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Dangerous Goods Handling in Air Cargo: A Case Study of PT Ensatama Travelindo

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Abstract

Purpose: This study examines the procedures, facilities, workforce roles, and operational implementation of dangerous goods delivery via air cargo at PT. Ensatama Travelindo, a freight forwarding company in West Jakarta, Indonesia. Ensuring compliance with International Air Transport Association (IATA) Dangerous Goods Regulations (DGR) and national aviation safety standards is essential for maintaining safety, cargo integrity, and operational efficiency. However, empirical studies on dangerous goods handling in Indonesian freight forwarding companies remain limited.
Research Methodology: A qualitative descriptive case study approach was employed. Data were collected through field observations during an internship period, semi-structured interviews with key informants, and document analysis. The study focused on four operational dimensions: facilities and infrastructure, human resources, work procedures, and implementation activities.
Results: The findings indicate that PT. Ensatama Travelindo has implemented procedures generally aligned with IATA DGR requirements, including shipper notification, goods verification, dangerous goods classification, wooden re-packaging, MSDS review, and air waybill issuance. Workforce responsibilities across sales, administrative, and operational functions are clearly defined and consistently implemented. Nevertheless, aging computer systems and unstable Internet connectivity contribute to delays in data entry and documentation processes.
Conclusions: Dangerous goods delivery procedures are operationally effective and largely compliant with regulatory requirements. However, improvements in technological infrastructure are needed to reduce processing delays and strengthen compliance performance.
Limitations: The study is limited to a single company and observation period, restricting broader generalization.
Contributions: This study provides practical documentation and operational insights into dangerous goods handling in Indonesian air cargo freight forwarding, contributing to aviation logistics practice and training.

Keywords: *Air Cargo, Air Waybill, Dangerous Goods, Freight Forwarding, IATA DGR*

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1. Introduction

Air cargo transportation is a critical pillar of global supply chains, facilitating the rapid movement of high-value, time-sensitive, and specialized commodities across international borders (Cecil, 2024; Muhai,

2019; Zhang et al., 2022). Within this operational ecosystem, the shipment of dangerous goods—broadly defined as substances or materials capable of posing significant risks to human safety, health, property, or the environment when transported by air—presents a uniquely complex regulatory and operational challenge (IATA, 2023). The International Air Transport Association (IATA) estimates that dangerous goods are present in a substantial proportion of all air cargo shipments, either explicitly declared or inadvertently included within general cargo consignments, making robust procedural compliance a matter of both regulatory obligation and flight safety imperative (Ardhianti et al., 2022; ICAO, 2022; Mukherjee & Sen, 2023).

The regulatory framework governing the air transport of dangerous goods is anchored in the IATA Dangerous Goods Regulations (DGR), which operationalizes Annex 18 of the Convention on International Civil Aviation (ICAO) into carrier-level technical instructions (Dempsey & Johansson, 2020; Lesmini et al., 2022; Widiyanto et al., 2023). These regulations classify dangerous goods into nine primary hazard classes—explosives, gases, flammable liquids, flammable solids, oxidizing substances, toxic and infectious substances, radioactive materials, corrosive substances, and miscellaneous dangerous substances—and mandate specific packaging, labeling, documentation, and handling requirements for each class (IATA, 2023; of Transportation, 2013). In Indonesia, these requirements are further reinforced by the Civil Aviation Safety Regulation (CASR) framework administered by the Directorate General of Civil Aviation (DGCA) and operationalized through Law No. 1 of 2009 on aviation (Parmenas et al., 2023).

Freight forwarding companies occupy a pivotal intermediary position in the dangerous goods air cargo chain, serving as functional links between shippers and airlines (Lesmini et al., 2022; Ostad-Ali-Askari, 2022). Unlike airlines, which operate under direct IATA and DGCA oversight, freight forwarders operate in a more heterogeneous regulatory environment, where compliance quality can vary substantially based on employee training, infrastructure availability, and internal procedure rigor (Hafriyani & Pinem, 2022; Ryan Firdiansyah & Soekarsono, 2016; Saputra et al., 2022). In Indonesia, where the freight forwarding sector encompasses a wide spectrum of operators ranging from large multinational logistics providers to small and medium-sized independent forwarders, compliance variability represents an important concern for aviation safety regulators and industry practitioners (Achir et al., 2022; Fadhilah et al., 2022; Walton & Marion, 2020).

