

The Influence of Compensation and Education Level on Air Traffic Controllers' Performance at Jakarta Air Traffic Service Center (Perum LPPNPI)

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Abstract

This study aims to analyze the influence of compensation and educational level on the performance of air traffic controllers at Perum LPPNPI Jakarta Air Traffic Service Center. The performance of air traffic controllers plays a crucial role in maintaining aviation safety and operational efficiency; therefore, enhancing human resource quality is essential. The research employed a quantitative method with a survey approach involving 40 respondents from a total population of 400 employees. The independent variables consist of compensation (financial and non-financial) and educational level (education level, field relevance, and competence), while the dependent variable is performance, measured through quantity, quality, and punctuality indicators. The findings reveal that both compensation and educational level have a positive and significant effect on air traffic controllers' performance, either partially or simultaneously. These results emphasize the importance of fair compensation and continuous educational and training development to improve employee performance. In conclusion, enhancing welfare and educational competence among air traffic controllers serves as an effective strategy to strengthen professionalism and aviation safety in Indonesia.

Keywords: Compensation, Education, Performance, Air Traffic Controller, Human Resources

INTRODUCTION

A company requires various elements such as machinery, human resources, and capital to operate effectively in achieving its objectives. Among these elements, human resources (HR) play a crucial role in determining the efficiency and effectiveness of an organization. Effective human resource management enables the company to allocate its workforce appropriately, define its objectives, design and produce goods and services, and ensure quality control. As Rivai (2011) stated, "Employees contribute to the company's progress through quality performance, while companies reward employees with compensation that reflects their achievements."

Compensation serves as one of the fundamental functions of human resource management, acting as a means to attract, retain, and motivate competent employees. Fair and adequate compensation both financial and non-financial can increase employees' job satisfaction and loyalty. Financial compensation includes direct and indirect payments such as wages, bonuses, and benefits, while non-financial compensation may consist of recognition, appreciation, and opportunities for personal growth. A well-balanced compensation system contributes significantly to productivity and organizational success.

Education, on the other hand, equips employees with the necessary knowledge, skills, and cognitive abilities to perform their duties effectively. As education level increases, employees' productivity, creativity, and problem-solving abilities are also enhanced. Abdullah (2012) emphasized that employee performance is influenced by various factors, including compensation and educational background.

At Perum LPPNPI (AirNav Indonesia) particularly at the Jakarta Air Traffic Service Center (JATSC) air traffic controllers play a critical role in maintaining aviation safety and efficiency, especially given Indonesia's dense airspace. However, their performance is shaped by internal factors such as compensation and education level. A study by Monica Marsella (2016) demonstrated that compensation has a significant positive impact on employee performance,

while Mufidah (2017) found that education and competency levels are equally influential in improving work outcomes.

Based on JATSC's 2025 employee data, most air traffic controllers hold a Diploma (D3) degree (52.25%), indicating a need for continuous education and advanced training programs to maintain high performance standards. Comparative studies from countries such as Singapore and Australia show that investment in education and competitive compensation systems contribute to improved performance and aviation safety.

Thus, this research seeks to analyze how compensation and educational level affect the performance of air traffic controllers at Perum LPPNPI Jakarta Air Traffic Service Center. The findings are expected to assist management in designing fair compensation systems and education development programs to enhance workforce performance and maintain operational excellence.

RESEARCH METHODS

The operational objectives of this research are directed toward understanding and improving the performance of air traffic controllers at Perum LPPNPI Jakarta Air Traffic Service Center through a quantitative analytical approach. Specifically, this study seeks to examine how compensation influences employee performance by assessing both financial and non-financial reward systems within the organization. Furthermore, it aims to analyze how education level affects the overall performance of air traffic controllers, considering factors such as educational attainment, field relevance, and competency. Beyond these analytical purposes, the research also intends to provide valuable managerial insights for Perum LPPNPI particularly for the Jakarta Air Traffic Service Center in designing more effective compensation schemes and educational development programs. The ultimate goal is to enhance employee performance, strengthen organizational efficiency, and ensure the delivery of high-quality air traffic services that align with the institution's operational standards and safety objectives.

Population and Sample

According to Sugiyono (2016), population refers to a generalization area consisting of objects or subjects with certain characteristics determined by the researcher. The population in this study consists of 400 air traffic controllers at Perum LPPNPI Jakarta Air Traffic Service Center as of July 31, 2025.

