Bachelor of Science in Air Transportation: A Tracer Study

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DOI: https://doi.org/10.47772/IJRISS.2026.101000688

Received: 28 October 2026; Accepted: 03 November 2026; Published: 16 November 2026

ABSTRACT

Tracer studies show how well a school's graduates fare in the labor market and how well the curriculum prepares them. This study traced Bachelor of Science in Air Transportation (BSAT) alumni of an aeronautical school in Parañaque City, Philippines, to determine (a) their reasons for choosing the program, (b) their reasons for staying in their current jobs, and (c) the competencies and core values learned in school that they find useful at work, and to compare employment indicators before and during the COVID-19 pandemic. A quantitative, cross-sectional survey was administered through Google Forms to 108 alumni recruited by snowball sampling, a non-probability technique, through email and social media between March 2021 and February 2022. Data were analyzed using multiple-response frequencies and percentages, 95% Wilson confidence intervals, Cochran's Q and McNemar tests, Fisher's exact and Mann–Whitney tests, and multiple regression.

Strong passion for the profession was the most frequent reason for choosing the program (64.8%), followed by opportunity for employment abroad (34.3%) and prospect of career advancement (33.3%). Alumni stayed in their jobs mainly for salaries and benefits (68.9%) and career challenge (60.0%). Communication (78.3%), technical (76.1%), problem-solving (71.7%), and critical thinking skills (69.6%) were the most useful competencies; entrepreneurial skills (26.1%) were endorsed significantly less often than all others, and human relations skills ranked fifth (54.3%). Differences among core values were not significant. Of the 57 respondents who answered, 63.2% reported that their first job was related to the program. Alumni who graduated in 2020–2021 were less likely to be employed than earlier graduates (18.8% versus 58.9%, $p = .005$), although the cohort was small ($n = 16$). No competency was significantly associated with duration in the first job or initial earnings.

The study proposes a framework for an automated alumni tracking system and curricular enhancements in entrepreneurship and human relations, and it recommends recording the exact graduation year, time to first job, and salary in future tracer cycles.

Keywords: tracer study, alumni, air transportation, employability, COVID-19, curriculum

INTRODUCTION

Aviation is a capital-intensive, high-stakes industry. Passenger safety and service depend on many specialized roles, including pilots, flight attendants, aircraft mechanics, and the operations and coordination staff who keep flights moving. The Bachelor of Science in Air Transportation (BSAT) prepares graduates mainly for the last group, with careers such as Airport Operations Manager, Flight Operations Coordinator, Airline Customer Service Manager, Cargo Handling Agent, and Flight Dispatcher.

The COVID-19 pandemic disrupted economies worldwide, and aviation was among the sectors most affected by travel restrictions. It is therefore important for aviation schools to monitor how their graduates are faring, whether in the field or outside it, and how well their programs continue to prepare them. Alumni are an institution's link to the industry and to the aviation and business world. Information gathered from them allows a school to identify the competencies graduates need and to improve its programs accordingly.

This study traced the career path of BSAT alumni of an aeronautical school in Parañaque City, Philippines. It examined why alumni chose the program, why they remain in their current jobs, and which competencies and

core values acquired in school they find useful at work. It also reports employment alignment, compares employment indicators before and during the pandemic, and tests whether competencies are associated with employment outcomes. Finally, it proposes an automated alumni tracking framework and curricular enhancements for the lowest-ranked competencies.

Statement of the Problem

The study examined the link between the aeronautical school and the aviation industry through its BSAT alumni. Specifically, it sought answers to the following questions:

1. What are the alumni's reasons for choosing the BSAT program in the aeronautical school?
2. What are the alumni's reasons for staying in their current jobs?
3. Which competencies and core values learned in the aeronautical school do the alumni find useful in their jobs?
4. How closely is the alumni's first job aligned with the program, and how can employment indicators (employment rate, time to first job, and job–program alignment) be compared between alumni who graduated before and after the onset of the COVID-19 pandemic?

Background of the Study

The aeronautical school in Parañaque City offers senior high school and college programs related to aviation. It was founded in 1969 by Atty. Ambrocio R. Valdez. One of its college programs is the Bachelor of Science in Air Transportation, which is designed to meet the present requirements of the air transportation industry, including its management and operations areas.

The program concentrates on (a) the modern economics of air transportation; (b) airline operations; and (c) the market behavior of air carriers in terms of aircraft selection, fleet planning, aircraft scheduling and procedures, techniques in forecasting airline traffic, logistics, airline statistics, and government policies and regulations agreed in assemblies convened by the International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA), and other world fora.

