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Vocational Awareness, Aspiration, and Career Readiness of Aviation Students in the Industry 5.0 Era

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ABSTRACT

The Industry 5.0 paradigm emphasizing human-technology collaboration, sustainability, and resilience demands a reconceptualization of career readiness in vocational aviation education. However, empirical research on how vocational awareness and vocational aspiration jointly shape aviation students' career readiness within this new paradigm remains limited, particularly in the Indonesian context. This quantitative, cross-sectional survey involved 184 aviation students from four academies in Java (sampled from 350 using proportional stratified random sampling). Validated Likert-scale instruments (Cronbach's $\alpha > 0.85$) measured all constructs, and data were analyzed using multiple linear regression. The results showed that vocational awareness ($\beta = 0.476$, $p < 0.001$) and vocational aspiration ($\beta = 0.351$, $p < 0.001$) jointly explained 67.3% of the variance in career readiness ($R^2 = 0.673$, $F = 189.23$, $p < 0.001$), with awareness exerting a significantly stronger effect. Theoretically, this study extends Social Cognitive Career Theory to the Industry 5.0 context; practically, it underscores the urgent need for human-centric industry induction and career guidance programs in aviation academies.

1. INTRODUCTION

1.1 The Industry 5.0 Paradigm Shift

The demand for air traffic has grown rapidly in recent years, the efficiency and safety of air traffic management faces greater challenges with limited airspace resources (Cai, 2023). The transition from Industry 4.0 to Industry 5.0 represents a fundamental philosophical reorientation: from technology-centered automation to human-centric, sustainable, and resilient industrial ecosystems (Nahavandi, 2019). Industry 5.0 rests on three pillars: human-centricity (technology serves humans), sustainability (environmental and social responsibility), and resilience (adaptability to disruptions) (Kumar et al., n.d.).

In recent years, AI and Human collaboration has become an exciting new approach to IT systems design designed to balance the role of automation and human expertise. Specifically humans and AI work together in dynamically sharing IT tasks, AI provides decision tools for augmentation, and reciprocal performance is optimized by dynamically adjusting learning parameters (Rabbani et al., 2025). In the aviation sector, this paradigm shift has concrete operational implications. Human-AI collaboration is no longer futuristic speculation but daily reality: pilots increasingly interact with AI-assisted decision support systems for route optimization and emergency handling. In the aviation sector, this paradigm shift has concrete operational implications. Human-AI collaboration is no longer futuristic speculation but an everyday reality. Pilots are increasingly interacting with AI-assisted decision support systems for route optimization and emergency handling. Air traffic controllers rely on machine learning algorithms for traffic flow prediction and maintenance engineers use IoT-enabled predictive analytics to anticipate component failures before they occur These challenges necessitate the integration of Artificial Intelligence (AI) to augment human decision-making, improve operational efficiency, and ensure safety in increasingly complex air traffic environments. These developments demand socio-technical competence—the ability to work effectively within systems where human judgment and machine intelligence constantly negotiate authority and responsibility

In addition, ethical automation has emerged as an important concern. Unlike fully automated systems, Industry 5.0 requires aviation professionals to determine when to override algorithmic recommendations, how to distribute accountability between human and AI operators, and how to ensure that automation does not erode manual flying skills. Artificial intelligence (AI), defined as the capacity of machines to perform cognitive functions typically associated with humans' underlying perception, reasoning, learning, and problem-solving abilities, has now reached or even surpassed human performance that requires advanced thinking and strategic reasoning. AI systems are better than human-driven manual solutions in operational tasks are considered to be highly complex and depend on human expertise (Hao, Demir, & Eyers, 2025). In particular, AI systems have demonstrated superior ability to anticipate potential disruptions and inefficiencies before they escalate.

1.2 Career Readiness in the Industry 5.0 Era

Career readiness in vocational aviation education has traditionally been defined as the ability to perform job roles in accordance with industry standards, safety regulations, and technical competency requirements (Anggraini, Prayitno, & Setiawan, 2025).

Students really need strong motivation so that when they finish doing lectures, they can carry out their duties and work well. Motivation in the world of work can produce enthusiasm or motivation that directs a person's behavior to achieve certain goals (Khusnul Chotimah & Suryani, 2020). Work motivation can be assessed in various ways, such as interests and desires to work, career aspirations, motivation or pressure in work tasks as well as the need for self-recognition when entering the world of work. Competing in the world of work requires mature job readiness in terms of knowledge, skills, and information, and qualified graduates will have no trouble competing. Define job readiness as a person's total state to be able to perform activities related to good work. Job readiness can be measured through several indicators, such as maturity level, previous experience or training in the workplace, as well as stable mental and emotional conditions (Muspawi & Lestari, 2020). Students have an extraordinary opportunity to adjust to the actual workplace so that they can apply the knowledge they have gained and relevant skills (Endaryanti & Riawan, 2023).