Based on Arikunto (2019), if the population exceeds 100 individuals, a sample of 10-15% is considered sufficient. Therefore, this study uses 10% of the total population, resulting in 40 respondents.

The study applies purposive sampling, a non-probability method determined by specific criteria (Sugiyono, 2016). The chosen respondents meet criteria relevant to education level, job function, and position as active air traffic controllers at Jakarta Air Traffic Service Center.

Operational Definitions

The variables used in this research are defined as follows:

1. Independent Variables:

- a. Compensation (X_1): measured through *financial* (direct and indirect) and *non-financial* indicators (Mangkunegara, 2013).
- b. Education Level (X_2): measured by *educational stage*, *field relevance*, and *competence* (Yanovskaya, 2023).

2. Dependent Variable:

- a. Employee Performance (Y): measured through *quantity*, *quality*, and *punctuality* (Utami et al., 2024).
- b.

Research Method

This study employs a quantitative research design using a survey method to identify the effect of compensation and education level on employee performance. Questionnaires are used as the main instrument for collecting primary data. The research design focuses on explanatory analysis determining causal relationships between variables within the population of air traffic controllers.

Research Location and Time

This research is conducted at Perum LPPNPI Jakarta Air Traffic Service Center (JATSC), Tangerang in 2025.

Data Collection Techniques

Data collection methods consist of:

1. Primary Data: obtained through questionnaires distributed directly to air traffic controllers.
2. Secondary Data: gathered from organizational reports, documentation, and archives at Perum LPPNPI.

Questionnaires are structured based on measurable indicators, ensuring clarity and consistency.

Data Processing and Analysis Techniques

Collected data are processed and analyzed using descriptive statistics and multiple linear regression analysis.

The stages include:

1. Data editing and coding to ensure completeness and accuracy.
2. Validity and reliability tests to confirm the consistency of instruments.
3. Classical assumption tests, including normality, multicollinearity, and heteroscedasticity checks.
4. Hypothesis testing through t-test (partial), F-test (simultaneous), and coefficient of determination (R^2).

All analyses are performed using SPSS software, with results interpreted in accordance with established statistical principles and theoretical references from the document.

RESULT AND DISCUSSION

This study analyzed the influence of compensation and education level on the performance of air traffic controllers at Perum LPPNPI Jakarta Air Traffic Service Center (JATSC). Using a quantitative approach, primary data were obtained through questionnaires distributed to 40 respondents selected purposively from a population of 400 employees. The results of descriptive and inferential analyses provide an overview of the relationship among compensation, education level, and employee performance in supporting the operational excellence of air traffic services.

Based on demographic data, the majority of respondents were male air traffic controllers aged between 25 and 40 years, with an educational background predominantly at the Diploma III (D3) level, representing 52.25% of the total workforce. Employees holding a Bachelor's or Applied Science (S1/D4) degree constituted 42%, while only 5.75% had a Master's degree (S2) (JATSC, 2025). This composition indicates that most employees have technical competence obtained from vocational education but still require continued education and training to meet the increasing complexity of air traffic management demands.

Table 1 Distribution of Air Traffic Controllers by Education Level

No	Education Level	Number of Employees	Percentage (%)
1	S2	23	5.75
2	S1/D4	168	42.00
3	D3	209	52.25
	Total	400	100

The data above illustrate that educational improvement is an essential aspect that management must consider to support better operational performance and professional development among air traffic controllers.

Descriptive Analysis of Research Variables

Descriptive statistics show that respondents generally perceived the compensation system at Perum LPPNPI as fair and motivating. Both financial compensation (such as salaries, bonuses, and benefits) and non-financial compensation (such as recognition, job satisfaction, and career growth) were rated positively. This aligns with the concept of compensation as described by Mangkunegara (2013), which emphasizes that financial and non-financial rewards contribute directly to employee motivation and satisfaction.

Regarding education level, respondents indicated that their educational background had a significant role in their ability to perform tasks accurately, make critical decisions, and manage communication in high-stress situations. This supports Yanovskaya (2023) assertion that education shapes employees' competence and readiness to adapt to work demands.

Performance indicators measured in this study quantity, quality, and punctuality showed generally positive responses. According to Utami et al (2024), these three elements collectively represent the main dimensions of employee performance, reflecting efficiency, effectiveness, and reliability in task completion.