Career opportunities for graduates include Airport Operations Manager, Flight Operations Coordinator, Airline Customer Service Manager, Cargo Handling Agent, and Flight Dispatcher. In recent years, however, many graduates have become airline pilots, which raises the question: how are BSAT graduates doing?

REVIEW OF RELATED LITERATURE

The success of alumni in their fields of work is one indicator of how well a higher education system performs. A tracer study, also called alumni tracking, gathers information that helps a university identify the competencies it needs to strengthen. Typical information includes the waiting period for work, the search process for the first job, work situations, the contribution of the school's competencies to the job, and vertical and horizontal alignment (Safi'i & Priyantoro, 2019).

Universities treat alumni data, such as department, year of graduation, and current workplace, as a link between the school and the industry. Banten Jaya University distributes its questionnaires through social media and stores alumni information using PHP and a MySQLi database (Sutanto et al., 2020). Universitas Advent Indonesia used a web-based GPS system to locate alumni, which also supports the relationship between the university and its graduates and, in turn, its quality (Thomas & Wagiu, 2019).

Alumni information also supports accreditation. Data on personal identity, educational background, and employment background help a school improve and prepare for accreditation. Lhokseumawe State Polytechnic built its tracer system using the Waterfall method, the CodeIgniter framework, and a MySQL database and found that locating alumni, including their home and work addresses, was among the most difficult data to gather

(Rizka et al., 2018). Alumni databases are valuable but tend to be incomplete because contact details change over time. Tahun et al. (2021) suggested that combining reduction and supervised query strategies collects alumni data more efficiently than unsupervised strategies. Toba et al. (2017) addressed the related problem of identifying alumni through unsupervised person name disambiguation.

Tracer data also describe the outcomes of study programs. A tracer study of the Islamic Early Childhood Education program at STAIN Gajah Putih Takengon, for example, found that graduates worked in early childhood education roles (e.g., kindergarten teacher, school principal, and family planning teacher) and generally waited less than a year to find work (Hafiz, 2020). Analyzing alumni performance helps schools identify the competencies that current and future students need. STMIK Widya Cipta Dharma Samarinda developed a website-based alumni record system to process alumni profiles, performance, and work locations (Harianto et al., 2019).

Most tertiary institutions conduct tracer studies to learn how education translates into the world of work, yet even institutions with tracer websites find it difficult to contact alumni. Many tracer systems follow the Waterfall method, beginning with the problems faced in collecting alumni data, and most studies end up recommending a system through which alumni data can be accessed anytime and anywhere (Pambudi et al., 2020). Sadi et al. (2019) linked alumni tracking to the Industrial Revolution 4.0 and recommended mobile (Android) applications to track and monitor alumni.

Taken together, the reviewed studies concentrate on the design of tracking systems and on the difficulty of locating alumni. Fewer connect alumni data to the competencies a program teaches, and none of the reviewed studies examined these links among aviation graduates during a pandemic. This study addresses that gap for BSAT alumni and proposes a tracking framework that responds to the data-collection problems the literature describes.

Theoretical Framework

The study draws on the model of employability shown in Figure 1, as presented by de Guzman and De Castro (2008, as cited in Bolaane et al., 2010). The model holds that subject understanding, skills (including key skills), and personal qualities (including self-theories and efficacy beliefs) are interrelated and together shape employability. The authors encouraged alumni tracer studies as a way of assessing a school's capability to prepare students for the demands of industry. Such studies cover alumni experiences in searching for a job, employment conditions, the application of knowledge acquired in the institution, promotion, and job satisfaction.