PT. Ensatama Travelindo is a representative example of a small-to-medium Indonesian freight forwarding company that handles dangerous goods shipments via air cargo from its operational base in West Jakarta. As a company without universal IATA-licensed dangerous goods certification across its workforce, yet operationally active in this domain, it provides a valuable and practically significant case study for understanding how procedural compliance is maintained and where gaps may emerge under real operational conditions. Prior academic research on dangerous goods handling in Indonesian freight forwarding contexts has been sparse (Hafriyani & Pinem, 2022; Misaal et al., 2024), and detailed procedural documentation of freight forwarder-level operations is largely absent from peer-reviewed literature.

This study addresses this gap through four specific research objectives: (1) to document the facilities and infrastructure employed by PT. Ensatama Travelindo in dangerous goods air cargo delivery; (2) to analyze the roles and responsibilities of the workforce involved in the delivery process; (3) to describe and evaluate the work procedures applied in dangerous goods shipment processing; and (4) to trace the end-to-end implementation of the dangerous goods delivery process from shipper contact to recipient delivery. By pursuing these objectives through a rigorous qualitative case study design, this study produces empirical documentation that can serve as a practical reference for regulatory compliance assessment, vocational training content, and future comparative research in Indonesia's aviation logistics

sector.

The remainder of this paper is organized as follows. Section 2 reviews the relevant theoretical and regulatory literature. Section 3 describes the research methodology used in this study. Section 4 presents and discusses the findings across four analytical dimensions. Section 5 concludes with a summary of the findings, limitations, and directions for future research.

2. Literature Review

2.1 Air Cargo and the Classification of Cargo Types

The IATA defines air cargo as all goods transported by aircraft under an Air Waybill (AWB), excluding postal items subject to international postal conventions and passenger baggage covered by a passenger ticket (Hasan, 2022a; IATA, 2023). The economic significance of air cargo is substantial: the International Air Transport Association estimates that air freight carries approximately 35% of global trade by value while accounting for less than 1% by volume, reflecting its concentration in high-value and time-critical commodity segments (Abeyratne, 2024; IATA, 2023; Warpani, 2016).

Based on the IATA Airport Handling Manual (AHM), air cargo is categorized into two primary classes: general and special cargo. General cargo encompasses shipments that require no extraordinary handling procedures beyond standard transportation safeguards; examples include household goods, clothing, and office supplies (Arimbawa & Suryawan, 2022; Bombelli et al., 2020; Hava, 2022). In contrast, special cargo refers to shipments whose physical, chemical, or biological properties necessitate specific handling protocols, specialized equipment, or regulatory compliance procedures beyond those applicable to general cargo (Hendiyana et al., 2022; IATA, 2023; Warpani, 2016). Special cargo subcategories include live animals (AVI), human remains (HUM), perishable goods (PER), valuable goods (VAL), strongly aromatic goods, live human organs (LHO), diplomatic pouches (DIP), and dangerous goods (DG). Dangerous goods represent the most stringently regulated category, given the direct safety implications for aircraft, crew, and ground personnel (Anguita & Olariaga, 2023; Hasan, 2022b; Lee et al., 2019).

2.2 Dangerous Goods: Definition, Classification, and Regulatory Framework

Dangerous goods (DG) are substances, materials, or articles that can pose hazards to health, safety, property, or the environment when transported by air (IATA, 2023; ICAO, 2022). The IATA Dangerous Goods Regulations (DGR), now in its 64th edition, represent the primary technical standard governing the identification, classification, packaging, marking, labeling, documentation, and handling of dangerous goods for air transport (Deng & Sun, 2023; Kalbarczyk et al., 2023; Stojanovic et al., 2023). In Indonesia, these requirements are supplemented by Minister of Transportation Regulation No. PM 90 of 2013 on Dangerous Goods Transport by Air and implemented within the broader Civil Aviation Law No. 1 of 2009.

