Analysis Of Link And Match Between Air Traffic Controller Study Program Graduates Of Aviation Polytechnic Of Surabaya And Airnav Indonesia

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ABSTRACT
This study aims to analyze the alignment (link and match) between graduates of the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya and the demands of the Indonesian aviation industry. The research objectives are threefold: (1) to assess the relevance of graduates' competencies with industry requirements, particularly AirNav Indonesia; (2) to evaluate the suitability of establishing the program with current workforce recruitment needs; and (3) to provide strategic recommendations for improving curriculum and training alignment. A qualitative research approach was applied, focusing on a comprehensive understanding of field realities. Data were obtained through in-depth interviews with alumni, lecturers, and AirNav Indonesia representatives, complemented by observations and documentation. Data analysis followed the stages of reduction, presentation, and conclusion drawing, with triangulation employed to ensure data credibility. The findings indicate that the collaboration between Politeknik Penerbangan Surabaya and the aviation industry has not been established in a consistent and sustainable manner. The curriculum has not fully adapted to industrial developments, and supplementary training remains uneven. Furthermore, the establishment of the study program does not yet fully correspond to AirNav Indonesia's actual recruitment needs. Strengthening partnerships and curriculum adaptation are necessary to enhance graduates' relevance and competitiveness in the aviation sector.

Keywords: *Link and Match, Air Traffic Management, AirNav Indonesia, Aviation Education.*

1. INTRODUCTION

In the complex and high-risk ecosystem of the aviation industry, safety, order, and efficiency of air traffic movement are fundamental pillars that cannot be compromised. At the heart of operations that ensure these three pillars stand firm is the profession of the Air Traffic Controller (ATC). ATC personnel are responsible for regulating and monitoring aircraft movements on the ground and in the air, issuing clearances, instructions, and information to pilots in order to prevent collisions and facilitate the smooth flow of air traffic. Given such immense responsibility, the competence of an ATC is a key determinant in the aviation safety chain.

In Indonesia, the provision of air navigation services is monopolized by a single state-owned enterprise, namely the Public Corporation for the Provision of Air Navigation Services in Indonesia (Perum LPPNPI), better known as AirNav Indonesia. As the sole Air Navigation Service Provider (ANSP), AirNav Indonesia carries the mission of providing air traffic services that are safe, reliable, and environmentally friendly, with the vision of becoming the best air navigation service provider in Southeast Asia. Thus, AirNav Indonesia stands as the primary user and the most crucial stakeholder for ATC human resources throughout Indonesian airspace.

To meet the demand for such highly specialized human resources, the government, through the Ministry of Transportation, organizes higher vocational education in the field of aviation. One of the main institutions is the Surabaya Aviation Polytechnic (Poltekbang Surabaya), an official educational institution tasked with preparing competent human resources for the air transport industry (Sunarno et al., 2020). Poltekbang Surabaya, along with other aviation polytechnics, serves as the primary supplier of prospective aviation professionals, including ATC personnel, whose graduates are consistently absorbed by industry leaders such as AirNav Indonesia, airlines, and airport operators. The high absorption rate of graduates indicates a very close and interdependent relationship between educational institutions and the industry.

This relationship is not merely transactional between supplier and user, but rather a symbiosis of imperative nature. AirNav Indonesia heavily relies on the steady supply of qualified and job-ready graduates from Poltekbang Surabaya to maintain its service continuity and quality. Conversely, the relevance and reputation of Poltekbang Surabaya as an educational institution are determined by its ability to produce graduates whose competencies align with and can be directly integrated into AirNav Indonesia's operations. A failure on the part of Poltekbang Surabaya to deliver competent graduates would not only pose an academic

issue but also a direct strategic risk to AirNav Indonesia's operations, and ultimately, to national aviation safety. These consequences elevate the analysis of alignment between the two entities from merely an evaluation of educational quality to a matter that concerns both economic infrastructure and national security.

