Jurnal Teknologi Kedirgantaraan (JTK)
Vol. 11, No. 2, September 2026, page. 163 – 167
ISSN: 2528-2778 (Print); 2684-9704 (Online)
https://doi.org/10.35894/jtk.v11i2.335/

JTK
Jurnal Teknologi Kedirgantaraan
(Journal of Aeronautical Engineering)

Identification and Mitigation of Data Errors In Aeronautical Information Publications (AIP)

Ilona Gisela Br. Sibarani[1], Elfi Amir, S.SiT., S.E., M.M[2], Lina Rosmayanti, S.E., M.Si.[3]
[1]Politeknik Penerbangan Indonesia Curug
[2]Politeknik Penerbangan Indoensia Curug
[3]Politeknik Penerbangan Indoensia Curug

Article Info

Article History:
Submitted: 8 August 2025
Revised : 15 August 2025
Accepted : 7 August 2026

Keywords:
Aeronautical Information Publication (AIP), Data error, Quality Control (QC), AIS

ABSTRACT

Aeronautical Information Publication (AIP) is an official publication issued by, or under the authority of, a State containing permanent aeronautical information essential for air navigation. Despite its importance, various data errors are still found, potentially affecting flight safety. This study aims to identify data errors in AIP publications and propose methods to minimize them. A qualitative method with triangulation techniques - observation, interviews, and documentation - was employed during On-the-Job Training (OJT) at the Aeronautical Information Center. The findings reveal that frequent errors include mismatches between text and charts, coordinate inaccuracies, inconsistencies in navigation station names, and discrepancies in effective dates between documents. The primary cause is the manual implementation of the Quality Control (QC) process. As a solution, the study proposes a web-based "Quality Control Monitoring Checklist Form" to enhance accuracy and documentation. The adoption of a digital QC system, along with updates to applicable SOPs, STDs, and technical guidelines, is expected to reduce data errors in AIP publications.

Correspondence Author:
Ilona Gisela Br. Sibarani
Email:
ilonagisela1612@gmail.com

INTRODUCTION

In the aviation sector, the safety, accuracy, and efficiency of flight operations depend greatly on the reliability of aeronautical information. The Aeronautical Information Publication (AIP), an official document issued by a state's civil aviation authority, serves as the primary source of permanent aeronautical information essential for safe air navigation and is produced in accordance with ICAO Annex 15 and Doc 8126 standards [1], [2]. In Indonesia, the Aeronautical Information Service (AIS) provider, AirNav Indonesia, is responsible for producing and maintaining the nation's AIP.

Despite the existence of standardized international guidelines and internal Standard Operating Procedures (SOPs), data integrity issues within AIPs remain a persistent concern in the global aviation industry. Data errors - ranging from incorrect coordinates and inconsistent station names to discrepancies in effective dates - can have severe consequences. According to international safety reports, such inaccuracies pose significant risks, potentially leading to navigational errors, operational delays, and, in extreme cases, contributing to incidents or accidents [3], [4]. *(Note: It is highly recommended to cite a specific ICAO safety report or a relevant academic paper on aviation safety here).*

While previous studies have addressed the general importance of data accuracy in AIS operations, there is limited research that specifically identifies and analyzes the types of errors occurring within AIP publications in the Indonesian context. A significant research gap exists in understanding how the specific Quality Control (QC) and validation workflows contribute to these data integrity issues. The current processes, while structured, are heavily reliant on manual procedures, which are inherently susceptible to human error.

METHODS

Data Collection

Observation Participatory observation was conducted during the AIP drafting and Quality Control (QC) processes. The researcher observed the workflow, including data collection, drafting, QC, compilation, and validation stages.Interviews [5]. Semi-structured interviews were conducted with 5 AIS officers: 2 from the Regional PIA, 2 from the Central PIA, and 1 from the QC team. Interviews focused on identifying common data errors, their causes, and mitigation strategies [6]. Documentation A total of 12 AIP publications (monthly editions over one year) were reviewed, along with relevant SOPs, STDs, and technical guidelines [7].