Table 1. IATA Dangerous Goods Classification System

Class	Category	Subclasses / Key Characteristics	Examples
1	Explosives	Divisions 1.1–1.6 based on explosion/projection hazard	TNT, dynamite, ammunition, fireworks
2	Gases	2.1 Flammable; 2.2 Non-flammable/non-toxic; 2.3 Toxic	LPG, butane, oxygen, tear gas, CO_2
3	Flammable Liquids	Flash point $< 60°C$; pressure-sensitive	Petrol, paint, alcohol, acetone
4	Flammable Solids	4.1 Flammable solid; 4.2 Spontaneously combustible; 4.3 Dangerous when wet	Matches, sulfur, sodium, calcium carbide
5	Oxidizing Substances	5.1 Oxidizers; 5.2 Organic peroxides	Ammonium nitrate, hydrogen peroxide
6	Toxic & Infectious Substances	6.1 Toxic; 6.2 Infectious/biohazardous	Arsenic, cyanide, viruses, bacteria
7	Radioactive Materials	Categorized by activity index and surface dose rate	Uranium, plutonium, medical isotopes
8	Corrosive Substances	Cause full-thickness destruction of skin tissue	Sulfuric acid, battery acid, mercury
9	Miscellaneous Dangerous Goods	Hazardous but not fitting other classes	Dry ice, lithium batteries, magnetized materials

Source: (IATA, 2023; of Transportation, 2013)

Table 1 shows the IATA DGR classification system identifies nine hazard classes. Each class is associated with specific UN identification numbers, packaging groups (I, II, or III, based on hazard severity), and quantity limits for passenger aircraft, cargo aircraft, and prohibited shipments. Certain dangerous goods are classified as forbidden and are absolutely prohibited from air transport regardless of quantity, while others are permitted with specific conditions governing packaging specifications, quantity limitations per package, labeling requirements, and documentation obligations (Damjanović et al., 2024; Grote et al., 2021; Oakey et al., 2022).

2.3 Cargo Reception Requirements and Documentation

The IATA Traffic and Conference Tariff (TACT) Rules (Section 2.3.2) specify that cargo must satisfy the "Ready for Carriage" criterion prior to acceptance by an airline or handling agent. For dangerous goods, this criterion requires: (1) a correctly completed Air Waybill (AWB) or Master Air Waybill (MAWB); (2) a fully completed and duly signed Shipper's Declaration for Dangerous Goods (SDDG) in accordance with IATA DGR requirements; (3) a valid Material Safety Data Sheet (MSDS), providing chemical composition, physical and health hazards, safe handling instructions, and emergency response information; (4) proper packaging conforming to the DGR specifications for the applicable hazard class and packaging group; (5) correct marking and labeling of each package with the UN identification number, hazard class label, subsidiary hazard labels where required, handling marks, and shipper/consignee information; and (6) where applicable, special permits or competent authority approvals for radioactive materials, infectious substances, or prohibited goods with exemptions (IATA, 2023; ICAO, 2022; Setyawati, 2022).

Failure to comply with any of these requirements exposes freight forwarders, shippers, and airlines to

regulatory sanctions, rejection of cargo, and—in cases of undeclared or misdeclared dangerous goods—potential criminal liability and civil aviation enforcement action. The IATA DGR identifies undeclared dangerous goods as one of the most significant systemic risks to air cargo safety (**MukherjeeSen2023**; IATA, 2023), underscoring the critical importance of thorough pre-shipment screening and documentation verification at the freight forwarder level.