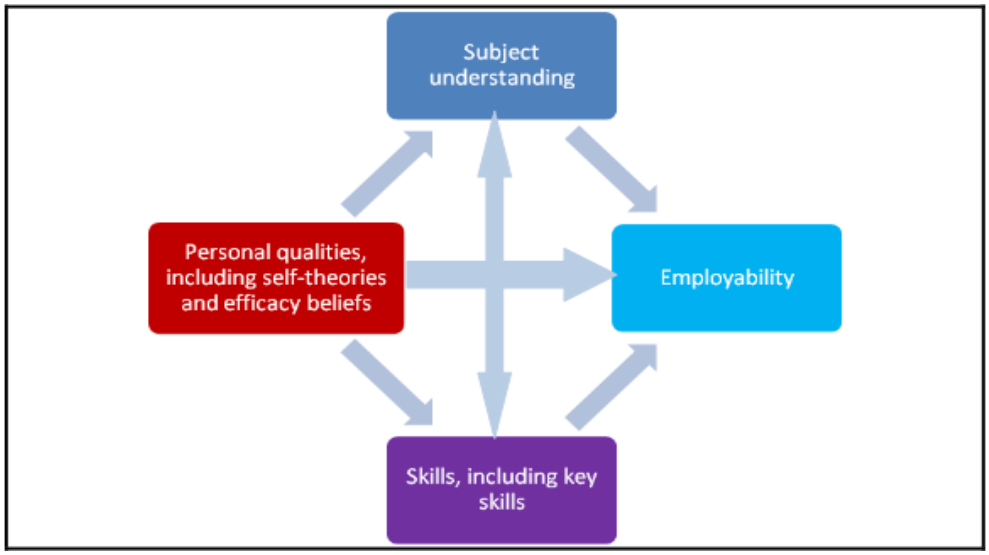

Figure 1. A schematic model of employability (de Guzman & De Castro, 2008, as cited in Bolaane et al., 2010).

The model implies that many factors influence how and why graduates decide on their careers after leaving the institution.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue X October 2026

Conceptual Framework

Figure 2 shows the conceptual framework of the study. The alumni's career path begins with their reasons for choosing a college course. After graduation and employment, they have reasons for staying in their jobs. Their work attitudes and practices are, in turn, shaped by the competencies and core values they learned in school, whether directly or indirectly. These factors influence the alumni's decisions from the time they were students until they work in, or outside, their fields of specialization.

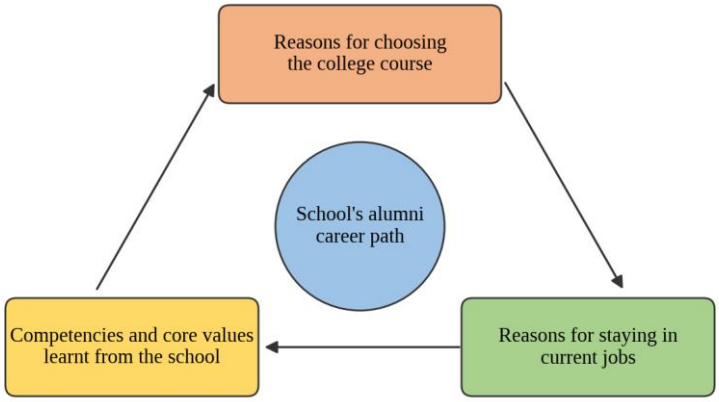

Figure 2. Conceptual framework: model for alumni employability.

METHODOLOGY

Research Design

The study used a quantitative, cross-sectional survey design, with data gathered through a Google Forms questionnaire. It is descriptive because it profiles the alumni's reasons for choosing the program, their reasons for staying in their jobs, and the competencies and core values they find useful. It is explanatory in that it interprets these results against the program's intended outcomes. Because the data are self-reported and cross-sectional, the study does not claim causal relationships. The variables were:

- reasons for choosing the bachelor's degree program in the aeronautical school;
- reasons for staying in the current job; and
- competencies and core values learned in the aeronautical school that alumni find useful in their jobs.

Respondents and Sampling Technique

The respondents were BSAT alumni of the aeronautical school. The researcher, together with the school's Research Department and Office of Student Affairs, used snowball sampling, a non-probability, chain-referral technique. Survey links were first sent by email and social media to alumni who could be reached, and these alumni were asked to forward the questionnaire to other graduates. Snowball sampling was chosen because the school had no complete and current registry of alumni contact details, a problem widely reported in the tracer-study literature (Rizka et al., 2018; Tahun et al., 2021), and because online distribution was the only practical option during the pandemic. The sampling frame is therefore unknown.

The survey was open from March 26, 2021, to February 2, 2022, and received 572 responses from graduates of all programs of the school. Of these, 108 respondents indicated BSAT as their program and were retained for this study; one respondent who listed two programs was excluded. Table 1 presents their profile. Ninety-seven respondents (89.8%) graduated between 2011 and 2020, six (5.6%) between 2001 and 2010, three (2.8%) in 2021, and one (0.9%) between 1991 and 2000; one entry (0.9%) for year graduated was invalid and was treated as missing in year-based analyses, and the entry "April 2019" was read as 2019. Twelve respondents (11.1%)

reported passing a licensure or professional examination, such as the flight dispatcher or flight operations officer examination or a pilot license. Because the sample is self-selected and concentrated in recent cohorts, the findings describe these respondents and should not be generalized to all BSAT alumni.