The aviation industry is one of the most dynamic and complex sectors in the era of globalization. The continuous growth of air passenger traffic each year, coupled with advancements in communication, navigation, and surveillance systems, makes this industry highly dependent on the presence of competent professionals. In the context of air traffic management, the role of air traffic controllers is particularly crucial, as it is directly related to ensuring the safety and efficiency of flight operations. In Indonesia, AirNav Indonesia, as a state-owned enterprise, holds a vital responsibility in providing air navigation services throughout the country's airspace. The institution ensures that both domestic and international flights operate safely, efficiently, and in compliance with international standards. Consequently, the performance of AirNav Indonesia is significantly influenced by the quality of its human resources, particularly in the field of air traffic services. To meet these demands, the role of aviation vocational higher education institutions, such as Politeknik Penerbangan Surabaya, is essential. As an institution dedicated to preparing professional human resources in the aviation sector, Politeknik Penerbangan Surabaya carries the responsibility of producing graduates who are job-ready, equipped not only with technical competencies but also with the mental readiness to handle dynamic and high-pressure work environments. In the context of vocational education policy in Indonesia, the concept of "link and match" has become one of the key strategies to bridge the gap between education and industry. This concept emphasizes the importance of aligning the learning outcomes of higher education with the actual requirements of the labor market. In this way, graduates are expected to adapt quickly and contribute effectively once they enter the professional world. However, in practice, a mismatch often occurs between what is taught in classrooms and the real demands of the workplace. Many graduates face challenges such as limited practical skills, difficulties in adapting to the latest technologies, and insufficient proficiency in English, which is an international standard in the aviation industry. These conditions affect the absorption rate of graduates into the workforce, including within AirNav Indonesia. Therefore, it is necessary to conduct an in-depth analysis of the extent to which the Air Traffic Management Study Program of Politeknik Penerbangan Surabaya prepares its graduates in accordance with the competency standards required by AirNav Indonesia. Such analysis is expected to provide clearer insights into aspects that are already aligned as well as those that need further improvement. Moreover, the findings of this study are expected to serve as a basis for curriculum development, enhancement of learning quality, and the strengthening of partnerships between higher education institutions and the aviation industry.

2. LITERATURE REVIEW

2.1 Supporting Theories

2.1.1 Definition and Legal Basis

The concept of link and match is an approach aimed at aligning education with industry needs so that graduates' competencies meet labor market demands. This approach is carried out through partnerships between educational institutions and industries, for example through curriculum revisions that are relevant to workplace requirements. Legally, Law No. 13 of 2003 on Manpower emphasizes that education and training programs must meet labor market needs, requiring each study program to produce graduates who are work-ready in accordance with industry demands (Nizam, 2023). Several scholars provide different perspectives on link and match. Highlights the importance of integrating theory and practice while also developing soft skills such as discipline, teamwork, and communication to prepare graduates for industry challenges (Darmono, 2012). On the other hand, views link and match from a structural perspective, arguing that the education system must remain flexible in adapting to technological advancements and labor market dynamics (Tilaar, 2002). This is particularly crucial in the aviation industry, which relies heavily on technological innovation and demands high adaptability. Global perspectives also reinforce this concept. Asserts that work-based learning is one of the most effective ways to align education with labor market needs by combining theory with real-world experience (UNESCO, 2015). In aviation, this includes mastering technical skills, operating navigation equipment, managing safety in control towers, and developing the capacity to compete internationally. Thus, the theory of link and match essentially emphasizes the relevance of education to industry needs through collaboration, industry-based curriculum development, and the provision of hands-on learning opportunities to enhance graduate competitiveness.

2.1.2 The Importance of Link and Match

The implementation of the link and match concept plays a crucial role in ensuring that the world of education remains in line with the actual needs of industry, particularly in the aviation sector where safety, precision, and professionalism are highly demanded.

Without this alignment, the competencies developed in educational institutions risk becoming irrelevant to the expectations and standards required in the field. One concrete example of this problem is reflected in the temporary halt of recruitment carried out by AirNav Indonesia, which indicates the absence of a thorough workforce needs analysis. This situation shows that the application of link and match is still relatively weak, and the direct consequence is the low absorption rate of graduates in the job market. When industries temporarily stop hiring, while educational institutions continue to produce graduates, the imbalance creates a mismatch between supply and demand in the aviation workforce.

To overcome this challenge, the proper application of the link and match principle must become a strategic priority in higher education institutions. By collaborating intensively with industry players, campuses can design and implement curricula that are more industry-based, practical, and responsive to dynamic changes in aviation operations. Such collaboration not only ensures that students acquire the theoretical foundation but also equips them with the practical skills demanded in the field. Consequently, graduates will possess competencies that are in line with industry standards, making them more competitive and easily absorbed into the workforce. In the long run, this approach will enhance the reputation of higher education institutions, while at the same time opening up wider employment opportunities for alumni, thereby contributing to the overall improvement of human resource quality in the aviation sector.

