Assessing Alumni Data Integration Readiness To Support Strategic Decision-Making At SMK Negeri 9 Medan

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Abstract
This study aims to demonstrate an assessment approach for alumni data integration readiness to support strategic decision-making at SMK Negeri 9 Medan. Five dimensions are considered: data governance, data quality, interoperability, security and privacy, and organizational readiness, with COBIT 2019 serving as a reference for information and technology governance. A synthetic dataset representing 30 hypothetical respondents was created solely to demonstrate the analysis. The illustrative five-point Likert instrument was converted to a 0–100 index. The simulated overall readiness index is 58.6%; security and privacy scores highest (71%), while interoperability scores lowest (47%). Compared with an illustrative target of 80%, interoperability has the largest gap at 33 percentage points. The results demonstrate how standardization, validation, data ownership, and secure data-sharing procedures can be prioritized. Because the values are synthetic and were not collected at the school, they must not be interpreted as empirical findings about SMK Negeri 9 Medan.
***Keywords**:* alumni data, integration readiness, COBIT 2019, data quality, strategic decision-making.

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Introduction

Alumni data can provide vocational schools with strategic information about graduates' transition into employment, the relevance of competencies, curriculum improvement needs, and opportunities for partnerships with industry. However, the value of such information depends on whether data are collected consistently, updated, linked across sources, and made available to decision-makers in an understandable form. Data-quality literature shows that information quality involves more than accuracy; completeness, consistency, understandability, and accessibility also influence usefulness [6][7].

Data integration is not simply a matter of merging files or building an application. It requires data ownership rules, standardized element definitions, validation mechanisms, access controls, and clearly assigned responsibilities throughout the data life cycle. Khatri and Brown describe data governance in terms of decision rights and accountability for data assets [8], while DAMA-DMBOK treats governance, quality, architecture, integration, metadata, and security as interconnected practices [9].

COBIT 2019 provides a governance and management framework for information and technology that can be tailored to an organization through design factors and governance/management objectives [10], [11]. Studies by researchers affiliated with Universitas Pembangunan Panca Budi have also applied COBIT-related frameworks to evaluate IT governance, assess capability, and formulate improvement recommendations in organizational and educational contexts [2]–[5]. Research on UML-based alumni information systems provides additional context for mapping interactions and alumni-data management processes [1].

Nevertheless, alumni data integration readiness at an individual school should be assessed in terms of organizational conditions, data quality, interoperability among sources, protection of personal information, and staff capacity. This paper focuses on an assessment design rather than claiming that an integration system has been implemented or tested at SMK Negeri 9 Medan. Its practical contribution is an initial readiness framework that combines integration dimensions with a COBIT 2019 governance orientation. The objectives are to demonstrate how to calculate a readiness index, identify priority gaps, and formulate recommendations that can later be verified through field research.

Literature Review

2.1 Alumni Data Integration and Governance

Data integration is the process of aligning data from different sources so that they can be accessed and used consistently. In an alumni context, potential sources may include graduate databases, tracer-study forms, career-center records, certification records, and industry partnership information. These are possible sources that must be verified at the school; this paper does not claim that all are currently available. UML-based alumni information-system research highlights the importance of mapping actors, activities, process sequences, and data structures before implementation [1].

Data governance determines who is authorized to define, correct, approve, share, and delete data. Data quality can be assessed through dimensions such as accuracy, completeness, consistency, timeliness, and accessibility [6], [7]. Quality assessment should be followed by continuous improvement and control rather than one-time data cleaning [12].

2.2 COBIT 2019 as a Governance Reference

COBIT 2019 links stakeholder needs to enterprise goals and governance/management objectives for information and technology. Objective selection should be tailored to the organizational context and design factors rather than performed mechanically [10], [11]. For alumni data integration readiness, APO14 (Managed Data) is relevant to data management; APO13 (Managed Security) to security; BAI03 (Managed Solutions Identification and Build) may be considered when designing a solution; DSS06 (Managed Business Process Controls) is relevant to process controls; and MEA01 (Managed Performance and Conformance

Monitoring) can inform monitoring. This is an initial conceptual mapping and must be validated against the design factors and evidence of actual processes.