Table 1. Profile of Respondents (N = 108)

Characteristic	**Category**	**f**	**%**
Year graduated	1991–2000	1	0.9
	2001–2010	6	5.6
	2011–2020	97	89.8
	2021	3	2.8
	Invalid entry	1	0.9
Licensure or professional examination	Passed	12	11.1
	None reported	96	88.9

Note. f = frequency.

Instrumentation

Data were collected with a researcher-made questionnaire administered through Google Forms. The instrument was validated by the institution's research department. Most items allowed multiple responses, so percentages within an item can total more than 100%. The questionnaire covered:

- the respondent's profile, including year graduated and professional examinations passed;
- reasons for choosing the bachelor's degree program;
- employment status, reasons for staying in the current job, and first-job information, including whether the first job was related to the program, how long it took to land the first job, how long the respondent stayed in it, job level, and initial gross monthly earnings; and
- competencies (communication, human relations, technical, problem-solving, critical thinking, and entrepreneurial skills) and core values learned in the aeronautical school that the respondent found useful in the first job.

The number of valid responses differed by item because employment and first-job items were answered only by employed respondents. Percentages in Table 2 are based on all 108 respondents; those in Table 3 on the 45 who answered the job-retention item; those in Table 4 on the 46 who answered the competency item; and those in Table 5 on the 45 who answered the core-value item. The denominator is stated in each table.

Ethical Considerations and Data Treatment

Participation was voluntary, and responses were collected online. Data-privacy procedures were followed, including compliance with Republic Act No. 10173, the Data Privacy Act of 2012, and all ethics-review clearance.

Multiple-response analysis produced the frequency and percentage of each response, and responses were ranked from highest to lowest percentage. Ninety-five percent Wilson score confidence intervals (CIs) were computed for each percentage. Cochran's Q test compared how often the competencies, and separately the core values,

were endorsed by the same respondents; where it was significant, exact McNemar tests with a Bonferroni correction identified which competencies differed. An exact binomial test compared the proportion of alumni whose first job was related to the program against an even (50%) split.

To evaluate how competencies relate to employment outcomes, Fisher's exact test compared respondents who did and did not endorse each competency on (a) duration in the first job (2 years or more versus less than 2 years; respondents still in their first job were excluded because their duration is incomplete) and (b) initial gross monthly earnings (₱20,000 or more versus lower). Spearman's rank correlation related each competency to the ordinal earning band. A multiple linear regression then modeled the earning band (coded 1 to 9, from ₱5,000–9,999 to ₱50,000 and above) on the six competencies, controlling for year graduated; respondents who ticked two earning bands were excluded. For the pandemic comparison, alumni who graduated in 2019 or earlier (pre-pandemic) were compared with those who graduated in 2020 or 2021 (pandemic and post-pandemic) on employment rate, time to first job, and job–program misalignment, using Fisher's exact test for percentages and the Mann–Whitney U test for time to first job. Employment rate was defined as the percentage of respondents who reported being presently employed. Significance was set at $\alpha = .05$. Analyses were run in Python (SciPy).

RESULTS AND ANALYSIS

Reasons for Choosing the BSAT Program

Table 2 shows the alumni's reasons for choosing the program. Strong passion for the profession was cited most often (f = 70, 64.8%), followed by opportunity for employment abroad (f = 37, 34.3%), prospect of career advancement (f = 36, 33.3%), status or prestige of the profession (f = 31, 28.7%), and influence of parents or relatives (f = 27, 25.0%). The lower confidence limit for passion (55.4%) lies above the upper limit for the second-ranked reason (43.6%), so passion was cited more often than any other reason. The intervals for the next several reasons overlap, so their relative order should not be over-interpreted. High or good grades were the least-cited reason (f = 2, 1.9%).

Table 2. Reasons of the BSAT Alumni for Choosing the Program (n = 108)

Rank	Reason	f	%	95% CI
1	Strong passion for the profession	70	64.8	55.4–73.2
2	Opportunity for employment abroad	37	34.3	26.0–43.6
3	Prospect of career advancement	36	33.3	25.2–42.7
4	Status or prestige of the profession	31	28.7	21.0–37.9
5	Influence of parents or relatives	27	25.0	17.8–33.9
6	Inspired by a role model	19	17.6	11.6–25.8
7	Prospect of attractive compensation	19	17.6	11.6–25.8
8	Availability of course offering in the chosen institution	15	13.9	8.6–21.7
9	Affordable for the family	10	9.3	5.1–16.2
10	Prospect for immediate employment	9	8.3	4.4–15.1
11	Peer influence	8	7.4	3.8–13.9
12	No particular choice or no better idea	4	3.7	1.4–9.1
13	High grades or good grades	2	1.9	0.5–6.5

Note. Multiple responses were allowed. CI = Wilson score confidence interval, in percent.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue X October 2026

These results suggest that most alumni chose the program out of genuine interest in the profession. The second and third reasons point to the labor market: alumni expected the program to open opportunities abroad, where many jobs related to the course are offered, and to lead to career advancement.