The implementation of the link and match concept is crucial to ensure alignment between education and industry needs, particularly in the aviation sector. The lack of workforce needs analysis, as illustrated by the temporary halt in AirNav Indonesia's recruitment, reflects weak application of this principle and leads to low graduate absorption. By applying link and match, higher education institutions can design industry-based curricula, produce competent graduates, and enhance employment opportunities for alumni.

2.1.3 Concept and Spectrum of Link and Match

Link and match emphasizes the alignment between education and industry through competency standards, training, and certification (Kemnaker, 2021). Its implementation includes competency-based curriculum development, internship programs, and continuous evaluation. In the case of Politeknik Penerbangan Surabaya, the establishment of the Air Traffic Management Study Program without considering AirNav Indonesia's recruitment policies reflects suboptimal application of this principle. The spectrum of link and match covers labor market needs analysis, collaborative training, and competency certification, all of which require data-driven planning and close coordination with industry to ensure effective graduate absorption.

2.1.4 Link and Match Strategies

Five key requirements are essential for the effective implementation of link and match: joint curriculum development updated annually with industry, the involvement of industry practitioners as guest lecturers, internship programs lasting at least one semester, competency certification systems, and industry commitment to graduate recruitment, including the adoption of the Teaching Factory model (Sakarinto, 2020). In the context of Politeknik Penerbangan Surabaya, these strategies can be applied through intensive communication with AirNav Indonesia, regular curriculum evaluation in line with industry standards, and the use of labor market data to design relevant study programs. Such measures are expected to improve graduate employability and ensure that vocational education remains aligned with the needs of the aviation industry.

2.1.5 The Role of Politeknik Penerbangan Surabaya in Developing Link and Match

Politeknik Penerbangan Surabaya plays a pivotal role in bridging vocational education with the dynamic needs of the aviation industry, particularly in addressing the relatively low absorption rate of graduates from the Air Traffic Management (ATM) study program. As a higher education institution dedicated to aviation, it is responsible not only for equipping students with theoretical knowledge but also for ensuring that their skills and competencies are aligned with operational requirements in the workplace. One of the primary strategies is to conduct comprehensive workforce mapping in collaboration with stakeholders such as AirNav Indonesia, allowing the institution to adjust the number of graduates to the actual demand for air traffic controllers in the industry. This alignment minimizes the risk of producing graduates whose qualifications do not meet available opportunities.

To further enhance graduate competencies, Politeknik Penerbangan Surabaya integrates professional certification programs into its curriculum. These certifications serve as additional credentials that strengthen graduates' employability and demonstrate their readiness to meet industry standards. Beyond this, the institution also develops supplementary training modules that focus on advanced operational skills, language proficiency, and human factors, all of which are critical in aviation services. Such initiatives are designed to reduce the gap between academic preparation and industry expectations, ensuring that

graduates are not only academically competent but also industry-ready.

Another significant measure undertaken by Politeknik Penerbangan Surabaya is the implementation of continuous evaluation through tracer studies. By tracking graduate outcomes and identifying challenges faced in the workplace, the institution can refine its educational programs to better meet industry requirements. This evidence-based approach enables curriculum adjustments, targeted skill development, and the establishment of stronger partnerships with aviation stakeholders. In addition, the institution invests in modern facilities, including advanced technology-based simulators, which provide students with practical exposure and realistic training environments. These facilities ensure that graduates are familiar with the operational complexities of air traffic management before entering the workforce.

Through these comprehensive efforts, Politeknik Penerbangan Surabaya demonstrates its commitment to strengthening the concept of link and match within vocational education. By combining curriculum innovation, industry collaboration, certification, and practical training, the institution not only improves graduate employability but also contributes to the broader mission of enhancing aviation safety and efficiency in Indonesia. Ultimately, these strategies highlight the critical role of Politeknik Penerbangan Surabaya as a driver of sustainable workforce development in the aviation sector, ensuring that its graduates remain competitive at both national and international levels.

2.2. Relevant Previous Studies

Several previous studies have highlighted the close connection between the issue of link and match in the Air Traffic Management (ATM) Study Program at Politeknik Penerbangan Surabaya and vocational aviation education in general. The first study, entitled Analysis of the Impact of Low Absorption of ATM Graduates on Their Social Conditions at Politeknik Penerbangan Surabaya, discusses the social consequences of low graduate absorption, including psychological pressure, unemployment, and career shifts. This study shares similarities with the present research as it also addresses the low absorption of ATM graduates, although it places greater emphasis on the social impacts experienced by alumni.