2.4 The Role of Freight Forwarders in Dangerous Goods Compliance

Freight forwarders serve as regulated agents in the air cargo supply chain, acting on behalf of shippers to arrange air transportation, consolidate cargo, prepare documentation, and interface with airlines and cargo-terminal operators. Under the IATA and ICAO frameworks, regulated agents—including freight forwarders—are required to implement security programs, conduct dangerous goods awareness training for all staff handling or accepting cargo, and maintain records of dangerous goods shipments for a minimum period (ICAO, 2022; Ryan Firdiansyah & Soekarsono, 2016). The IATA specifies that personnel who accept, handle, or process dangerous goods must hold a valid dangerous goods certification issued within the preceding 24 months (Category 6 training under the IATA DGR).

In practice, compliance quality among smaller Indonesian freight forwarders varies significantly. Hafriyani and Pinem (2022) documented gaps in dangerous goods knowledge among cargo service users at Komodo Airport, attributing these deficiencies to limited training access and weak enforcement of certification requirements at the regional level. Sahlan et al. (2016) identified infrastructure and documentation quality as key determinants of cargo operational efficiency at Hasanuddin International Airport. These findings contextualize the PT. Ensatama Travelindo case study and highlight the practical relevance of detailed procedural documentation for the Indonesian freight forwarding sector.

3. Methodology

3.1 Research Design

This study employed a qualitative descriptive case study methodology (Creswell & Poth, 2018; Yin, 2018). The case study design was selected because (1) the study seeks to understand 'how' and 'what' regarding complex operational procedures within a bounded real-world setting; (2) the phenomena under investigation—dangerous goods delivery procedures—are deeply context-specific and cannot be meaningfully abstracted from their organizational and regulatory environment; and (3) the limited prior literature on this topic in the Indonesian context requires inductive, discovery-oriented inquiry rather than hypothesis testing. The descriptive orientation is appropriate because the primary goal is comprehensive procedural documentation and operational analysis rather than causal inferences.

3.2 Research Site and Case Selection

The research site was PT. Ensatama Travelindo, a freight forwarding company headquartered at Ruko Green Garden Block Y3/49, North Kedoya, Kebon Jeruk District, West Jakarta, Indonesia. The case was selected based on the following criteria: (1) active engagement in dangerous goods air cargo shipments, (2) representativeness of small-to-medium Indonesian freight forwarding operations, and (3) feasibility of access for systematic observation and informant interviewing during a structured internship attachment. The organization employs a three-tier operational structure (sales, administrative, and operational teams) and operates from a three-story facility serving as a packaging floor, office space, and warehouse.

3.3 Data Collection

Data were collected using three complementary methods. First, systematic field observations were conducted throughout an extended internship attachment at PT. Ensatama Travelindo, enabling direct observation of the dangerous goods handling process from customer contact through delivery documen-

tation. Observational notes were recorded using a structured observation protocol organized around four analytical dimensions: facilities/infrastructure, workforce, work procedures, and activity implementation. Second, semi-structured interviews were conducted with key informants representing each operational function: sales, administrative staff, and internal and external operational team members. The interview questions addressed daily role responsibilities, procedural knowledge, regulatory awareness, and perceptions of operational challenges. Third, document analysis was conducted on available shipping records, MSDS files, internal procedure manuals, and air waybill samples to triangulate the observational and interview data.

3.4 Data Analysis

Data analysis followed the qualitative content analysis approach described by Schreier (2012), proceeding through three stages: (1) data organization and coding, in which transcripts, observation notes, and documents were read and thematically coded against the four analytical dimensions; (2) thematic synthesis, in which codes were clustered into higher-order themes describing patterns of compliance, gaps, and procedural strengths; and (3) interpretive analysis, in which themes were evaluated against the IATA DGR requirements and prior literature to identify areas of alignment and divergence. Member checking was performed by sharing the draft findings with two senior operational staff members to confirm the accuracy of the procedural descriptions.

4. Results and Discussion

4.1 Facilities and Infrastructure

The physical facilities and equipment available at PT. Ensatama Travelindo form the material foundation of its dangerous goods handling capability.