Reasons for Staying in Current Jobs

Table 3 presents the reasons for staying in the current job. Salaries and benefits were cited most often (f = 31, 68.9%), followed by career challenge (f = 27, 60.0%), relatedness to the respondent's special skill (f = 20, 44.4%), and relatedness to the course or program of study (f = 16, 35.6%). Proximity to residence (f = 8, 17.8%), family influence (f = 5, 11.1%), and peer influence (f = 3, 6.7%) were cited least. The lower confidence limits for salaries and benefits (54.3%) and career challenge (45.5%) exceed the upper limits for proximity, family influence, and peer influence (31.3% at most), so alumni stay mainly for job rewards and challenge rather than convenience or the influence of family and peers. Two respondents also wrote in a pandemic-related reason, including retrenchment due to the pandemic.

Table 3. Reasons of the BSAT Alumni for Staying in Their Current Jobs (n = 45)

Rank	Reason	f	%	95% CI
1	Salaries and benefits	31	68.9	54.3–80.5
2	Career challenge	27	60.0	45.5–73.0
3	Related to my special skill	20	44.4	30.9–58.8
4	Related to course or program of study	16	35.6	23.2–50.2
5	Proximity to residence	8	17.8	9.3–31.3
6	Family influence	5	11.1	4.8–23.5
7	Peer influence	3	6.7	2.3–17.9

Note. Multiple responses were allowed. Two write-in pandemic-related responses are not tabulated.

Competencies Learned in School and Found Useful at Work

Table 4 shows that communication skills were endorsed most (f = 36, 78.3%), followed by technical skills (f = 35, 76.1%), problem-solving skills (f = 33, 71.7%), critical thinking skills (f = 32, 69.6%), human relations skills (f = 25, 54.3%), and entrepreneurial skills (f = 12, 26.1%). Endorsement differed significantly across the six competencies, Cochran's $Q(5) = 49.19$, $p < .001$. Post hoc exact McNemar tests with Bonferroni correction showed that entrepreneurial skills were endorsed significantly less often than every other competency (adjusted $p \leq .005$ in all five comparisons), including human relations skills (adjusted $p = .005$). The four leading competencies had overlapping intervals, so their order is descriptive only.

Table 4. Competencies Learned in School That the BSAT Alumni Find Useful in Their Jobs (n = 46)

Rank	Competency	f	%	95% CI
1	Communication skills	36	78.3	64.4–87.7
2	Technical skills	35	76.1	62.1–86.1
3	Problem-solving skills	33	71.7	57.5–82.7
4	Critical thinking skills	32	69.6	55.2–80.9
5	Human relations skills	25	54.3	40.2–67.8
6	Entrepreneurial skills	12	26.1	15.6–40.3

Note. Multiple responses were allowed. Three respondents also ticked "other skills," which is not tabulated. CI = Wilson score confidence interval, in percent.

Communication and technical skills lead, as expected for a technical school whose graduates coordinate with supervisors, other departments, and external partners. Problem-solving and critical thinking skills are used in resolving expected and unexpected operational problems with teams.

Core Values Learned in School and Found Useful at Work

The school has five core values: Patriotism, Adeptness, Trust, Thoroughness, and Service Orientedness. Table 5 shows that Thoroughness, Trust, and Service Orientedness were each endorsed by 28 respondents (62.2%), followed by Adeptness (f = 23, 51.1%) and Patriotism (f = 18, 40.0%). The differences among the five values were not statistically significant, Cochran's $Q(4) = 8.51$, $p = .075$, and the confidence intervals overlap, so the ranking is descriptive only.

Table 5. Core Values Learned in School That the BSAT Alumni Find Useful in Their Jobs (n = 45)

Rank	Core value	f	%	95% CI
1	Thoroughness	28	62.2	47.6–74.9
2	Trust	28	62.2	47.6–74.9
3	Service orientedness	28	62.2	47.6–74.9
4	Adeptness	23	51.1	37.0–65.0
5	Patriotism	18	40.0	27.0–54.5

Note. Multiple responses were allowed. Thoroughness, Trust, and Service Orientedness are tied.

