SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

ALTRACK: An Alumni Tracking Information System with Predictive Analytics for Enhanced Graduate Monitoring at Urdaneta City University

Ryan Jay A. Fermo[1], Leo Grabriel V. Villanueva[2], Christine Lourrine S. Tablatin[3], Michael E. Acosta[4]
[1,2,3,4]School of Advanced Studies (SAS)
Pangasinan State University, Urdaneta City Campus

Article Info:
Received: ***05 June 2025;*** *Revised:* ***19 Aug 2025;*** *Accepted:* ***21 Sept 2025;*** *Available Online:* ***17 Dec 2025***

Abstract – *The development and evaluation of ALTRACK: An Alumni Tracking Information System with Predictive Analytics for Enhanced Graduate Monitoring at Urdaneta City University focused on addressing the limitations of the university's manual and fragmented graduate tracer process. The system was designed to improve the collection, management, and analysis of alumni data, provide real-time employment tracking, support job matching, and generate data-driven insights through predictive analytics to enhance institutional decision-making and curriculum development. The study employed a descriptive-developmental research design using the Rapid Application Development (RAD) model, which involved requirements planning, user design, construction, and implementation. The system was evaluated by alumni and key university stakeholders in terms of usability, performance, reliability, maintainability, and security using a weighted mean analysis. Results revealed that ALTRACK obtained a highly acceptable rating across all evaluation criteria, with an overall weighted mean of 4.76, indicating strong user acceptance. The findings also showed that the system effectively addresses common issues in traditional tracer studies such as incomplete records, delayed reporting, and lack of centralized data management. The study concludes that ALTRACK is an effective and efficient solution for modernizing alumni tracking at Urdaneta City University. It enhances graduate monitoring, improves employment data accuracy, and supports evidence-based institutional planning. The system is recommended for full implementation and integration with existing university information systems to further strengthen alumni engagement and graduate outcome tracking.*

Keywords – *Alumni Tracking, Information System, Predictive Analytics.*

INTRODUCTION

Comprehensive graduate monitoring serves as an empirical compass for institutional realignment, bridging academic competencies with industry expectations. High-impact monitoring allows universities to isolate long-term professional trajectories rather than just immediate employment rates (Alumni, 2021).

Traditional, localized survey methods suffer from data rot, declining response rates, and severe administrative lag. Transitioning to integrated management information systems mitigates these bottlenecks by offering automated tracking mechanisms. (Bautista & Ramos, 2022).

The deployment of predictive analytics in modern HEIs has shifted administrative workflows from reactive reporting to proactive intervention. Predictive modeling allows academic planners to forecast employability trends based on baseline historical student metrics. (Castillo, 2023).

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

Graduate Tracer Studies (GTS) are vital tools for Higher Education Institutions (HEIs) to evaluate graduates' employability, career progression, and the alignment of academic programs with evolving industry demands. In the Philippines, the Commission on Higher Education (CHED) mandates HEIs to conduct regular tracer studies as a core component of institutional quality assurance and curriculum evaluation. These studies yield critical data on employment status and workplace performance, enabling institutions to continuously refine their educational services (Semos et al., 2020).

However, many institutions struggle to maintain accurate longitudinal data due to manual, fragmented, and inefficient alumni monitoring processes. At Urdaneta City University (UCU), the Alumni Association faces similar operational challenges in tracking graduates and managing records effectively. This data gap hinders the university's ability to make swift, data-driven institutional decisions.

To address this challenge, this study developed ALTRACK: A Smart Alumni Tracer Management Information System with Predictive Analytics for Urdaneta City University. Moving beyond traditional data storage, ALTRACK integrates an automated platform for real-time tracking, job matching, and predictive data analytics. Educational Data Mining (EDM) techniques provide software engineers with actionable patterns from fragmented institutional repositories, transforming static graduate rosters into relational intelligence hubs. (Santos, 2024). This paper presents the development of the system and evaluates how its predictive capabilities can transform raw institutional data into actionable insights, ultimately enhancing graduate monitoring, strengthening academic programs, and fortifying the university's career support services.

OBJECTIVES OF THE STUDY

The primary goal of this study was to design and develop ALTRACK, a web-based Alumni Tracking Information System with Predictive Analytics aimed at enhancing graduate monitoring at Urdaneta City University. To achieve this, the study first analyzed the workflows and data gaps within the current manual alumni tracking procedures. Based on these findings, the functional and non-functional requirements for the automated platform were established. Subsequently, the ALTRACK system was architected and implemented to optimize alumni records management and data-driven reporting. Finally, the system's quality and operational viability were validated through comprehensive User Acceptance Testing (UAT), evaluating its performance across five distinct criteria: usability, performance, reliability, maintainability, and security.