Table 2. Facilities and Infrastructure Inventory at PT. Ensatama Travelindo

Facility/Equipment	Quantity	Function	Adequacy Assessment
Weighing scale (kg)	1 unit	Determines gross weight for AWB and freight calculation	Adequate
Measuring tape (cm)	>1 unit	Determines volumetric dimensions for chargeable weight	Adequate
Packing tape / adhesive	Multiple	Seals packaging; secures documentation pouches	Adequate
Scissors	Multiple	Cuts packaging materials during re-packing	Adequate
Bubble wrap	Stock available	Cushions fragile goods against shock and vibration	Adequate
Plastic wrap	Stock available	Provides moisture/water barrier for exterior packaging	Adequate
Fragile tape / sticker	Stock available	Marks fragile and split-handle parcels; handling indicator	Adequate
Wooden packaging materials	Stock available	Required outer packaging for fragile & certain DG classes	Adequate
DG classification labels	Stock available	IATA-mandated hazard class labels for DG packages	Adequate
Calculator	>1 unit	Computes shipping rates, chargeable weight, invoice totals	Adequate
Printer	2 units	Prints AWB, SDDG, invoices, and delivery receipts	Adequate
Computer / laptop	>1 unit	Email, data entry, daily reports, system access	Partially inadequate (system slowdowns)
Internet connectivity (Wi-Fi)	1 network	Supports email, airline system access, documentation	Partially inadequate (intermittent failures)
Office stationery (ATK)	Complete	Manual recording of shipping documents	Adequate
Motor vehicle and car	Available	Goods collection from shipper; delivery to cargo terminal	Adequate
Three-floor office building	1 unit	Floor 1: packaging; Floor 2: workspace; Floor 3: warehouse	Adequate

Source: Field Observation, PT. Ensatama Travelindo, 2022

Table 2 presents a systematic inventory of the facilities observed during the fieldwork period, categorized by function and assessed for operational adequacy. Most of the facilities and infrastructure at PT. Ensatama Travelindo are operationally adequate for the company's dangerous goods handling activities. Packaging materials, including bubble wrap, plastic wrap, wooden packaging, and IATA-compliant DG hazard labels, are sufficiently stocked to support the consistent re-packaging of dangerous goods according to classification requirements. The availability of multiple measuring instruments and scissors enables the simultaneous processing of multiple consignments, which is important during peak shipment periods.

However, two infrastructural deficiencies were identified through field observations that warrant particular attention. First, several computer units suffered from system performance degradation, manifesting as

slow processing speeds and intermittent system crashes that delayed data entry during high-volume periods. In the context of dangerous goods documentation, where accurate and timely input of AWB data, MSDS information, and SDDG content is a regulatory obligation, system failures create not only operational delays but also potential compliance risks if documentation deadlines are missed. Second, the Wi-Fi internet connection experienced recurring failures that disrupted email communications with shippers and access to airline booking and cargo management systems. Given that PT. Ensatama Travelindo relies on email as the primary channel for receiving shipper consignment details and MSDS documentation, connectivity failures at critical points in the booking-to-delivery cycle can cascade into booking delays, documentation errors, or cargo acceptance failures at the terminal.

These findings are consistent with Sahlan et al. (2016), who identified technology infrastructure as a critical operational constraint for air cargo handling in the Indonesian context, and suggest that investment in hardware renewal and redundant Internet connectivity (e.g., dual-provider failover solutions) would yield meaningful improvements in procedural reliability and regulatory compliance outcomes.

4.2 Workforce Roles and Responsibilities

The workforce at PT. Ensatama Travelindo engaged in the dangerous goods delivery process comprises three functional teams: sales, administration, and operations (subdivided into internal and external).