However, the Industry 5.0 paradigm expands this definition to include: (a) ability to collaborate with smart technologies, (b) awareness of ethical dimensions of automation, (c) commitment to sustainable practices, and (d) adaptive resilience in the face of disruptions (Lent & Brown, 2020).

Empirical evidence reveals a significant readiness gap. A survey of 384 vocational students across ten institutes in Guangdong, China, found that while students demonstrated strong subject matter knowledge, they exhibited marked weaknesses in continuous learning orientation and ability to collaborate with artificial intelligence systems (Wang, L. et al., 2023). In Indonesia, approximately 45% of vocational graduates lack clear career direction, primarily due to insufficient understanding of how human values integrate with smart technology in contemporary industrial ecosystems (Hibar Al Dikry, 2025).

1.3 Theoretical Framework: Social Cognitive Career Theory (SCCT)

The study is based on Social Cognitive Career Theory (SCCT), as put forward by Lent and Brown(Lent & Brown, 2020) and expanded by Lent et al The SCCT argues that career-related outcomes are shaped by three interrelated mechanisms:

a. People's input (e.g., demographic characteristics, tendencies, aspirations, self-efficacy beliefs)
b. Contextual affordability of background (e.g., access to industry knowledge, vocational awareness, social support)
c. Learning experience (e.g., formal training, hands-on practice, representative observation)

Within this framework, vocational awareness functions as a contextual affordance—providing the cognitive map that enables students to form realistic perceptions of industry demands, competency requirements, and emerging technological trends (Lent & Brown, 2020; Wang, Y., & Chen, 2023). Students with high vocational awareness understand not only what jobs exist but also how those jobs are being transformed by human-AI collaboration, sustainability mandates, and resilience requirements.

Vocational aspiration, conversely, operates as a person input—a motivational force that directs effort, sustains goal commitment, and shapes career-related decision-making (Lent & Brown, 2020)Aspirations reflect students' ideals about their future work, including their desire to contribute to a sustainable and human-centered industry.

1.4 Research Gap

A systematic literature review reveals four specific gaps that this study addresses. First, existing studies on aviation student readiness remain anchored in Industry 4.0's techno-centric perspective, overlooking human-centric, ethical, and sustainability dimensions. Second, while vocational awareness and aspiration have been studied separately in general vocational contexts, no study has simultaneously examined both predictors among aviation students. Third, the Indonesian aviation education context remains understudied, despite Indonesia's rapidly growing aviation sector. Fourth, previous studies have used inconsistent operationalizations of career readiness, with none developing an instrument capturing the multi-dimensional nature of Industry 5.0 career readiness in the aviation domain.

1.5 Objectives and Hypotheses

Based on the theoretical framework and identified gaps, this study pursues three objectives:
(1) to analyze the partial effect of vocational awareness on career readiness;
(2) to analyze the partial effect of vocational aspiration on career readiness;
(3) to analyze the simultaneous effect of both variables.

The corresponding hypotheses are:
H1: Vocational awareness positively and significantly affects career readiness.
H2: Vocational aspiration positively and significantly affects career readiness.
H3: Vocational awareness and vocational aspiration simultaneously positively and significantly affect career readiness.

2. METHODS

2.1 Research Design

This study employs a quantitative approach with a cross-sectional survey design. The relationship between variables is examined using an explanatory predictive framework, not a causal one. Given the cross-sectional nature of the data (all variables measured at one point in time), this study can only establish predictive associations—that is, the degree to which vocational awareness and vocational aspiration predict career readiness—not causal relationships.

2.2 Population and Sample

The population consisted of 350 aviation students enrolled in four aviation academies on the island of Java, Indonesia, during the 2024/2025 academic year. Sample size was determined using Slovin's formula with a 5% margin of error, yielding a minimum required sample of 187 students. To account for potential incomplete responses, 200 questionnaires were distributed. Proportional stratified random sampling was employed to ensure representativeness across the four academies. After data selection, 184 questionnaires were deemed valid and complete (92% response rate).

2.3 Research Instrument

The research instrument was a structured self-report questionnaire using a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).
The questionnaire comprised four sections:
(A) respondent demographics,
(B) vocational awareness (15 items),
(C) vocational aspiration (12 items),
(D) career readiness (18 items).

2.3.1 Sample Items

Vocational Awareness:

a. "I understand the technical competencies required to become a commercial pilot/flight operator."
b. "I understand how pilots and AI-based flight assistance systems work together during flight operations."
c. "I understand how the aviation industry is working to reduce carbon emissions through operational changes."