MATERIALS AND METHODS

This section outlines the research design, data sources, instrumentation, and system modeling tools deployed in the development and evaluation of ALTRACK: A Smart Alumni Tracer Management Information System with Predictive Analytics for Urdaneta City University. This study integrated qualitative and quantitative methods to systematically gather system requirements and quantify user acceptability. Document analysis, participatory observation, software modeling frameworks, and a structured evaluation survey were utilized to ensure the system's structural integrity and operational viability.

Research Design

The study utilized a descriptive-developmental research design to address operational challenges and data fragmentation within the Urdaneta City University Alumni Association (UCUAA). System engineering was governed by the Rapid Application Development (RAD) model which, as noted by Kissflow (2024), leverages prototyping and iterative loops to maximize development speed, cost efficiency, and flexibility in response to evolving user needs. Utilizing rapid prototyping methods guarantees that software architecture remains flexible and highly responsive to end-user feedback loops. Iterative construction cycles dramatically accelerate system deployment timelines compared to rigid linear workflows. (Garcia & Martinez, 2021). Structurally

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

executed across four sequential phases such as requirements planning, user design, construction, and cutover, this agile framework embedded continuous stakeholder feedback directly into the development cycle, ensuring the resulting ALTRACK platform precisely matched institutional and user requirements.

Sources of Data and Sampling

Primary data sources included key institutional stakeholders such as the UCUAA President, active alumni, university graduates, and guidance personnel, who provided baseline insights into manual workflows and system requirements. Secondary data were synthesized from a thematic review of academic literature, institutional reports, and empirical studies on information systems and predictive modeling. To evaluate the completed platform, a convenience sampling technique was deployed to select evaluators based on their immediate availability and accessibility within the university.

Instrumentation and Data Collection

Qualitative data collection was achieved through document analysis and focused observation. Document analysis of physical records, alumni checklists, and registration forms ensured legacy data was successfully mapped to the digital platform, while concurrent observation of administrative workflows isolated operational bottlenecks and data entry delays. For the quantitative phase, a structured survey utilizing a 5-point Likert scale was deployed during User Acceptance Testing (UAT) to evaluate stakeholder feedback regarding the system's operational quality.

Tools for Data Analysis

System architecture and database structures were engineered using Entity-Relationship Diagrams (ERDs), Unified Modeling Language (UML) Use Case Diagrams, and system flowcharts to map system processes, user privileges, and data routing. These models were translated into a logical database schema and implemented via a live database instance. Implementing scalable database schema models through rigorous entity relationship designs optimizes data routing and protects transactional processing integrity over complex historical records. (Aquino, 2023).

RESULTS AND DISCUSSION

This section presents the empirical findings derived from the implementation and evaluation of ALTRACK: A Smart Alumni Tracer Management Information System with Predictive Analytics for Urdaneta City University (UCU). The results are logically arranged to directly address the study's specific research objectives: analyzing the existing alumni tracking processes, determining the functional and non-functional system requirements, and evaluating the system's operational acceptability through User Acceptance Testing (UAT).

Analysis of Existing Alumni Tracking Processes

Regarding the existing alumni tracking processes, the university currently follows a graduate tracer process where the Alumni President distributes tracer forms to graduates and collects their responses for monitoring and tracking purposes. The gathered information is then used to trace graduates' employment status and other relevant alumni data. This manual configuration hinders dynamic information updates and creates reporting delays. The current graduate tracing workflow is illustrated in Figure 1.

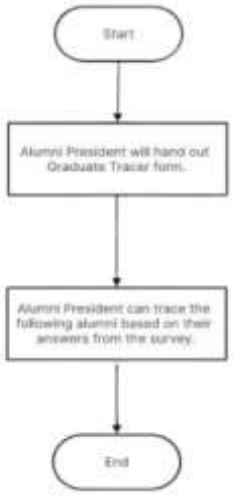

Figure 1. Current graduate tracing workflow.

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

For the existing process of posting announcements, the university currently relies on the Alumni President to upload news and event updates through the UCU Facebook page. Alumni are informed through these posts and further disseminate the information by contacting their former classmates regarding upcoming events. However, this manual method may result in delayed communication and limited dissemination of announcements. The current procedure for posting announcements is illustrated in Figure 2.