Thoroughness, Trust, and Service Orientedness may be valued because aviation tasks affect the safety of customers and passengers and air transportation work is service-oriented and team-dependent. The comparatively lower endorsement of Patriotism may reflect the fact that many opportunities for BSAT graduates are abroad, but the present data cannot test this explanation.

First-Job Alignment and Pandemic-Related Indicators

First-job alignment. Of the 57 respondents who answered whether their first job was related to the program, 36 (63.2%, 95% CI 50.2–74.5) said it was, and 21 (36.8%, 95% CI 25.5–49.8) said it was not. An exact binomial

test showed that the proportion of related first jobs was not significantly different from an even split (p = .063), although the observed pattern favors alignment. About one in three respondents therefore began their careers outside the field.

Pre- and post-pandemic comparison. Table 6 compares alumni who graduated in 2019 or earlier (n = 91) with those who graduated in 2020 or 2021 (n = 16). Overall, 57 of 107 respondents (53.3%, 95% CI 43.9–62.4) were presently employed, and 14 reported never having been employed. The employment rate was significantly lower among 2020–2021 graduates (18.8%, 3 of 16) than among earlier graduates (58.9%, 53 of 90; Fisher's exact p = .005). Among employed respondents, the median time to first job was 1 to 6 months, and 66.1% (37 of 56) found their first job within six months; this did not differ between cohorts (65.4% versus 66.7%, p = 1.00; Mann–Whitney U = 86.0, p = .764). Job–program misalignment was 35.8% (19 of 53) among earlier graduates and 66.7% (2 of 3) among 2020–2021 graduates (p = .549). Because only three 2020–2021 graduates were employed, the time-to-first-job and misalignment comparisons have almost no statistical power and should be regarded as inconclusive. The employment-rate difference is large, but it compares a very small recent cohort with a much larger one, and recent graduates have had less time to find work; it therefore cannot be attributed to the pandemic alone.

Table 6. Pre- and Post-Pandemic Employment Indicators of BSAT Alumni

Indicator	**Overall**	**Graduated 2019 or earlier**	**Graduated 2020–2021**	**p (test)**
Presently employed, % (f/n)	53.3 (57/107)	58.9 (53/90)	18.8 (3/16)	.005 (Fisher)
Found first job within 6 months, % (f/n)	66.1 (37/56)	65.4 (34/52)	66.7 (2/3)	1.00 (Fisher)
Time to first job, median category	1–6 months	1–6 months	1–6 months	.764 (Mann-Whitney)
First job unrelated to program, % (f/n)	36.8 (21/57)	35.8 (19/53)	66.7 (2/3)	.549 (Fisher)

Note. Respondents with an invalid or missing graduation year are excluded from the cohort columns but included under Overall. Time-to-first-job, misalignment, and the other first-job items were answered only by employed respondents.

Competencies and Employment Outcomes

Table 7 compares respondents who did and did not endorse each competency on duration in the first job and on initial earnings. No competency was significantly associated with either outcome (all Fisher's exact p > .05). The closest to significance was human relations skills, endorsed by a larger share of respondents who earned ₱20,000 or more at first (p = .069; Spearman ρ with the earning band = .28, p = .065).

Table 7. Association Between Competencies and Employment Outcomes

Competency	**Stayed 2+ years in first job, % with / without (n = 39)**	**p**	**Initial pay ₱20,000+, % with / without (n = 44)**	**p**
Technical skills	53.6 / 54.5	1.000	42.4 / 36.4	1.000
Communication skills	58.6 / 40.0	.465	38.2 / 50.0	.716
Problem-solving skills	51.9 / 58.3	.742	34.4 / 58.3	.183

Critical thinking skills	53.8 / 53.8	1.000	43.3 / 35.7	.748
Human relations skills	59.1 / 47.1	.528	54.2 / 25.0	.069
Entrepreneurial skills	44.4 / 56.7	.706	41.7 / 40.6	1.000

Note. "With" = respondents who endorsed the competency; "without" = those who did not. p values are from Fisher's exact test. Respondents still in their first job, and those who ticked two earning bands, are excluded from the respective columns.