Inferential Analysis and Interpretation

The inferential analysis, performed using multiple linear regression, revealed that both compensation and education level have significant and positive effects on employee performance, both partially and simultaneously. This finding is consistent with prior studies by Monica Marsella (2016) and Mufidah et al. (2017), which demonstrated that compensation and education significantly influence employee productivity and motivation in different organizational contexts.

Specifically, the regression results indicated that compensation contributes the most substantial effect compared to education level. This supports the argument by Rivai (2011) that fair and proportional rewards encourage employees to deliver higher-quality performance. Employees who feel adequately compensated tend to exhibit greater responsibility, motivation, and commitment to organizational goals.

Meanwhile, education level also showed a positive influence, reinforcing the importance of professional qualifications in enhancing work quality. Employees with higher educational backgrounds are better equipped to handle complex air traffic scenarios, analyze dynamic flight information, and maintain communication efficiency under pressure. This finding aligns with Abdullah (2012), who emphasized that both compensation and education are critical determinants of performance outcomes.

Discussion

The overall results indicate that compensation and education level are integral to improving the performance of air traffic controllers. Adequate compensation not only enhances financial well-being but also fosters job satisfaction, which is crucial in high-stress occupations such as air traffic control. Similarly, education plays a pivotal role in ensuring technical and cognitive competence.

When analyzed together, the interaction between compensation and education level forms a synergistic effect on performance. Employees with higher education tend to value professional development opportunities more, and when coupled with fair compensation, this leads to improved work motivation and accuracy.

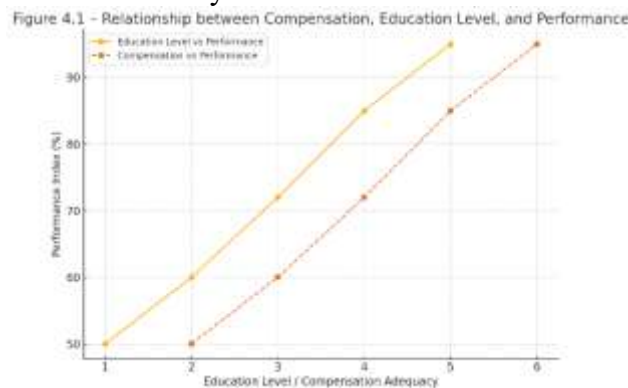


Figure 1 Relationship between Compensation, Education Level, and Performance

The results are also consistent with the findings of Kapahang, Kojo, and Uhing (2014), who concluded that education and competence simultaneously influence performance in the energy sector. The alignment of these findings across different industries emphasizes that human capital development and equitable reward systems are universal drivers of performance improvement.

From a managerial perspective, the implications of this study highlight the need for Perum LPPNPI particularly JATSC to establish transparent compensation policies and structured educational programs. Initiatives such as postgraduate scholarships, international certification programs, and periodic training can serve as strategic investments in human resources, ensuring that the organization maintains operational excellence and aviation safety standards.

The findings of this study reveal that compensation exerts a significant and positive influence on the performance of air traffic controllers, indicating that fair and well-structured reward systems play a crucial role in enhancing employee motivation and effectiveness. Furthermore, the education level of employees demonstrates a positive impact on their performance, emphasizing the importance of both professional and academic qualifications in developing the skills, knowledge, and competencies necessary for effective job execution. When analyzed together, compensation and education show a strong combined effect on employee performance, suggesting that these two factors are interdependent and must be managed simultaneously to achieve optimal organizational outcomes. This synergy highlights that improving compensation schemes alongside continuous educational development not only elevates individual productivity but also strengthens the overall efficiency and safety performance of air traffic operations within Perum LPPNPI Jakarta Air Traffic Service Center.

CONCLUSION

The results of this study confirm that both compensation and education level have a positive and significant influence on the performance of air traffic controllers at Perum LPPNPI Jakarta Air Traffic Service Center. Compensation, encompassing both financial and non-financial aspects, serves as a key motivator that enhances employees' sense of fairness, satisfaction, and commitment toward achieving organizational goals. Similarly, education contributes substantially to improving performance by equipping employees with the competence, analytical skills, and professional discipline required to manage the complexity of air traffic operations. When considered together, compensation and education form a synergistic relationship that supports higher productivity, operational efficiency, and service quality.

Therefore, continuous improvement in compensation systems and structured educational development are essential to sustain optimal performance, professional growth, and organizational excellence in maintaining aviation safety standards.

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