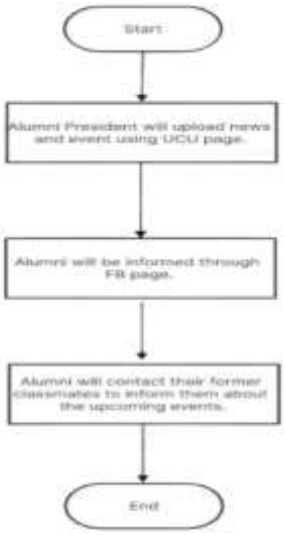

Figure 2. Current announcement posting workflow.

Regarding the existing process for job postings, the PACC is responsible for conducting job fairs and disseminating employment opportunities to alumni. Job vacancies are announced through on-site job fair activities and postings on the official Facebook page. However, this manual and social media-based approach may limit accessibility, organization, and timely dissemination of job-related information. The current procedure for job posting is illustrated in Figure 3.

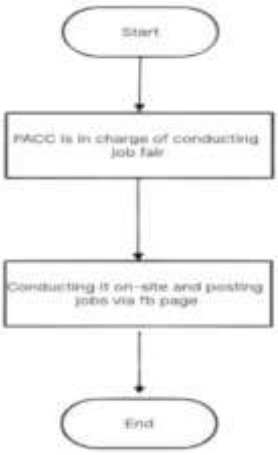

Figure 3. Current job posting workflow.

System Requirements Analysis

To effectively address the limitations of legacy manual workflows and establish a data-driven monitoring platform, the proposed system was developed around a concrete set of functional capabilities and operational quality attributes.

Functional Requirements

Functional requirements define the core characteristics, computations, and discrete actions the system must perform to fulfill business processes and satisfy distinct user actor permissions. In this system, these capabilities are mapped across specific system plates:

Alumni Tracking Component. The system must provide centralized data management capabilities for compiling extensive graduate records. This includes the ability for the Registrar to manually encode details or execute bulk spreadsheet imports and exports categorized by academic year. To ensure data integrity, each entry dynamically maps unique Ticket IDs and Student ID numbers to track employment status and career progression, as illustrated in Figure 4.

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

Figure 4. Alumni Tracking Interface.

Announcement Management Component. The system must act as a reliable broadcasting hub for institutional communication. System administrators, the Alumni President, and the Public Affairs and Placement Coordinator (PACC) OIC are authorized to compose, schedule, and publish official notices regarding campus news and career opportunities. Registered alumni automatically gain visual access to these announcements upon authentication, with the interface workflow displayed in Figure 5.

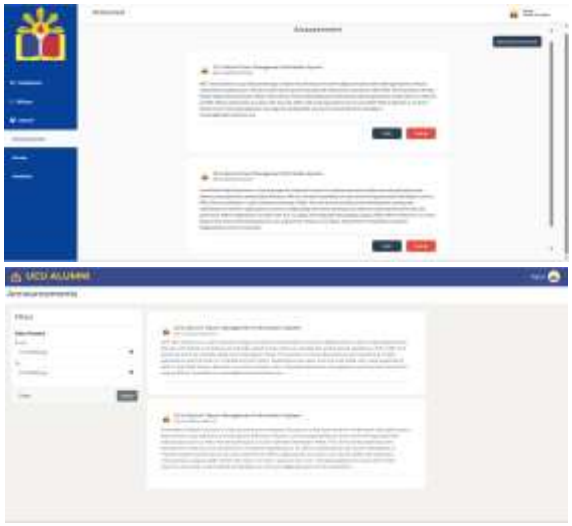

Figure 5. Announcement Management Panel.

Job Posting and Matching Component. The system must maintain a dynamic career network by allowing the PACC OIC to host, update, and manage active job listings alongside concrete corporate vacancy deadlines. The system deploys automated filtering to execute course-based job matching, prioritizing employment alternatives that align with the alumnus's undergraduate field of study. Alumni can review their application history log through the illustrated in Figure 6 and Figure 7.

Figure 6. Job posting interface.

Figure 7. Career matching module.

Descriptive Analytics Component. The dashboard environment must generate statistical visualization modules using real-time institutional data. This requires generating automated graphs charting annual graduation volumes, sex distribution metrics, and structural charts validating employment survey yields and post-application statuses. The data visualization layout is presented in Figure 8.

Figure 8. Descriptive Analytics Dashboard.

Predictive Analytics Component. Leveraging localized data parameters, the system must employ predictive computing models to identify underlying trends and future outcomes. It assesses structural attributes, such as major subject impacts, to evaluate how effectively specific educational programs prepare

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

graduates for core professional landscapes. Linear and classifier models built upon localized historical training datasets provide reliable frameworks for predicting workforce integration pathways, provided data inputs are constantly updated. (Villanueva & Reyes, 2024).

This forward-looking analytical module is depicted in Figure 9.