Examined efforts to improve the competitiveness of Air Traffic Control (ATC) graduates through human factors training (Supriyanto et al., 2021). Their findings show that such training strengthens communication, decision-making, and risk management skills. The relevance to the current study lies in the shared focus on education and training as a means of ensuring graduates' competencies meet industry standards. However, Supriyanto et al. place more emphasis on strengthening competencies specifically through human factors.

Explored the effectiveness of link and match policies in vocational education, highlighting the role of industry-based curricula, internship programs, competency certification, and collaboration with industry in enhancing graduate readiness (Ningrum, 2025). This study aligns with the current research as it also examines the alignment between vocational education and industry demands, though it takes a broader approach by covering various industries rather than focusing solely on aviation.

Another relevant source is an article published by BPPMPV KPTK (Ministry of Education and Culture), which emphasizes the mismatch between vocational education and national industry needs. The article recommends systemic solutions such as joint curriculum development, competency certification, and industrial practice. Its similarity to this study lies in the focus on link and match as a solution to bridge competency gaps, though the scope of the article is broader, addressing national and cross-sector challenges rather than the aviation sector specifically.

In their study on vocational aviation education, highlight institutional challenges, particularly the lack of adequate facilities and qualified teaching staff (Kurniawan et al., 2019). They stress the importance of strengthening cooperation with the aviation industry to ensure graduates meet global work standards. The relevance to the present study lies in the emphasis on collaboration between vocational education and industry, although Kurniawan et al. focus more on improving infrastructure and teaching quality.

3. METHODOLOGY

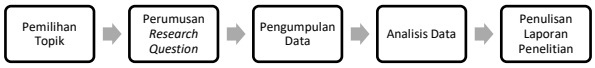
Scalar Research methodology consists of two main terms, namely method and research. The word method derives from the Greek methodos, which combines meta, meaning "towards" or "beyond," and hodos, meaning "path" or "way" (Ningrum, 2025). In essence, a method can be understood as a systematic procedure designed to achieve specific objectives, solve problems, or generate new information. Meanwhile, research is defined by the Indonesian Dictionary (KBBI) as a systematic and objective process of collecting, processing, analyzing, and presenting data to develop general principles or discover new theories to address a problem. Research may also be described as a structured effort to gather and present information, aligning view that research is a structured process for obtaining data and presenting its results (Sugiyono, 2022).

According to (Sugiyono, 2017), qualitative research is a methodology applied to investigate natural conditions, in which the researcher acts as the primary instrument. Data collection is conducted using triangulation techniques, the analysis follows an inductive approach, and the results emphasize meaning rather than generalization. From these perspectives, research methodology can be concluded as the set of techniques and processes employed to identify, collect, and analyze information to derive valid conclusions.

In this study, a qualitative approach was chosen because it allows for a more in-depth exploration of data through literature reviews, interviews with relevant stakeholders, and thematic analysis of the collected data. This approach aims to identify gaps between education and industry requirements and to provide strategic recommendations for aligning academic programs with labor market demands. Ultimately, such an approach is expected to enhance the employability and competitiveness of graduates within the aviation industry.

3.1 Research Design

Figure 3. 1 Research Design



According to (Kharinal, 2016), a research design can be defined as a framework that outlines the plan and structure of an investigation, systematically arranged to enable researchers to obtain answers to their research questions. It functions as a comprehensive scheme encompassing the entire research program, including the choice of method, the research subjects, as well as strategies for data collection and analysis (Nurdianawati, 2021). This study adopts a qualitative research method, as this approach is considered most appropriate for gaining in-depth insights into the relationship between graduates of the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya and the demands of the aviation industry.

The qualitative method was chosen because it allows for detailed exploration through descriptive interpretations rather than numerical data. Using this approach, the researcher can investigate the perspectives and experiences of relevant stakeholders, such as alumni, academic staff, and aviation industry practitioners. The collected data were analyzed thematically to identify recurring patterns, themes, and connections. In-depth interviews served as the primary technique for exploring key issues, including the relevance of graduates' skills to job requirements, the effectiveness of collaboration between educational institutions and industry, and industry expectations regarding graduate quality. Through this design, the study aims to provide a comprehensive understanding of existing gaps while offering strategic recommendations for aligning educational outcomes with labor market needs.

3.2 Population, Sample, and Research Object

In research, the population is defined as the overall generalization area consisting of objects or subjects with specific characteristics determined by the researcher to be studied in order to draw conclusions (Sugiyono, 2019). The population in this study consists of seven individuals representing different groups, including cadets from the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya, alumni of the program, and representatives from the Indonesian aviation industry.