Table 3. Workforce Role Distribution in the Dangerous Goods Delivery Process

Role	**Key Responsibilities**	**DG-Specific Functions**	**Observed Performance**
Sales	Customer acquisition; service pricing; initial inquiry management	Requests DG details and MSDS from shipper; communicates pricing; confirms booking	Consistent with job description
Admin	Receives approved shipment requests; system data entry; invoice generation	Inputs DG consignment data into system; generates documentation; files MSDS	Consistent; subject to computer/connectivity delays
Internal Operations	Receives goods at office; verifies weight, dimensions, type, and destination	Verifies DG classification; conducts MSDS cross-check; repackages goods per DGR class	Consistent with job description
External Operations	Collects goods from shipper; delivers goods to cargo terminal	Transports DG consignments; ensures intact packaging during transit to terminal	Consistent with job description

Source: Field observations and informant interviews, PT. Ensatama Travelindo, 2022

Table 3 shows summarizes the role distribution and field observations regarding the performance. Field observations confirmed that all four workforce functions were present at PT. Ensatama Travelindo are carried out in accordance with their designated job descriptions, demonstrating clear role definition and functional accountability. The internal operations team plays a particularly critical role in the dangerous goods compliance chain, as it is responsible for the DG classification verification and re-packaging stage—the point at which non-compliant or misdeclared shipments would ideally be identified and corrected before reaching the cargo terminal.

One notable operational characteristic is that, while not all employees hold formal IATA Dangerous Goods Category 6 certification, those without certification possess substantial practical experience in DG handling. While this arrangement is common among small freight forwarders in Indonesia, it carries

an inherent compliance risk: the IATA DGR specifies that all personnel who accept, handle, or process dangerous goods must complete category-appropriate training (IATA, 2023). In the event of an incident or regulatory audit, the absence of current certification for all DG-handling staff could constitute a regulatory violation under the Indonesian Civil Aviation Authority (ICAO) standards. Therefore, it is recommended that the company establish a structured training and recertification calendar to ensure progressive IATA DGR certification of all operational staff within a defined timeline.

4.3 Work Procedures

The work procedures applied at PT. Ensatama Travelindo differentiate packaging and handling requirements across four cargo categories, with escalating levels of intervention for goods presenting higher risk or fragility.

Table 4. Work Procedure Categories at PT. Ensatama Travelindo

Cargo Category	**Primary Packaging Method**	**Additional Requirements**	**Regulatory Basis**
Documents	Plastic sleeve, sealed with tape	Complete moisture seal; no gaps permitting water ingress	Internal procedure
General goods (ordinary)	Plastic wrap or bubble wrap	Standard cushioning; no special handling	IATA AHM General Cargo
Fragile goods	Wooden outer packaging + plastic wrap / bubble wrap	Fragile sticker affixed; handling orientation marked	IATA AHM Special Cargo
Dangerous goods (DG)	Packaging per IATA DGR specification for applicable hazard class and packaging group	IATA hazard class label; UN number; SDDG; MSDS verification; quantity compliance check	IATA DGR; PM 90/2013; ICAO Annex 18

Source: Field Observation and Document Analysis, PT. Ensatama Travelindo, 2022

Table 4 shows summarizes the procedures applicable to each cargo category. The dangerous goods work procedure at PT. Ensatama Travelindo is the most procedurally complex and is broadly consistent with IATA DGR requirements. Critically, the procedure mandates that before goods are accepted for processing, their dangerous goods classification must be verified against the MSDS submitted by the shipper to avoid accidents. This pre-acceptance classification check is a key compliance control as it enables the internal operations team to identify misdeclared or under-declared dangerous goods before they are integrated into the shipment stream. If the initial classification supplied by the shipper does not correspond to the actual physical and chemical properties of the goods, re-classification and corresponding re-packaging are performed.

Field observations confirmed consistent adherence to these procedures across the observed shipments. Workers demonstrated adequate knowledge of DG classification categories, packaging group requirements, and label application protocols for the most commonly handled hazard classes —primarily Classes 3 (flammable liquids), 8 (corrosive substances), and 9 (miscellaneous dangerous goods). This finding aligns with the assertion of Hafriyani and Pinem (2022) that practical, on-the-job experience can, to a degree, compensate for the absence of formal certification, though not as a permanent substitute for regulatory compliance.