Vocational Aspiration:
a. "I have a clear vision of my career path in the aviation industry over the next 10 years."
b. "I aspire to contribute to sustainable aviation practices in my future career."

Career Readiness:
a. "I have mastered the basic technical skills required for my future aviation role."
b. "I am confident in my ability to work collaboratively with AI-based decision support systems."

2.3.2 Validity and Reliability

Content validity was established through expert judgment involving three academics in career guidance and two aviation industry professionals. Exploratory Factor Analysis (EFA) was conducted (not CFA due to pilot sample size of n=30). KMO values exceeded 0.60 for all constructs, and all items had factor loadings > 0.40. Reliability was assessed using Cronbach's alpha: vocational awareness (α = 0.887), vocational aspiration (α = 0.856), and career readiness (α = 0.912).

2.4 Data Collection Procedures

Data collection was conducted from January to March 2025. Before questionnaire administration, the researcher explained the purpose of the study, guaranteed data confidentiality, and obtained informed consent from participants. Questionnaires were distributed directly to students to ensure common understanding of each question, particularly those related to Industry 5.0 concepts.

2.5 Data Analysis Techniques

Data analysis was performed using SPSS version 26 in three stages: (1) descriptive statistics to describe respondent characteristics and response distributions; (2) classical assumption tests (normality, multicollinearity, heteroscedasticity, linearity); (3) multiple linear regression analysis to test hypotheses, with results interpreted as predictive relationships, not causal.

3. RESULTS

3.1 Respondent Characteristics

Of the 184 valid respondents, 142 were male (77.2%) and 42 female (22.8%), reflecting the typical gender composition of aviation students in Indonesian vocational academies.

3.2 Descriptive Analysis

Indicator-level analysis revealed the lowest indicators: "understanding of human-machine collaboration in flight operations" (mean = 3.68) and "awareness of sustainability aspects of the aviation industry" (mean = 3.72). The highest indicators were "mastery of technical skills" (mean = 4.31) and "strong desire to work in the aviation industry" (mean = 4.28).

Table 1. Descriptive statistics of the research variables

Variabel	Mean	Standard Deviation	Category
Vocational Awareness	4,12	0,56	High
Vocational Aspiration	4,28	0,49	Very High

Career Preparation	4,05	0,61	High

3.3 Results of the Classical Assumptions Test

The normality test using the Kolmogorov-Smirnov test showed an asymptotic significance value (two-tailed) of 0.124 > 0.05, indicating a normal distribution of the data. The multicollinearity test showed a tolerance value > 0.10 and a VIF < 10 for all variables (vocational awareness: tolerance 0.478, VIF 2.092; vocational aspiration: tolerance 0.478, VIF 2.092), indicating an absence of multicollinearity. The heteroscedasticity test using Glejser's test showed a significance value > 0.05 for all variables, indicating an absence of heteroscedasticity. The linearity test showed a deviation from linearity > 0.05 for all relationships between variables, indicating a linear relationship.

Table 2. Summary of Classical Assumption Tests

Assumption	Test	Result	Criterion	Conclusion
Normality	Kolmogorov-Smirnov	p = 0.124	p > 0.05	Normal
Multicollinearity	VIF	2.092	VIF < 10	No multicollinearity
Heteroscedasticity	Glejser	p > 0.05	p > 0.05	Absent
Linearity	Deviation from linearity	p > 0.05	p > 0.05	Linear

All assumptions were satisfied, confirming that multiple linear regression is appropriate.

3.4 Results of the Multiple Linear Regression Analysis

The effect of vocational guidance on professional readiness in the Industry 5.0 era. The results of this study demonstrate that vocational guidance has a positive and significant effect on the professional readiness of aviation students in the Industry 5.0 era. This is shown in the following table:

Table 2. Results of the multiple linear regression analysis

Variable	Regression Coefficient (B)	Standard Error	Beta	t-test	Sig.
(Constant)	0,324	0,287	-	1,129	0,260
Vocational Awareness	0,512	0,089	0,476	5,753	0,000
Vocational Aspiration	0,398	0,094	0,351	4,234	0,000

According to the table above, the regression equation obtained is:

Career readiness = 0.324 + 0.512 Vocational awareness + 0.398 Vocational aspiration + e

The positive regression coefficient indicates that an increase in vocational awareness and vocational aspiration will result in increased career readiness among students.

1. **The partial t-test**

   Partial test (t-test): H1 accepted (t = 5.753 > t_table 1.973; $p < 0.001$); H2 accepted (t = 4.234 > 1.973; $p < 0.001$). Vocational awareness is the dominant predictor ($\beta = 0.476$).

   Shows that vocational awareness has a calculated t-value of 5.753, which is greater than the t-value from Table 1.973, with a significance level of 0.000 < 0.05. Therefore, H1 is accepted. Vocational aspiration has a calculated t-value of 4.234, which is greater than the t-value from Table 1.973, with a significance level of 0.000 < 0.05. Therefore, H2 is accepted.