Figure 9. Predictive Analytics and Trend Forecasting Interface.

Non-Functional Requirements

The non-functional requirements dictate the technical constraints, quality attributes, and operational criteria governing the execution environment of the software. Benchmarking software infrastructure using international quality models establishes a transparent metric for verifying technical acceptability. Standardized non-functional evaluations isolate operational vulnerabilities before a system undergoes institutional rollout. (Tan, 2022). These criteria align explicitly with the standard ISO/IEC 25010 software quality characteristics utilized during system evaluation:

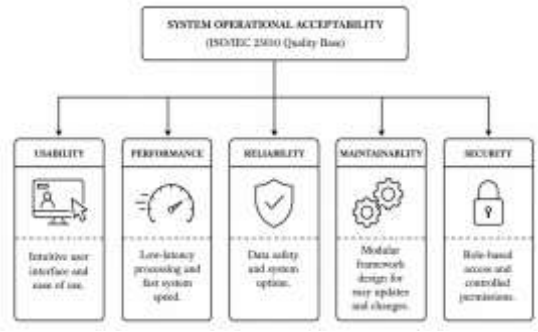

Figure 10. System Operational Acceptability Framework.

Maintainability. Relates to the ease with which the codebase can be modified, bugs fixed, or features expanded within production environments. The system must implement a modular architectural framework using clean PHP and MySQL conventions, ensuring technical evaluators can smoothly deploy updates, add new pages, or adjust database schemas without breaking dependent tracking functions.

Security. Governs systemic data protection, vulnerability management, and user authentication constraints. The platform must enforce Role-Based Access Control (RBAC), securing registrar actions, placement configurations, and sensitive alumni profiles behind authenticated Officer IDs and encrypted credential keys. Restricted sub-tier permissions must limit access paths for encoders and secretaries via pop-up access layers to prevent information loss.

Performance. Focuses on system speed, efficiency, and runtime optimization under standard execution workloads. Computational tasks, real-time analytics generation, and massive database queries, such as executing bulk Excel data imports or exports, must execute with minimum latency to avoid performance bottlenecks or timeouts.

Reliability. Dictates data consistency, operational uptime, and fault-tolerance constraints over extended processing durations. The underlying storage engines must maintain transaction handling safety, ensuring tracer inputs, user accounts, and historical application details are stored securely without systemic corruption or memory leaks.

Usability. Pertains to the presentation layout, user interface (UI) design, and general operational ergonomics. The system components must utilize clearly recognizable navigation icons, streamlined forms, and centralized visualization tools, mitigating cognitive loads and preventing user confusion among casual alumni and primary administrative operators alike.

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

System Operational Acceptability

High empirical acceptance scores in system testing often correlate with targeted user-centric design paradigms executed during the initial prototype phase. Software that minimizes administrative friction inherently scores higher across user groups. (Valenzuela, 2023). The User Acceptance Testing (UAT) results, as summarized in Table 1, revealed that all evaluated non-functional requirements achieved a "Highly Acceptable" verbal description, yielding an overall weighted mean of 4.76. Among the indicators, maintainability obtained the highest score (WM = 4.80), followed by security (WM = 4.78), performance (WM = 4.77), and reliability (WM = 4.74). Usability received the lowest yet still highly favorable rating (WM = 4.73), confirming that the developed tracking platform effectively satisfies all institutional software quality standards.

Table 1. Summary of Non-functional Requirements

Non-functional Requirements	WM	DESC
1. Usability	4.73	HA
2. Reliability	4.74	HA
3. Performance	4.77	HA
4. Security	4.78	HA
5. Maintainability	4.8	HA
Weighted Mean	4.76	HA

Legend: HA-Highly Acceptable, A-Acceptable, MA-Moderate, SA-Slightly Acceptable, NA-Not Acceptable

CONCLUSION AND RECOMMENDATION

Conclusion

The development and architectural implementation of the web-based ALTRACK platform successfully establishes an automated, predictive data analytics infrastructure that transforms traditionally static, fragmented graduate records into actionable institutional insights. By shifting from manual survey workflows to a centralized ecosystem, the platform mitigates administrative latency and significantly reduces data compilation errors.

Achieving a "Highly Acceptable" rating with an overall weighted mean score of 4.76 during User Acceptance Testing (UAT) empirically validates that the software architecture satisfies the rigorous technical quality benchmarks established by the ISO/IEC 25010 framework. The high evaluation yields across all core software quality metrics prove that the application is operationally resilient and ready for immediate, full-scale administrative deployment within Urdaneta City University.