In the multiple regression of the initial earning band on the six competencies and year graduated (n = 43), the overall model was not significant, $R^2 = 0.22$, $F(7, 35) = 1.41$, $p = .232$. Human relations skills had a positive coefficient ($b = 2.06$ bands, $SE = 0.90$, $p = .029$), but with seven predictors, an overall nonsignificant model, and 43 cases, this single result should be treated as exploratory. No other predictor was significant, including year graduated ($p = .546$). With these sample sizes, the tests can detect only large associations, so the absence of significant results does not show that competencies are unrelated to employment outcomes.

DISCUSSION

Conclusions

Based on the findings, the following conclusions are drawn:

1. Alumni chose the BSAT program mainly out of passion for the profession, which was cited significantly more often than any other reason. Employment abroad and career advancement followed. High or good grades were the least-cited reason.

2. Alumni stay in their jobs mainly for salaries and benefits and for career challenges, and far less because of proximity to home or the influence of family and peers.

3. Communication, technical, problem-solving, and critical thinking skills are the competencies alumni find most useful. Entrepreneurial skills were endorsed significantly less often than every other competency, and human relations skills ranked fifth. Thoroughness, Trust, and Service Orientedness were the most useful core values, but the differences among the five values were not statistically significant.

4. About 63% of respondents held a first job related to the program, and about 37% did not. Respondents who graduated in 2020 or 2021 were significantly less likely to be employed than earlier graduates (18.8% versus 58.9%), but the cohort is small (n = 16), and time to first job and misalignment could not be compared meaningfully.

5. No individual competency was significantly associated with duration in the first job or with initial earnings; the sample sizes allow only large associations to be detected.

Lower endorsement does not mean that a competency is unimportant. Human relations skills are central to airline customer service and to the team-based coordination that aviation safety depends on, and entrepreneurial skills support innovation and career mobility, including for graduates who work abroad. The ranking is better read as a signal that these competencies are less visible in the alumni's day-to-day work than the technical and communication core, or less strongly developed in the program. This is the basis for the recommendations in Section 4.3.

Limitations

Six limitations should be considered. First, snowball sampling is non-probabilistic and self-selecting, so the 108 respondents may differ from alumni who could not be reached, and the findings cannot be generalized to all BSAT alumni. Second, 89.8% of respondents graduated between 2011 and 2020, and only 16 graduated in 2020

or 2021, of whom 3 were employed; the pandemic comparison is therefore underpowered and confounded by time since graduation. Third, the number of valid responses varied by item (n = 45 to 108), and first-job items were answered only by employed respondents, so time to first job, alignment, earnings, and duration describe employed alumni only. Fourth, the data are self-reported and may be affected by recall and social-desirability bias; earnings and duration were reported in bands, and some duration entries were ambiguous. Fifth, the study covers a single institution, and the multiple-response format shows endorsement rather than the degree of usefulness. Sixth, the regression treats an ordinal earnings band as a numeric outcome and rests on 43 cases. Future tracer cycles should record the exact graduation year, month of first employment, salary in numeric form, and employment status so that pre- and post-pandemic comparisons and the inferential tests described in Section 2.4 can be completed routinely.

RECOMMENDATIONS

A framework for an automated alumni tracking system

The literature identifies the difficulty of locating alumni and of keeping records current as the main weakness of tracer studies (Rizka et al., 2018; Tahun et al., 2021; Pambudi et al., 2020), and this study's reliance on snowball sampling is a consequence of the same problem. It is therefore recommended that the school's Research Department, Office of Student Affairs, and IT Department develop an automated alumni tracking system. Figure 3 shows the proposed framework, and Table 8 describes its components.

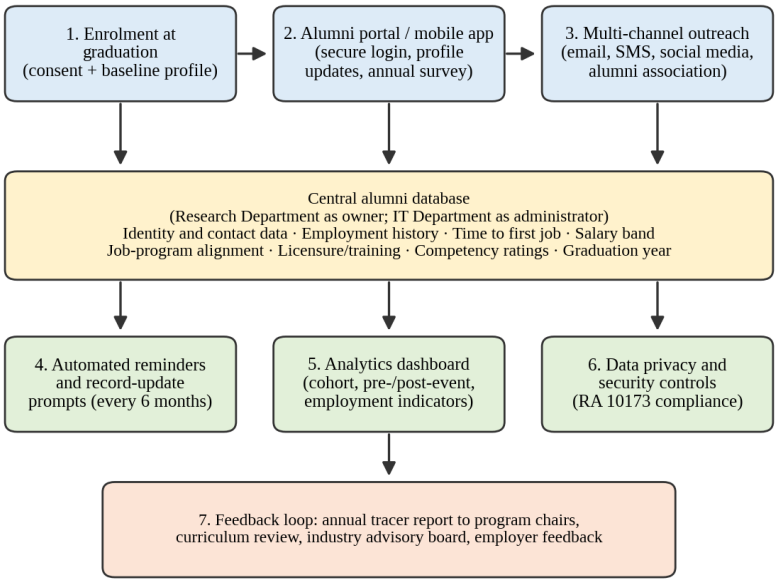

Figure 3. Proposed framework for an automated alumni tracking system.