2. **The simultaneous F-test**

   F_calculated = 189.234 > F_table 3.05; p < 0.001 → H3 accepted.

   Yields a calculated F-value of 189.234, which is greater than the F-value from Table 3.05, with a significance level of 0.000 < 0.05. This indicates that both vocational awareness and vocational aspiration have a significant effect on students' career readiness. Therefore, H3 is accepted.

3. **The coefficient of determination (R^2)**

   Adjusted R^2 = 0.673, meaning that 67.3% of the variance in career readiness is explained by both predictor variables.

   Shows an adjusted R^2 value of 0.673. This means that vocational awareness and vocational aspiration jointly influence career readiness by 67.3%, while the remaining 32.7% is influenced by other factors outside the research model.

4. DISCUSSION

4.1 Why Does Vocational Awareness Dominate Over Aspiration?

The finding that vocational awareness ($\beta = 0.476$) exerts a stronger predictive effect than vocational aspiration ($\beta = 0.351$) carries substantive theoretical meaning. Within SCCT, contextual affordances—access to accurate industry information—serve as the cognitive foundation upon which career-related self-efficacy and outcome expectations are built (Lent et al., 2018). Without these affordances, person inputs like aspirations may lack direction or become detached from reality.

Why is awareness more dominant in the aviation context? Four reasons can be identified. First, the high-stakes nature of aviation. Unlike many other industries, aviation errors can result in catastrophic loss of life. Accurate vocational awareness serves as a reality check aligning aspirations with regulatory and operational realities (Menteri Perhubungan, 2020). Second, rapid technological transformation under Industry 5.0. Students relying on outdated mental models will be dangerously unprepared for actual cockpit environments. Third, persistence of traditional vocational narratives. Many students enter training with romanticized notions focused on manual flying skills, while Industry 5.0 reality emphasizes teamwork with AI (Onnasch & Roesler, 2021). Fourth, the hierarchical and regulated career structure of aviation. Students with high awareness, even with moderate aspiration, are more likely to make strategic, informed career preparation decisions.

4.2 Vocational Aspiration: Self-Oriented vs. System-Oriented Goals

Although aspiration's predictive effect is smaller, it remains significant ($\beta = 0.351$). The very high mean for "strong desire to work in aviation" (4.52) indicates strong intrinsic motivation. However, the lower score for "aspiration to contribute to a sustainable aviation industry" (4.08) suggests that students' aspirations remain self-oriented (personal achievement) rather than system-oriented (industry sustainability). This finding extends employability theory by suggesting a third dimension: value-aligned employability—the extent to which career aspirations are congruent with the industry's evolving values.

4.3 Critical Reflection: Industry 5.0 as More Than Jargon

Unlike prior studies that use Industry 5.0 superficially, our results pinpoint specific deficits: human-machine collaboration and sustainability. These are not abstract concepts but concrete competencies. Pilots increasingly interact with AI-assisted decision support systems; maintenance engineers use IoT-enabled predictive analytics. Students' low awareness in these areas signals a curriculum gap. Therefore, integrating socio-technical systems thinking into aviation training is urgent.

5. CONCLUSION

5.1 Summary of Findings

This study concludes that vocational awareness and vocational aspiration positively and significantly predict career readiness among Javanese aviation students in the Industry 5.0 era (R^2 = 67.3%). Vocational awareness is the dominant predictor ($\beta = 0.476$). However, students demonstrate weak understanding of human-machine collaboration and sustainability, indicating a gap between Industry 5.0 rhetoric and actual vocational preparation.

5.2 Theoretical Contributions

This study extends Social Cognitive Career Theory to the Industry 5.0 aviation context; demonstrates that contextual affordances (awareness) outweigh personal inputs (aspiration) in high-stakes vocational settings; and provides empirical evidence for the dissociation between self-oriented aspirations and system-oriented sustainability values.

5.3 Practical Implications

Aviation academies should redesign induction programs to include: guest lectures on human-AI collaboration in flight operations; site visits to airports/airlines using AI-assisted systems; internships emphasizing socio-technical skills; ethics and sustainability seminars; and mentoring by professionals committed to human-centric values.

5.4 Limitations

This study has several limitations: cross-sectional design (predictive relationships only, not causal); potential self-report bias; regional limitation (Java only, not generalizable to other Indonesian regions); lack of objective performance measures; and gender imbalance (77.2% male).

5.5 Future Research

Future research should conduct longitudinal studies tracking career readiness into early employment; comparative studies across Indonesian islands; experimental designs testing Industry 5.0 intervention modules; and inclusion of self-efficacy and social support as mediating variables.

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