A procedural improvement opportunity was identified in the systematic documentation of internal reclas-

sification decisions. While re-packaging is performed when classification discrepancies are identified, no formal written record of the re-classification rationale was consistently maintained. The IATA DGR recommends that all DG acceptance checks be documented and retained for a minimum period to support regulatory audits and enable learning from past shipment irregularities. The implementation of a standardized DG Acceptance Check Sheet—recording the original shipper classification, the verification outcome, any re-classification decision, and the authorizing employee—would strengthen the company's compliance documentation and risk management posture.

4.4 Implementation of the Dangerous Goods Delivery Process

The end-to-end dangerous goods delivery process at PT. Ensatama Travelindo comprises three primary stages: shipper contact and booking, goods reception and processing at the office, and delivery to the cargo terminal and onward to the recipient.

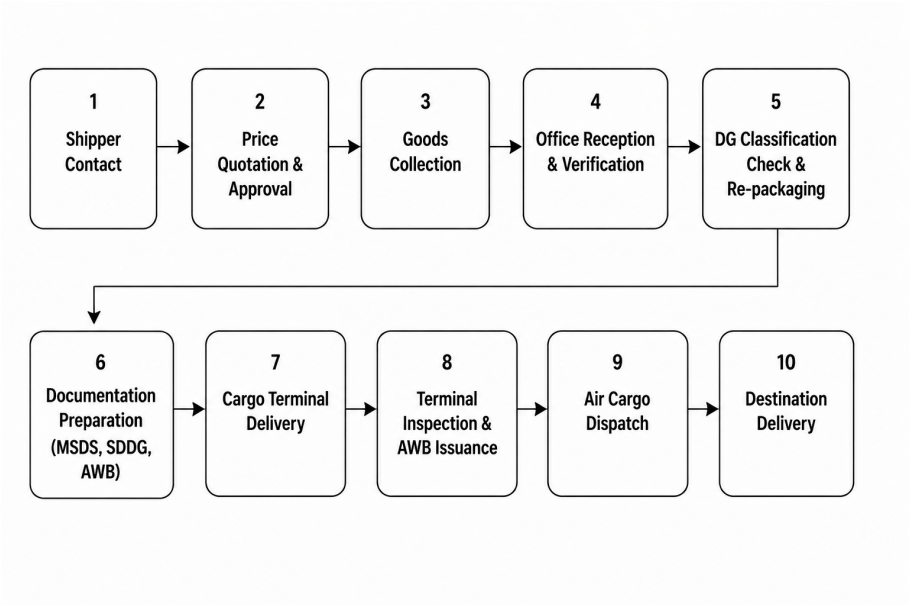

Figure 1. End-to-End Dangerous Goods Delivery Process at PT. Ensatama Travelindo

Figure 1 presents a summary of the process flow. The flowchart depicts the complete shipping process, illustrating each sequential step from shipper contact to final destination delivery, including quotation, collection, verification, classification, documentation, terminal delivery, inspection, air cargo dispatch, and destination delivery.

4.4.1 Stage 1: Shipper Contact and Booking

The process is initiated when a customer contacts the sales team to request shipping services for dangerous goods. The sales team requests the shipper to provide via email: (1) item description and classification, (2) quantity and weight, (3) dimensions, (4) destination address, and (5) the Material Safety Data Sheet (MSDS), which is a mandatory document for all dangerous goods shipments under the IATA DGR (IATA, 2023). Based on this information, a price quotation incorporating freight charges, handling surcharges, and DG fees is prepared and submitted to the shipper for approval. Upon the shipper's approval of the quotation, the external operations team is dispatched to collect the goods from the shipper's premises.

The MSDS requirement at this initial stage is a procedurally sound practice that aligns with the IATA DGR expectations (IATA, 2023). By mandating MSDS submission before goods collection, the company pre-screens the shipment for DG identity and hazard class, enabling the internal operations team to

prepare appropriate packaging materials and confirm pre-clearance requirements before the goods' physical arrival at the office. This pre-submission screening stage represents the best-practice element of the company's procedure.