2.3 Organizational Readiness and Decision Support

Integration readiness depends not only on technology but also on leadership, user competencies, agreed procedures, and organizational support. Information-systems success research connects system and information quality with use, user satisfaction, and net benefits [13]. Technology-acceptance research also emphasizes relationships among perceived quality, satisfaction, and system use [14]. Therefore, the value of alumni data integration should be assessed not only by whether a system exists, but also by whether its data support relevant, timely, and traceable decisions.

Research Methodology

3.1 Research Design and Limitations

This draft uses a descriptive quantitative design to demonstrate a readiness-assessment approach. All data presented are synthetic dummy values created to illustrate tables, graphs, index calculations, and discussion. They were not obtained from interviews, questionnaires, documents, or systems belonging to SMK Negeri 9 Medan. Therefore, the results must not be cited as empirical findings. For an actual study, data must be collected after obtaining permission and consent from relevant parties.

3.2 Illustrative Population, Sample, and Instrument

The simulation uses 30 hypothetical respondents: 3 school leaders or decision-makers, 7 data administrators or operators, 12 teachers or homeroom teachers, and 8 personnel assumed to be involved in industry relations or graduate services. This composition is only an example; actual respondent numbers and roles should be determined by mapping the school's stakeholders. The illustrative instrument uses a five-point Likert scale (1 = strongly disagree; 5 = strongly agree), with items representing the five readiness dimensions.

3.3 Dimensions and Index Calculation

Five dimensions are used: (D1) data governance and ownership, (D2) data quality and standardization, (D3) interoperability and data exchange, (D4) security and privacy, and (D5) organizational and user readiness. Dummy dimension scores are expressed as index percentages. For a field instrument, the index for each dimension may be calculated as: index = [(actual score − minimum score) / (maximum score − minimum score)] × 100%. The values in this paper are prepared as simulated percentages and are not calculated from real responses.

For illustrative interpretation, index scores of 0–39 are categorized as low, 40–59 as moderately low, 60–79 as moderately high, and 80–100 as high. These thresholds are working categories for demonstration and are not official COBIT 2019 standards. The 80% target is also illustrative and has not been approved by the school.

3.4 Data Analysis

The analysis is descriptive: the mean of the five dimensions is calculated, each dimension is compared with the illustrative target, gaps are ranked, and improvement recommendations are formulated. The gap formula is target minus dimension score. In a field study, descriptive analysis should be accompanied by checks for response completeness, expert review of instrument content, pilot testing, and documentation of data collection. If COBIT is used for a formal assessment, evidence should be gathered through interviews, document reviews, observation, and validation with process owners.

Results

4.1 Readiness Index Profile (Dummy Data)

Table 1 presents the simulated score for each dimension. The mean readiness index is 58.6%, which falls in the moderately low category under the working classification used in this draft. Security and privacy has the highest score (71%), while interoperability has the

lowest (47%). This pattern was created to demonstrate how quantitative results can inform priorities; it does not represent the actual condition of the school.

Table 1. Alumni data integration readiness index by dimension (dummy data)

No.	Dimension	Index (%)	Illustrative category
1	Data governance and ownership	62	Moderately high
2	Data quality and standardization	58	Moderately low
3	Interoperability	47	Moderately low
4	Security and privacy	71	Moderately high
5	Organizational and user readiness	55	Moderately low
6	Overall mean	58.6	Moderately low