Data Analysis

Data were analyzed using thematic analysis with open coding to identify patterns and categories of errors. Triangulation was applied by comparing findings from observation, interviews, and documentation to ensure validity and reliability [5][8]. The qualitative method was chosen because it allows for an in-depth exploration of processes and human factors contributing to data errors, which cannot be fully captured through quantitative measures. Triangulation strengthens the credibility of the results by cross-verifying data from multiple sources [5].

RESULT AND DISCUSSION

Research Results

This research identifies several challenges within the current Aeronautical Information Publication (AIP) process. Through document analysis, interviews, and participant observation, several recurring types of data errors were identified. These findings highlight potential areas for improvement in the existing Quality Control (QC) and validation workflow [9]. By analyzing several AIPs published over the past year, several types of data errors were identified, which can be classified as follows:

1.) Inconsistencies in the effective date;
2.) Errors in coordinates;
3.) Inconsistencies in station names.

An analysis of AIP documents published over the past year identified 10 significant cases of data errors. These errors can be classified into three primary categories: inconsistency in effective dates,

errors in coordinates, and inconsistency in station/waypoint names. The quantification and details of each error type are presented in Table 1.

Table 1 Quantitative Summary of Data Error Findings

Category	Error Type	Frequency	Specific Examples from Analyzed AIP Documents
Date	Inconsistency in Effective Date	1	Discrepancy in the effective date between AIP AMDT 83 and Checklist AD 0.4.
Spatial Data	Errors in Coordinates & Waypoints	5	Incorrect coordinates (DOLTA & GUSKO); incorrect Parking Stand coordinates (AMDT 140); coordinate discrepancy (GUROL); missing coordinates for published waypoints (RULKI in AMDT 152, UGUBI in AMDT 155).
Naming	Inconsistency in Station Names	4	Naming discrepancies for TANJUNGPANDAN, BANJARMASIN, BOYOLALI/SOLO, and SLEMAN/YOGYAKARTA between text and chart sections within AMDT 155.
	Total Findings	10	

The quantitative and visual findings above indicate a systematic gap between ideal procedures and current practices. The existing QC process is not entirely effective in filtering various error types before publication. A more in-depth gap analysis is presented in Table 2.

Table 2 GAP Analysis

Area	Ideal Conditions	Current Conditions	The gap & Impact
Data Accuracy	All data (coordinates, names, dates) are verified and consistent across all document sections before compilation.	Discrepancies in coordinates and station names are found post-publication (e.g., GUROL, SOLO/BOYOLALI).	**Gap:** Lack of a robust, early-stage cross-verification mechanism. **Impact:** Potential for navigational errors and safety risks; undermines data reliability.
Process Validation	Validation is an integral, proactive step at the beginning of the workflow to prevent errors.	Validation is performed as a manual Quality Control (QC) check at the final stage, after drafting is complete.	**Gap:** The validation process is reactive, not preventive. **Impact:** Errors are not detected early, leading to costly revisions and the potential for errors to persist into the final published version.
Workflow Efficiency	The workflow is designed to minimize rework and ensure first-time accuracy.	Errors originating from data sources or drafting lead to a revision limit of two (2) times, indicating recurring issues.	**Gap:** The current process accommodates errors rather than eliminating them. **Impact:** Increased workload, process delays, and a higher probability of undetected errors due to repetitive manual checks.

Discussion

This section presents a discussion of the research findings to answer the established research questions. The results presented in section 2.1 indicate that the current AIP publication process, despite its detailed procedural documentation (e.g., FRM.02, JKS.01, STD.34), is vulnerable to data integrity issues. The core of the problem lies in the workflow's dependency on manual checks and its linear, sequential nature.

The detailed process flow - from data collection (FRM.02), text drafting (JKS.01, STD.34) [10], [11], and chart creation (JKS.02, STD.12) [12], [13] to the final QC check (STD.32, JKS.09) [14], [15] operates in silos. Text and chart components are developed separately and are only formally checked against each other during the final QC stage. This procedural design is the direct cause of the gaps identified in Table 2. For instance, the inconsistency of the station name "BOYOLALI" in the text versus "SOLO" on the chart (Table 1) is a clear symptom of this lack of integrated, real-time verification.

Furthermore, the current system for addressing non-conformities, while structured through FRM.29 and the "5 whys" method, is fundamentally **reactive**. It is a mechanism for correction after an error has already occurred, rather than a system for prevention. The fact that the status of a non-conformity can remain "open" if a fix is ineffective highlights a process that struggles with ensuring definitive, first-time-right corrections [16].