4.4.2 Stage 2: Office Reception and Processing

Upon arrival of the goods at the office, the internal operations team conducts a comprehensive re-verification covering (1) weight, using a kilogram-calibrated platform scale; (2) dimensions, using a measuring tape, to confirm or recalculate chargeable weight; (3) item count and type, cross-referenced against the shipper's details; (4) destination address; and (5) DG classification, cross-referenced against the MSDS (IATA, 2023). The MSDS review at this stage is particularly critical because it enables the identification of hazardous properties that may not be apparent from physical inspection alone, including flash points, toxic concentration limits, and reactivity characteristics that determine the applicable IATA DGR hazard class, packaging group, and quantity limit.

Following verification, the goods are re-packaged in accordance with the applicable DGR specifications. For dangerous goods, this typically involves the application of a class-appropriate inner and outer packaging, cushioning materials where required, and affixing the correct IATA hazard class diamond label, subsidiary hazard label(s), and UN identification number markings (IATA, 2023). The external dimensions of the repackaged unit were measured and recorded for the AWB volumetric weight calculation. The sales team then confirms the final shipment size and revised price (if the volumetric recalculation has altered the chargeable weight) with the shipper before proceeding to the documentation preparation.

4.4.3 Stage 3: Cargo Terminal Delivery and AWB Issuance

The external operations team transports the repackaged dangerous goods consignment to the cargo terminal of the airline selected for the shipment. At the terminal, cargo handling agents conduct an independent inspection of (1) outer packaging integrity and DGR compliance, (2) correctness of hazard class labels and markings, (3) weight and dimensional accuracy as stated in the documentation, and (4) completeness of the SDDG and MSDS (IATA, 2023). If all requirements are met, the airline or its handling agent issues an Air Waybill (AWB), which constitutes the contract of carriage and the primary shipment-tracking document. A copy of the AWB is transmitted to the shipper for delivery confirmation.

Upon arrival at the destination airport, the consignment is transferred to the destination warehouse and subsequently delivered to the recipient's address by the airline or handling agent's delivery team, completing the end-to-end shipment chain (IATA, 2023). The alignment of this process with the IATA DGR end-to-end chain—shipper → freight forwarder → cargo terminal → airline → destination handling → recipient—confirms the PT. Ensatama Travelindo's operational procedure is structurally compliant with industry standards, with the infrastructural and certification gaps identified in Sections 4.1 and 4.2 representing addressable improvement priorities rather than fundamental procedural deficiencies (IATA, 2023).

5. Conclusions

This study analyzed dangerous goods delivery procedures at PT. Ensatama Travelindo using a qualitative descriptive case study design. Four main conclusions emerged. First, the company possesses adequate facilities and infrastructure, including packaging materials, measuring instruments, vehicles, and documentation capabilities, though aging computer hardware and unstable internet connectivity create operational delays that pose addressable compliance risks. Second, workforce roles across sales, administration, internal operations, and external operations are well-defined and consistently executed, demonstrating functional clarity and accountability. Third, cargo-specific packaging and documentation procedures broadly comply with IATA DGR standards, including pre-acceptance MSDS verification,

class-specific re-packaging, DG label application, and SDDG preparation; however, the absence of a standardized DG Acceptance Check Sheet represents a documentation gap with potential regulatory audit implications. Fourth, the end-to-end delivery process—from initial shipper contact through cargo terminal handover to final recipient delivery—follows a structured, multistage sequence that incorporates key compliance checkpoints mandated by IATA DGR and Indonesian aviation regulations, ensuring operational consistency and regulatory alignment.

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Author Contributions

MNN was responsible for the conceptualization of the study and interpretation of the research data. NAM was responsible for data collection, field observations, and analysis of cargo handling processes in airline operations. RFS contributed to the literature review, research methodology design, manuscript preparation, participated in reviewing and finalizing the manuscript.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this study. This research was conducted independently, and no financial or personal relationships influenced the results or interpretation of the findings.

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