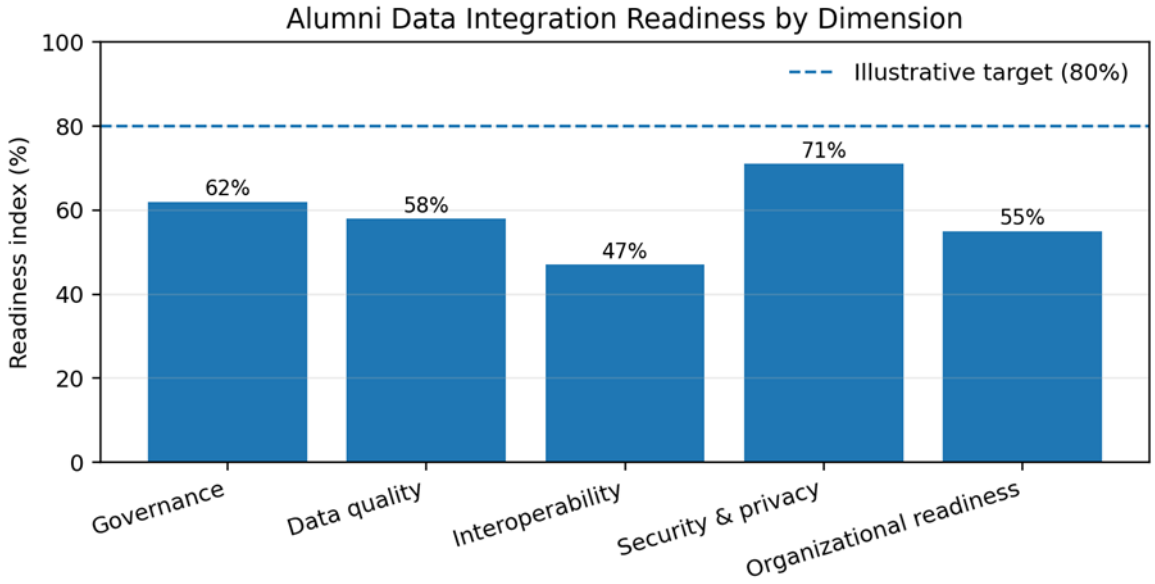


Figure 1. Comparison of readiness indices by dimension with the illustrative 80% target

Figure 1 shows that no dimension reaches the illustrative 80% target. This does not mean that the school fails to meet a formal standard, because the target is used only as an analytical reference. In field research, the target should be agreed with the school based on needs, risks, resources, and strategic objectives.

4.2 Readiness Gaps and Priority Ranking

The gap is calculated by subtracting each dimension's index from the illustrative target of 80%. Table 2 shows the largest gap for interoperability (33 percentage points), followed by organizational readiness (25 points) and data quality (22 points). Under a gap-based prioritization approach, interoperability becomes the initial focus because reliable cross-source integration is difficult when formats, codes, graduate identifiers, and variable definitions are inconsistent.

Table 2. Gaps from the illustrative target and improvement priorities (dummy data)

No.	Dimension	Score	Target	Gap (pp)	Priority
1	Interoperability	47	80	33	1
2	Organizational and user readiness	55	80	25	2
3	Data quality and standardization	58	80	22	3