Recommendations

Based on the findings, conclusions, pilot implementation, and User Acceptance Testing (UAT) results of the ALTRACK platform, the following recommendations are proposed for its wider implementation and continuous enhancement at Urdaneta City University.

1. Wider Institutional Implementation. Following the positive results of pilot testing, the ALTRACK platform is recommended for broader implementation across relevant university offices and graduating student cohorts. Institutional adoption of the system may strengthen graduate monitoring, alumni engagement, and tracer data collection processes within the university.

2. Integration with Existing University Systems. Interoperability between detached institutional platforms represents a critical milestone for university data stewardship, removing human errors introduced through manual double-entry loops. (Lopez, 2022). To improve operational efficiency and data consistency, the system is recommended for integration with existing university platforms, particularly the Student Information System (SIS), registrar databases, and alumni records. This integration can streamline data exchange, reduce repetitive encoding, and improve access to graduate information for administrators and alumni.

3. User Support and Engagement Enhancement. Regular orientations, training sessions, and user support resources are recommended to ensure effective system utilization among graduates, employers, and university personnel. Integrating natural language processing

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

engines or conversational automation modules into user interfaces drastically enhances casual user retention and continuous database participation. (Mendoza et al., 2025). Future versions may also incorporate an AI-powered chatbot or automated help feature to provide real-time assistance and respond to common user concerns.

4. Use of Analytics for Academic Planning. The data and reports generated by the system are recommended to be utilized by academic departments, administrators, and curriculum planners as supplementary input for curriculum enhancement, graduate employability initiatives, and institutional decision-making.

5. Future Scaling and Continuous Improvement. Continuous monitoring, maintenance, and system enhancement are recommended to ensure long-term usability, scalability, and responsiveness to the evolving needs of alumni and the university. Feedback gathered from future users may be used to guide succeeding improvements before full-scale institutional rollout.

REFERENCES

Alumni, J. R. (2021). The evolution of tracer metrics in modern academic management frameworks. Journal of Educational Systems Engineering, 14(2), 112–125.

Aquino, M. D. (2023). Relational database schema optimization for academic monitoring tools. Philippine Journal of Information Technology, 16(1), 45–58

Bautista, L. E., & Ramos, K. J. (2022). Overcoming data latency in traditional institutional graduate surveys. Southeast Asian Review of Higher Education Quality, 29(3), 201–214.

Castillo, F. T. (2023). Predictive metrics and institutional strategy: A data-driven blueprint for higher education. Computer Science and Academic Analytics, 8(4), 310–322.

Garcia, S. H., & Martinez, R. C. (2021). Agile methodology and rapid prototyping in administrative software development. Systems Engineering Quarterly, 33(2), 155–168

International Organization for Standardization. (2023). *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models*. ISO/IEC Standard No. 25010:2023. https://www.iso.org/standard/78174.html

Kissflow, T. (2024, April 30). Rapid Application Development (RAD) | Definition, Steps & Full Guide. Kissflow, Inc. Retrieved from:https://kissflow.com/application-development/rad/rapid-application-development/

Kula-Semos, M., Hamadi, C., Aime, F., & Nasale, P. (2020). Graduate tracer study 2020: Formal report. Divine Word University. Retrieved from:https://www.dwu.ac.pg/en/images/All_Attachements/QAD/Graduate-Trace-Study-2020-Formal-Report.pdf

Lopez, G. N. (2022). Enterprise systems interoperability and automated registrar workflows. Journal of Software Engineering and Data Science, 11(3), 142–156

Mendoza, E. C., Soriano, V. A., & Pascual, D. M. (2025). Implementing baseline conversational AI modules for automated public user platforms. Journal of Intelligent Interface Design, 20(2), 99–112

Santos, P. L. (2024). Educational data mining applications for tracking professional trajectories. Asian Journal of Technology Management, 18(1), 22–37

Tan, J. K. (2022). A localized analysis of ISO/IEC quality metrics in institutional software testing. Journal of Quality Assurance in Software Systems, 7(4), 288–301

Valenzuela, R. M. (2023). Quantifying user acceptance testing in regional state university information deployments. Philippine Software Engineering Journal, 12(2), 84–97.

SOUTHEAST ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Volume 10, Issue 1, 2025
P-ISSN: 2672-2984
E-ISSN: 2672-2992
www.sajst.org

Villanueva, K. A., & Reyes, M. S. (2024). Predictive classifiers and analytical models in tracking educational trends. Computational Intelligence Review, 30(1), 130–145

PLEASE INCLUDE CONTACT INFORMATION:
NAME: RYAN JAY A. FERMO
CONTACT NO: 09194568956
EMAIL ADDRESS: RYANFERMO6@GMAIL.COM