The sample is a subset of the population that carries the same characteristics as the entire population (Sugiyono, 2019). In this study, the sample also comprises seven participants, purposively selected from cadets, alumni, and aviation industry practitioners. This selection ensures that the data collected can provide a representative overview of the alignment between educational outcomes and industry needs.

Meanwhile, the research object, as explained by (Sugiyono, 2022) refers to the scientific target established to obtain data with specific objectives, which must be objective, valid, and reliable. The object of this study focuses on the alignment between graduates of the Air Traffic Management Study Program and the requirements of the Indonesian aviation industry. This focus is crucial in assessing the extent to which vocational higher education has succeeded in preparing graduates to be readily absorbed into the workforce.

3.3 Data Collection Techniques and Research Instruments

Data collection is a crucial stage in research, as the primary objective of any study is to obtain relevant and valid data (Sugiyono, 2019). This process can be carried out across different settings, from multiple sources, and through various methods depending on the research objectives. In this study, data collection techniques were specifically designed to provide in-depth insights into the alignment between the competencies of graduates from the Air Traffic

Management Study Program at Politeknik Penerbangan Surabaya and the demands of the aviation industry. The main techniques employed include interviews, observation, and documentation.

In-depth interviews were conducted with several stakeholders, including program administrators, active cadets, alumni currently working in the aviation sector, and representatives from AirNav Indonesia. This method allowed the researcher to explore the relevance of the academic curriculum to industry requirements, the rationale behind the establishment of the study program, and industry perceptions of graduate quality. Furthermore, the interviews provided opportunities to examine how the program adapts to evolving labor market needs and expectations.

Observation was also employed as a significant technique in this study. Observation is defined as a systematic, logical, and objective process of monitoring real-world phenomena (Zainul & Uswatun, 2020). Through direct observation, the researcher assessed the extent to which the Air Traffic Management curriculum aligns with actual industry requirements, while also identifying challenges in graduate employability. The observations focused not only on technical competencies but also on the effectiveness of institutional-industry collaboration, recruitment strategies, and the social implications for graduates facing limited employment opportunities.

To complement these methods, documentation was used as a supporting technique. Documentation refers to the systematic process of collecting, analyzing, and utilizing documents to obtain accurate information (M., 2022). The reviewed documents included curriculum materials, graduate statistics, employment absorption rates, and institutional policies. Such data served as an evaluation tool for program policies, a means to identify competency gaps, and a basis for curriculum improvements to better meet industry standards.

The research instruments consisted of three main components. First, observation sheets were used to evaluate curriculum implementation, industry collaboration, and program success in preparing graduates. Second, semi-structured interview guidelines were employed with cadets, alumni, lecturers, and AirNav representatives to gather data on experiences, perceptions, and related policies. Third, documentation instruments were applied to analyze archives, academic records, and policy reports to strengthen research findings. By combining these instruments, the study aims to provide a comprehensive picture of how well graduate competencies align with the needs of the aviation industry.

3.4 Data Validation

According to (Sugiyono, 2017), testing the validity of data refers to the process of assessing the degree of trustworthiness of the information obtained in a study to ensure that it is accurate and reliable. Validating data is an essential step to guarantee that research findings truly reflect real conditions in the field and are free from distortion or bias.

Credibility testing was carried out through triangulation, which involves comparing and integrating data obtained from multiple sources, methods, and theoretical perspectives, complemented by discussions with experts in both education and the aviation sector. Additionally, a member-checking approach was applied by reconfirming interview and observation results with respondents to ensure the accuracy and consistency of the collected information.

Transferability testing was achieved by presenting the research findings in a detailed and contextual manner, enabling the results to be applicable to similar conditions in other institutions or within the aviation sector more broadly. By providing comprehensive and contextualized data, the study's outcomes can serve as a reference beyond the immediate research setting.

Dependability testing was implemented through the use of an audit trail, which systematically documents each stage of the research process. This approach ensures that the steps taken can be retraced and replicated by other researchers, thereby strengthening the reliability and consistency of the study.

Finally, confirmability testing was conducted to ensure that the findings are genuinely derived from objective field data rather than being influenced by the researcher's personal bias or subjective interpretations. This was achieved by maintaining transparent records and inviting independent reviewers, who were not directly involved in the study, to re-examine the findings. Such measures enhance the objectivity and credibility of the research outcomes.