Table 8. Components of the Proposed Automated Alumni Tracking System

Component	Function	Lead office
1. Consent and baseline registration	Collect each graduate's consent, personal email, mobile number, social media handle, and an alternate contact at clearance, together with a baseline profile.	Registrar; Office of Student Affairs
2. Alumni portal and mobile app	Secure web and mobile access where alumni update their employment record whenever they change jobs and complete a periodic tracer survey (replacing ad hoc online forms).	IT Department

3. Multi-channel outreach	Reach alumni through email, SMS, social media, and the alumni association; provide referral links so that snowball recruitment is tracked.	Office of Student Affairs
4. Central alumni database	Store standardized fields: identity and contact data, graduation year, employment history, employment status, time to first job, salary band, job–program alignment, licensure or training, and competency and core-value ratings.	Research Department (owner); IT Department (administrator)
5. Automated reminders	Send scheduled prompts (for example, every six months) to update records, and flag records with invalid contact details for follow-up.	IT Department
6. Analytics dashboard	Report employment rate, time to first job, alignment, and salary band by graduation cohort, enabling pre- and post-event comparisons and ready export for accreditation.	Research Department
7. Governance and privacy	Define access roles, retention periods, and security controls in compliance with the Data Privacy Act of 2012 (RA 10173).	Data Protection Officer
8. Feedback loop	Present an annual tracer report to program heads for curriculum review, and complement it with employer or industry advisory board feedback.	Program Chairpersons

Note. Office assignments are proposals for the institution's consideration.

The system can be introduced in phases: (1) a data audit that cleans existing alumni records, defines the data dictionary, and prepares consent forms; (2) development and a pilot with the next graduating batch; (3) a rollout that includes a campaign to enroll earlier alumni; and (4) an evaluation of response rate, record completeness, and user feedback, followed by yearly improvement. Because the system stores graduation year and employment history in structured form, it would let future tracer studies compare cohorts before and after events such as the pandemic without a separate survey.

Curricular enhancements for lower-ranked competencies and values

The faculty, chairpersons, and curriculum committee are encouraged to strengthen the competencies and values that alumni endorsed least. Table 9 proposes enhancements, which should be reviewed against accreditation and CHED requirements, piloted, and evaluated in the next tracer cycle.

Table 9. Proposed Curricular Enhancements

Area (endorsement)	**Proposed enhancement**	**Possible activities**
Entrepreneurial skills (26.1%)	Embed aviation entrepreneurship and intrapreneurship in the air transportation economics and management courses.	Business-plan projects on an aviation service (e.g., ground handling, cargo logistics, travel services); case studies of aviation start-ups; talks by alumni entrepreneurs; and innovation challenges with industry mentors.
Human relations skills (54.3%)	Add structured training in customer service, teamwork, conflict management, and intercultural communication.	Customer-service and service-recovery simulations; team-based operations exercises with debriefing; intercultural communication workshops (given the interest in employment abroad); interpersonal-skills criteria in the internship supervisor's evaluation.

Adeptness (51.1%) and Patriotism (40.0%)	Link core values to practice by connecting coursework to the local aviation industry and its regulation.	Case studies on Philippine aviation policy and regulation; industry visits; service-learning projects with airports or airlines; reflections on serving the Philippine and global aviation community.
Career preparation	Orient students to the realities of the industry, including overseas opportunities and the likelihood of starting outside the field.	Annual career orientation with alumni panels; industry advisory board input on job-relevant content; guidance on professional examinations and licensure.

Note. Percentages are the proportions of respondents who endorsed each competency or value (Tables 4 and 5).

Faculty should also prepare students holistically for the responsibilities of the field, where the consequences of error extend beyond grades to the safety of passengers, and should instill the competencies and core values both in direct instruction and through the school culture.

Directions for Future Research

Future tracer studies should (a) use a sampling frame drawn from the proposed alumni database to reduce selection bias; (b) record exact graduation year, employment status, time to first job, and salary band; (c) include enough pandemic-era graduates to compare cohorts with adequate statistical power; and (d) add employer feedback to triangulate alumni self-reports.

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