Based on the research findings above, which demonstrate systemic gaps leading to quantifiable errors, the author proposes a solution to minimize these risks: monitoring the QC process using a digital form. To implement this solution, the author created a web-based system called the "Quality Control Monitoring Checklist Form." This system is recommended for use in the QC process. This form contains all criteria that must be met according to standard operating procedures related to QC. The function of this form is to serve as a track record of personnel in the QC process. This will facilitate and assist personnel in avoiding missing criteria, thus preventing potential errors due to missed criteria. If there is even one criterion that does not pass QC, the form will automatically read that the draft being checked did not pass QC and requires revision or improvement. This digital intervention aims to transform the QC process from a reactive, manual check into a proactive, guided, and auditable procedure.

CONCLUSION

This study successfully achieved its primary objective of identifying, quantifying, and analyzing the root causes of data errors in Aeronautical Information Publications (AIP). By demonstrating a clear link between the manual, sequential Quality Control (QC) process and the occurrence of specific errors - such as inconsistencies in coordinates and station names - this research substantiates the need for procedural reform. The principal contribution of this work is the proposed "Quality Control Monitoring Checklist Form", a web-based system designed as a direct, proactive solution to the systemic gaps identified. This digital intervention moves beyond mere error correction and offers a framework for error prevention, thereby enhancing the integrity and reliability of critical aviation data.

REFERENCES

[1] ICAO Annex 15, *Annex 15 Aeronautical Information Services*. 2018.
[2] ICAO 8126, *Doc 8126 AIS Manual 7th Edition*. 2022.
[3] AirNav Indonesia, *SOP 005 Prosedur Draftign AIP dan AIC Di Unit Pelayanan Informasi Aeroautika Wilayah*. 2025.
[4] AirNav Indonesia, *SOP 004 Prosedur Drafting Aip Dan Aic Di Bagian Publikasi Informasi Aeronautika Dan Kartografi*. 2025.
[5] Sugiyono, "Metode Penelitian Kualitatif (Untuk penelitian yang bersifat: eksploratif, enterpretif, interaktif dan konstruktif)," *Metod. Penelit. Kualitatif*, pp. 1–285, 2022, [Online]. Available: http://belajarpsikologi.com/metode-penelitian-kualitatif/
[6] Zahroh, "Strategi Pengumpulan Data Dalam Penelitian Kualitatif: Teknik, Tantangan Dan Solusinya," *J. Kaji. Pendidik.*, vol. 3, no. 6, pp. 107–118, 2025.
[7] Aminarno, "Metode Penelitian Ilmiah by Aminarno BP -1.pdf," 2019.
[8] F. Nurrisa, D. Hermina, and Norlaila, "Pendekatan Kualitatif dalam Penelitian : Strategi , Tahapan , dan Analisis Data Jurnal Teknologi Pendidikan Dan Pembelajaran (JTPP)," *J. Teknol. Pendidik. Dan Pembelajaran*, vol. 02, no. 03, pp. 793–800, 2025.
[9] N. Muzahra and M. I. P. Nasution, "Strategi untuk menjaga konsistensi dan akurasi data dalam pengambilan keputusan," vol. 2, no. 4, pp. 641–647, 2025.
[10] AirNav Indonesia, *JKS. 01 Petunjuk teknis format penulisan teks aip dan aic*. 2023.

[11] AirNav Indonesia, *STD. 34 Standar pembuatan draft teks aip dan aic*. 2023.
[12] AirNav Indonesia, *JKS. 02 Pembuatan Chart*. 2020.
[13] AirNav Indonesia, *STD. 12 Standar Chart Di PIA Wilayah*. 2020.
[14] AirNav Indonesia, *STD.32 QC CHECKLIST DRAFT TEKS AIP , AIC , DAN PREFACE*. 2023.
[15] AirNav Indonesia, *JKS.09 Panduan verifikasi, identifikasi perubahan data, qc, dan validasi*. 2023.
[16] AirNav Indonesia, "SOP 033 Prosedur ketidaksesuaian dan tindakan perbaikan," 2025.