3.5 Data Analysis Technique

This study employs a qualitative approach to explore in depth the alignment between graduates of the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya and the workforce demands of the Indonesian aviation industry. The data analysis process follows the stages outlined by Miles and Huberman, as cited in (Sugiyono, 2022).

The first stage is data collection, which involves the use of multiple techniques such as observation, in-depth interviews, and documentation, often conducted through a triangulation approach. This process typically requires a considerable amount of time, ranging from several days to several months, allowing the researcher to

obtain data that is rich, detailed, and meaningful. During this phase, the researcher carries out comprehensive exploration of the research setting and records every observation and statement in detail to gather diverse information.

The second stage is data reduction, where the researcher filters, summarizes, and selects the most relevant pieces of information related to the study's focus. At this stage, the data begins to be organized by highlighting key aspects, while patterns and emerging themes are identified. Data reduction provides a structured overview that not only simplifies the subsequent analysis process but also facilitates further data collection if required.

The next stage is data display. In qualitative research, data are most commonly presented in the form of descriptive narratives, though they may also be complemented with diagrams, tables, flowcharts, or inter-category relationships. Miles and Huberman (1984) emphasize that narrative text is the most widely used method for presenting qualitative data, as it offers clarity and supports deeper analytical interpretation.

The final stage is verification and conclusion drawing. At this point, the researcher develops interpretations based on the data obtained. However, early conclusions are tentative and remain subject to change if not sufficiently supported by evidence. As additional, consistent, and valid data are gathered from the field, these preliminary conclusions become stronger and more reliable, ultimately reaching a level of credibility. Thus, qualitative data analysis is a continuous and iterative process involving collection, reduction, display, and verification to generate findings that are valid and trustworthy.

3.6 Research Procedure

The research procedure was carried out in three main stages: pre-research, implementation, and data analysis.

In the pre-research stage, the researcher identified the central problem, namely the establishment of the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya without fully considering the workforce requirements of AirNav Indonesia. To strengthen the foundation of the study, a literature review was conducted using various academic sources and official documents to collect secondary data. During this phase, the research objectives were formulated, a conceptual framework was developed, and research instruments such as interview guidelines were prepared. In addition, logistical planning was carried out to ensure the smooth execution of the research process.

The implementation stage focused on collecting primary data through interviews with key stakeholders, including representatives from AirNav Indonesia, active cadets, and alumni. Field observations were also conducted to examine recruitment patterns in the aviation sector. Secondary data were gathered from official documents, such as annual reports and institutional policies. To ensure reliability and validity, triangulation techniques were applied by cross-checking information obtained from different sources and methods.

The final stage was data analysis, in which all collected information was processed, categorized, and organized according to relevant themes, such as AirNav's workforce needs and the number of graduates from the Air Traffic Management Study Program. This analytical process provided a more structured understanding of the alignment between education outcomes and industry requirements. The results not only highlighted the existing gaps but also offered strategic recommendations to refine the curriculum and enhance the program's relevance to the demands of the Indonesian aviation sector.

4. RESULTS AND DISCUSSION

4.1 Research Results

This study was conducted using a qualitative approach through in-depth interviews, direct observations, and documentation reviews involving various stakeholders, including cadets of the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya, alumni, and representatives from the aviation industry, particularly AirNav Indonesia. The collected data, when analyzed in relation to the research questions and theoretical framework, revealed several challenges regarding the alignment between graduates of the program and the actual workforce needs of the aviation sector. According to AirNav Indonesia's official report, the company currently employs 1,659 air traffic controllers (ATCs) but still faces a significant shortage, with an estimated need for an additional 2,000 personnel. A tracer study covering the last five cohorts (classes 8–12) shows that out of 160 graduates, only 57 have been employed by AirNav Indonesia, while 103 remain unabsorbed by the aviation industry.

These findings highlight a mismatch between the number of graduates produced by Politeknik Penerbangan Surabaya and the hiring capacity of AirNav Indonesia. Despite the ongoing demand for ATC personnel, the absorption rate of Air Traffic Management graduates remains relatively low. This situation indicates that the establishment of the study program has not been fully aligned with real workforce projections. The problem is likely rooted in limited coordination between the educational institution and the

industry, particularly in areas such as workforce planning, student admission quotas, and systematic graduate placement. Therefore, comprehensive evaluation and continuous collaboration between Poltekbang Surabaya and AirNav Indonesia are essential to ensure a balance between the number of graduates and available employment opportunities.