4	Data governance and ownership	62	80	18	4
5	Security and privacy	71	80	9	5

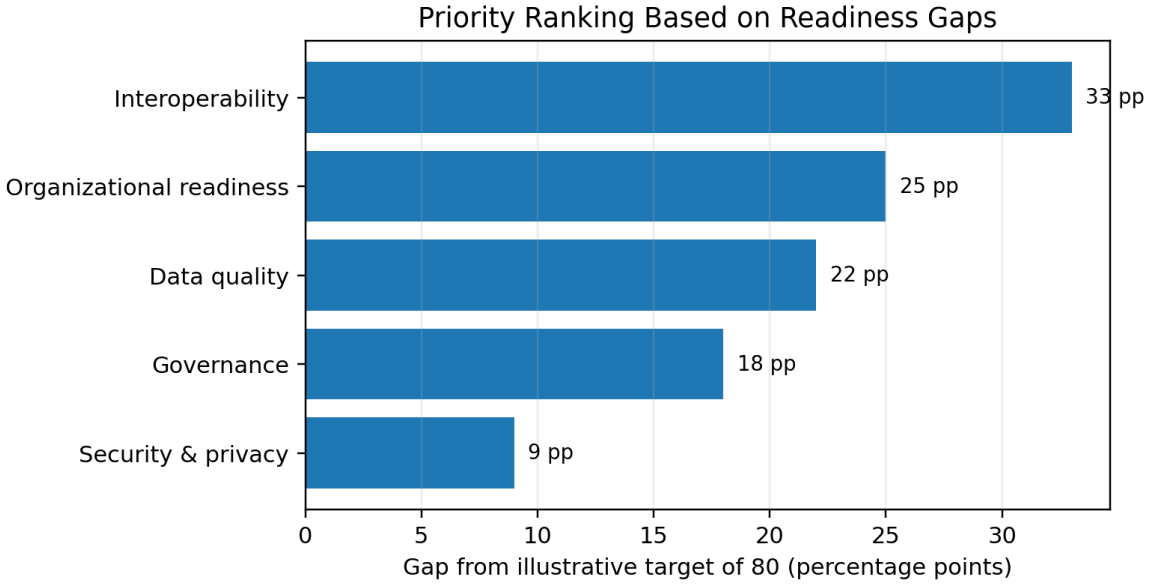


Figure 2. Ranking of gaps against the illustrative 80% target.

4.3 Implications for Strategic Decision-Making

If a similar pattern is identified through actual data collection, the school could begin by inventorying data sources, developing a data dictionary, assigning a consistent graduate identifier, and defining validation rules. Standardization is a foundation for comparing information such as employment status, occupational field, waiting time to employment, competency relevance, certifications, and training needs. These are proposed indicators that must be agreed upon and tested, not claims about data currently available at the school.

The simulated organizational-readiness gap suggests the need to assign data owners and operational administrators, establish update procedures, and provide short training for users. Good governance should specify who can access data, for what purposes, how changes are recorded, and how often records are updated. These controls align with data-governance and information-quality principles [8], [9].

Security and privacy must be designed from the outset, even though this dimension has the highest simulated score. Graduate information may contain identifiers and employment histories; collection and processing should therefore have a clear purpose, role-based access, secure storage, and procedures for meeting data-subject rights under applicable regulations. Individual records should not be exposed in strategic reports without a lawful basis; aggregated analytical outputs can reduce identity exposure.

4.4 Phased Recommendations

Table 3 summarizes actions derived from the simulation. The plan must be confirmed with stakeholders and adapted to the school's systems, budget, regulations, and staffing.

Table 3. Initial Recommendations Based On The Simulation

No.	Area	Recommended action	Proposed owner	Initial indicator
1	Interoperability	Inventory sources; create data dictionary; standardize formats and	Data team and operators	Approved source inventory and data dictionary

		codes; define graduate-identity matching rules		
2	Organizational readiness	Assign data owners; define roles; establish update SOPs; train users	School leadership and relevant units	Assignment and SOP available
3	Data quality	Audit a sample; detect duplicates; check missing values; establish correction process	Operators, homeroom teachers, and career center	Completeness and duplication rates measured
4	Governance	Define approval workflows, change documentation, and monitoring indicators	School leadership and process owners	Responsibility matrix and change log
5	Security and privacy	Apply least-privilege access; state processing purposes; secure files; define incident procedures	System administrator and school leadership	Access matrix and security procedure

4.5 Limitations

The main limitation of this draft is its use of dummy data, the absence of real respondents, and the lack of instrument validation or verification of school documents. The index values cannot be used to state the actual readiness level of SMK Negeri 9 Medan. In addition, the readiness dimensions and category thresholds are an operational design for demonstration, not a validated standard instrument. The next stage should include preliminary interviews, stakeholder and data-source mapping, questionnaire validation, actual data collection, and alignment of COBIT objectives with relevant design factors.

Conclusion

This draft demonstrates an approach to assessing alumni data integration readiness across five dimensions: governance, data quality, interoperability, security and privacy, and organizational readiness. In the dummy-data simulation, the mean index is 58.6%, and the largest gap is interoperability at 33 percentage points against the illustrative 80% target. These results demonstrate the analytical approach only and do not represent empirical conditions at the school. Conceptually, alumni data integration should begin with standardized data and graduate identifiers, clear data-management responsibilities, quality controls, secure access, and monitoring indicators that support strategic decisions. The practical implication is that the framework may serve as a starting point for an assessment instrument. Further research must replace all dummy values with properly collected field data, validate the instrument, and examine the suitability of COBIT 2019 objectives before drawing conclusions about organizational readiness.

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