan (AHSP) Bidang Cipta Karya dan Perumahan.
- Edi W, G., Septyani P, M. D., Tadjono, S., & Wibowo, H. (2017). Redesain Struktur Gedung Kuliah Umum Fakultas Teknik Universitas Diponegoro Menggunakan Konstruksi Baja Berdasarkan SNI 1729-2015 dan SNI 7972-2013. *Jurnal Karya Teknik Sipil*, 6(3), 182–196.
- Ekung, S., Lashinde, A., & Adu, E. (2021). Critical Risks to Construction Cost Estimation. *Journal of Engineering, Project, and Production Management*, 11(1), 19–29. <https://doi.org/10.2478/jepm-2021-0003>
- Ervianto, W. I. (2023). *Manajemen Proyek Konstruksi* (L. Mayasari, Ed.; Pertama). Yogyakarta: Penerbit ANDI.
- Famiyeh, S., Amoatey, C. T., Adaku, E., & Agbenohevi, C. S. (2017). Major causes of construction time and cost overruns: A case of selected educational sector projects in Ghana. *Journal of Engineering, Design and Technology*, 15(2), 181–198. <https://doi.org/10.1108/JEDT-11-2015-0075>
- Fry, T. D., Leitch, R. A., Philipoom, P. R., & Tian, Y. (2016). Empirical Analysis of Cost Estimation Accuracy in Procurement Auctions. *International Journal of Business and Management*, 11(3), 1. <https://doi.org/10.5539/ijbm.v11n3p1>
- Hatamleh, M. T., Hiyassat, M., Sweis, G. J., & Sweis, R. J. (2018). Factors affecting the accuracy of cost estimate: Case of Jordan. *Engineering, Construction and Architectural Management*, 25(1), 113–131. <https://doi.org/10.1108/ECAM-10-2016-0232>
- Hu, M., & Skibniewski, M. J. (2021). A Review of Building Construction Cost Research: Current Status, Gaps and Green Buildings. *Green Building & Construction Economics*, 1(17). <https://doi.org/10.37256/gbce.212021768>
- Imaduddin, Hidayat, A., & Wijanarko AP, T. (2020). Sistem Perhitungan Estimasi Biaya Konstruksi Bangunan (Studi Kasus di Cv. Telaga Cipta Sarana). *Jurnal Dimensi Pratama Teknik Sipil*, 9(1), 1–9.
- Kiswati, S., & Chasanah, U. (2019). Analisis Konsultan Manajemen Konstruksi Terhadap Penerapan Manajemen Waktu pada Pembangunan Rumah Sakit Jiwa di Jawa Tengah. *Jurnal NeoTeknika*, 5(1). <https://corphr.com/pmbok-project->
- Lendra, L. (2023). Building Cost Estimation Application Based on Unit Price Analysis of Work Based on Excel Macro. *Jurnal Aplikasi Teknik Sipil*, 21(4), 319–328. <https://doi.org/10.12962/j2579-891X.v21i4.15078>
- Mulyadi Sugih Dharsono, & Siti Hindun. (2024). Analysis of Labor Productivity of Beam and Floor Plate Work with Work Sampling Method. *Jurnal PenSil*, 13(3), 287–298. <https://doi.org/10.21009/jpensil.v13i3.44934>
- Nugraha, G. Y., Lendra, L., Puspasari, V. H., & Cahyanti, T. W. A. (2023). Analisis Perbandingan RAB Bangunan Gedung dengan AHSP 2016 dan AHSP 2022. *Musamus Journal of Civil Engineering*, 5(02), 56–60. <https://doi.org/10.35724/mjce.v5i02.5222>

- Oktaviani, R., Lusiana, L., & Rafie, R. (2025). Utilizing the AHSP Method for Cost Estimation in Road Improvement at Jalan Parit Demang. *Jurnal Teknik Sipil*, 24(4), 1514–1522. <https://doi.org/10.26418/jts.v24i4.86435>
- Open Data Jabar. (2024). Jumlah Industri pada SIINas Berdasarkan Kabupaten/Kota Jawa Barat.
- Ratukarangga, Y. A., & Aldino, I. (2024). Faktor Anggaran Biaya Proyek Konstruksi Terhadap Pembangunan Negara. *MENAWAN: Jurnal Riset dan Publikasi Ilmu Ekonomi*, 2(2), 134–148. <https://doi.org/10.61132/menawan.v2i2.271>
- Septiani Amalia, M., Agustine, D., & Abdillah, H. (2020). Perencanaan Konstruksi Baja Struktur Atas Pada Bangunan Gudang Tahan Gempa (Studi Kasus Bangunan Gudang Penyimpanan Barang Casing Elektronik). *JIMTEK: Jurnal Ilmiah Fakultas Teknik*, 1.
- Silalahi, Y. I., Masthura, L., & Fahriana, N. (2023). Analisis Faktor - Faktor Penentu Keberhasilan Proyek Konstruksi Berdasarkan Mutu, Biaya dan Waktu. *Jurnal Komposit*, 7(2), 233–240. <https://doi.org/10.32832/komposit.v7i2.14240>
- Swei, O., Gregory, J., & Kirchain, R. (2017). Construction cost estimation: A parametric approach for better estimates of expected cost and variation. *Transportation Research Part B: Methodological*, 101, 295–305. <https://doi.org/10.1016/j.trb.2017.04.013>
- Tayefeh Hashemi, S., Ebadati, O. M., & Kaur, H. (2020). Cost estimation and prediction in construction projects: a systematic review on machine learning techniques. *SN Applied Sciences*, 2(10), Springer Nature. <https://doi.org/10.1007/s42452-020-03497-1>
- Wibawanto Sunarwadi, H. S., Rizqi, A. A. Rudhistiar, D. Sugiantara, I. P. Naufal, F. (2023). Strategi Efektif Dalam Estimasi Biaya Konstruksi Rumah Tinggal dengan Aplikasi Halo Rumah. *SEMSINA 2023*, 214–223.
- Zuraidah, S. (2022). Elemen Struktur Baja (S. Zuraidah, Ed.; 1st ed.). Surabaya: Scopindo Media Pustaka.