4.2 Discussion

Based on the findings obtained through observations, interviews,document analysis during the research process, several critical issues were identified concerning the alignment between graduates of the Air Traffic Management (LLU) Study Program at Surabaya Aviation Polytechnic and the actual demands of the aviation industry in Indonesia. These issues not only affect the readiness of graduates to enter the workforce but also raise concerns about the effectiveness of the educational program in producing human resources that meet industry standards.

First, the link and match analysis revealed that the connection between LLU graduates and industry needs, particularly with AirNav Indonesia, has not been fully optimized. Tracer study results from the past five cohorts indicated that out of 160 graduates, only 57 (35.6%) were successfully recruited by AirNav, while 103 (64.4%) remained unemployed in their field. Interviews with alumni, current cadets, and industry representatives highlighted that while graduates possess adequate fundamental competencies, there are still gaps in practical application, especially in simulator usage and the adoption of updated operational procedures. Industry representatives also emphasized the need to strengthen soft skills, communication abilities, and additional competencies such as ACS and APS. This shows the necessity of updating the curriculum, reinforcing collaboration, and improving the tracer study system to better prepare graduates for employment.

Second, regarding cooperation between Surabaya Aviation Polytechnic and AirNav Indonesia, the findings revealed that the partnership is still fragmented and lacks sustainability. Although internship and industrial practice programs exist, they are not yet strategically positioned as formal employment pathways. The absence of a long-term formal agreement also limits guaranteed recruitment quotas. Furthermore, job information is often circulated informally among alumni or cadets rather than through an official campus system. This condition illustrates the weak structure of the link and match implementation, which should ideally be reinforced through formal cooperation agreements, joint curriculum development, and structured recruitment processes. In line with the Link and Match 8+i framework established by the Directorate General of Vocational Education (2020), strategic steps such as MoU signing, industry-based curriculum design, and joint recruitment are essential to strengthen educational-industry synergy.

Third, the intake of cadets in the LLU Study Program has not yet been fully adjusted to the workforce needs of AirNav Indonesia. The tracer study indicated a mismatch: from 160 graduates, only 57 were absorbed, while AirNav still requires approximately 2,000 ATC personnel, with its current workforce standing at 1,659. Interviews with stakeholders revealed that the demand for personnel at AirNav is highly fluctuating and depends on internal corporate policies. For example, during the COVID-19 pandemic, recruitment was suspended, leaving many graduates without opportunities to enter the profession. Consequently, several graduates had to pursue alternative careers or wait for new job openings. This reflects a broader misalignment between the output of educational institutions and the industry's recruitment capacity. As Triyanto (2020) asserted, vocational education often operates independently without considering the dynamics of industry needs, which results in graduates struggling to be absorbed into the labor market. Therefore, periodic evaluations, adjustment of student intake quotas, and stronger coordination with AirNav Indonesia are crucial to ensure that the establishment of the study program truly addresses the labor market requirements of the aviation sector.

5. CONCLUSION

Based on the findings obtained through observation, interviews, and document analysis, and when aligned with the research problems and theoretical foundation, it can be concluded that the alignment between graduates of the Air Traffic Management Study Program at Politeknik Penerbangan Surabaya and the workforce requirements of the aviation industry in Indonesia has not yet been fully realized. The results show that the absorption rate of graduates into the workforce, particularly in AirNav Indonesia, remains relatively low, and there is still a gap between the academic learning process on campus and the operational practices required in the aviation sector.

Furthermore, the collaboration between Politeknik Penerbangan Surabaya and AirNav Indonesia has not been implemented in a systematic and sustainable manner. Although internship programs and certain training initiatives exist, there is still no formal framework that guarantees a structured and continuous pathway for graduate placement in the industry. This issue is also compounded by the limited availability of official information channels regarding job

opportunities and the uneven provision of additional training or certifications that meet industry demands.

In addition, the recruitment policy for new cadets in the Air Traffic Management Study Program has not been fully adjusted to reflect the fluctuating workforce needs of the aviation sector. The imbalance between the number of graduates produced and the recruitment capacity of AirNav Indonesia has resulted in many graduates working outside their area of specialization. Therefore, a comprehensive evaluation of the vocational education system is required, alongside the establishment of stronger formal partnerships with the industry and better alignment of student intake with actual job opportunities. These measures are expected to ensure that the study program remains relevant, sustainable, and capable of effectively addressing the needs of the national aviation industry.

6.SUGGESTION

As a follow-up to the issues identified in this research, the following suggestions can be considered by the Surabaya Aviation Polytechnic and the aviation industry (AirNav):

1. Establishment of a Specialized Unit for Industry Partnership and Career Development:

   The Surabaya Aviation Polytechnic needs to establish a dedicated unit that is specifically responsible for managing industry partnerships and overseeing the career development of its cadets. The existence of such a unit is important because the aviation sector requires strong collaboration between educational institutions and professional organizations to ensure that the competencies developed on campus truly reflect the operational realities in the field. By having a specialized body, the Polytechnic can systematically map industry needs, identify gaps in graduate competencies, and design programs that are more responsive to the challenges faced by aviation service providers. This initiative will not only strengthen the institution's role as a provider of quality human resources but also create a structured mechanism for aligning educational outcomes with the dynamic demands of the aviation industry.

   Furthermore, the primary task of this unit would be to establish and maintain formal cooperation with key institutions such as AirNav Indonesia, airlines, and airport operators. Through such collaborations, cadets will have greater opportunities to gain practical exposure, such as internships, on-the-job training, and applied research projects that directly address industry problems. These experiences will provide cadets with valuable insights, strengthen their professional competencies, and prepare them to transition smoothly into the workforce after graduation. At the same time, industry partners will also benefit from receiving a steady supply of well-trained and competent graduates who are ready to contribute from day one. In the long term, this collaborative framework will foster mutual benefits, enhance graduate absorption rates, and elevate the reputation of the Surabaya Aviation Polytechnic as a center of excellence in aviation education.
2. Curriculum Enhancement and Strengthening of Practical Training:

   It is recommended that the Surabaya Aviation Polytechnic carry out regular reviews and adjustments to its curriculum in order to ensure that the learning materials and teaching methods remain relevant to technological developments as well as the evolving needs of the aviation industry. The aviation sector is a field that is constantly influenced by rapid changes, such as the introduction of new navigation systems, the application of digital technologies in air traffic management, and the increasingly complex operational standards applied internationally. Without periodic curriculum updates, there is a significant risk that cadets will graduate with knowledge and skills that no longer align with industry expectations. Therefore, systematic evaluation and curriculum development must be considered as a continuous process, guided by input from industry stakeholders, regulatory bodies, and technological advancements.

   In addition to curriculum updates, the Polytechnic also needs to improve the use of advanced simulators and implement operational procedures that closely reflect real-world conditions in the aviation industry. By providing cadets with access to state-of-the-art simulation technology, they can practice scenarios that are highly relevant to actual air traffic control environments, thus sharpening their decision-making skills, technical competencies, and ability to respond to emergencies. The integration of realistic procedures into training not only strengthens practical experience but also reduces the gap between theoretical learning and professional practice. Ultimately, this approach will better prepare cadets to enter the workforce with confidence, while at the same time enhancing the institution's reputation as a producer of highly competent aviation professionals who are ready to face global challenges.
3. Development of Formal Collaboration with the Industry

   The institution needs to establish formal and sustainable partnerships with aviation industry stakeholders such as AirNav Indonesia and airport operators. This collaboration can take the form of memoranda of understanding, integrated training programs, and cooperation in workforce recruitment. Such efforts are important to bridge graduates into the workforce more effectively. The target should be at least two formal

collaborations (MoUs or direct recruitment) with aviation institutions each year.

4. Improvement of Career Information Systems and Alumni Tracking

   With the support of campus human resources, alumni who already work in the industry, and information technology, a web-based internal career information and alumni tracking system (tracer study) can be developed within one academic year. Surabaya Aviation Polytechnic should develop a more organized and equitable job vacancy information system for all cadets and alumni. In addition, conducting tracer studies on a regular basis is necessary so that the campus has updated data on the employment positions of its graduates, which can then be used to evaluate and improve educational programs more accurately.

5. Synchronization of Graduate Numbers with Industry Absorption Capacity

   Strengthening connectivity between the campus and the industry will directly impact graduate employability and curriculum refinement to meet the demands and developments of the aviation industry. Closer coordination between the campus and industry is needed to obtain accurate labor demand projections. This information should serve as the basis for determining the intake of new cadets, in order to prevent an oversupply of graduates compared to the industry's capacity.

6. Implementation and Evaluation of Link and Match Programs

   All link and match strengthening programs are recommended to begin in the next academic year (2025/2026), with periodic evaluations every 6 months and progress reports at the end of each semester.

7. Enhancement of Soft Skills and Professional Ethics of Cadets

   Education should not only focus on technical aspects but must also equip cadets with soft skills such as communication, teamwork, and work ethics. This will produce graduates who are more competitive and adaptable to the professional work environment within the aviation industry.

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