Implementation TOGAF ADM in XYZ High School Information System

Putu Widiadnyana[a1], Putu Veda Andreyana[b2]
[a]STIKOM Bali Institute of Technology and Business
[b]Information Technology Study Program, Udayana University
email:[1]widiadnyana@stikom-bali.ac.id, [2]putuveda@unud.ac.id

Abstrak

Penelitian ini bertujuan untuk menerapkan kerangka kerja TOGAF Architecture Development Method (ADM) dalam perencanaan arsitektur sistem informasi pada lingkungan sekolah menengah atas. Permasalahan yang dihadapi sekolah adalah belum terintegrasinya sistemm akademik, administrasi dan layanan pendukung sehingga menghambat efektivitas pengelolaan data dan pengambilan keputusan. Penelitian ini menggunakan pendekatan dengan studi kasus dengan data dummy pada SMA XYZ. Penerapan TOGAF ADM dilakukan secara menyeluruh mulai dari Preliminary Phase hingga Opportunities and Solutions. Hasil penelitian menunjukkan bahwa TOGAF ADM mampu menghasilkan cetak biru arsitektur bisnis, data, aplikasi dan teknologi yang terstruktur serta selaras dengan visi dan misi sekolah. Simpulan dari penelitian ini adalah bahwa TOGAF ADM dapat digunakan sebagai pedoman strategis dalam pengembangan sistem informasi sekolah secara terintegrasi.

Kata kunci: *TOGAF ADM, arsitektur enterprise, sistem informasi sekolah, perencanaan TI*

Abstract

This research aimed to apply the TOGAF Architecture Development Method framework in planning an information system architecture in a senior high school environment. The main problem faced by schools was the lack of integration between academic, administrative, and supporting service systems, which hindered effective data management and decision-making. This research used a case study approach with dummy data at SMA XYZ. The implementation of TOGAF ADM was carried out comprehensively from the Preliminary Phase to Opportunities and Solutions. The results showed that TOGAF ADM was able to produce a structured blueprint of business, data, application, and technology architectures aligned with the school's vision and mission. The conclusion indicated that TOGAF ADM could serve as a strategic guideline for developing integrated and sustainable school information systems.

Keywords: *TOGAF ADM, enterprise architecture, school information systems, IT planning*

1. Introduction

Technological advancements are also being utilized in the world of education, or what is known as Education 4.0. In this era, the world of education is transforming its learning process to ensure optimal and continuous learning, without the constraints of space and time. Information technology has driven digital transformation across various sectors, including education. Schools, as educational organizations, are required to manage information quickly, accurately, and in an integrated manner to support academic processes, administration, and managerial decision-making. Information technology is a technology used to process data, including processing, obtaining, organizing, storing, and manipulating data in various ways to produce quality information. One form of information technology application that can be applied to the field of education is the information system that will be used by a high school in its implementation within the school environment.

In its activities, XYZ High School has not optimized the use of information technology and does not yet fully have an architectural design and use framework in practice, many schools

still face challenges such as siloed information systems, limited application usage for specific functions, and manual or semi-digital data management using office software. This situation has the potential to lead to data redundancy, information inconsistency, and low operational efficiency. For example, teachers are required to improve the quality and learning process by utilizing information technology. This effort is being undertaken to encourage schools to produce high-quality graduates.

In some business processes, schools still rely on file Excel is used for data recording. This sometimes creates problems such as data redundancy. Furthermore, manual attendance management sometimes takes more time. Currently, XYZ High School's technology infrastructure utilizes computers with Microsoft Office software for administrative management and student data collection, but there is no supporting system. This problem results in the inability to obtain necessary data and information on time and effectively due to the manual data management process.

Several previous studies have shown that this problem also occurs in secondary educational institutions. Research by Silaen and Mastan (2021) revealed that SMA Maria Mediatrix does not yet have an integrated information system architecture, so business processes such as PPDB, learning planning, and administration are still carried out conventionally [1]. Other research states that the implementation of enterprise architecture can help organizations describe existing conditions and design target conditions that align with the organization's vision and mission. Enterprise architecture also plays a vital role in improving business efficiency through data integration and strategic use of information technology [1].

TOGAF (The Open Group Architecture Framework) is one of the framework enterprise architectures which is widely used because it provides a systematic method of architectural development through Architecture Development Method (ADM). TOGAF ADM enables organizations to design business architecture, information systems, and technology in a structured and sustainable manner [2]. Based on this background, this study aims to design enterprise architecture school information system using the TOGAF ADM framework with a case study at XYZ High School using data dummy, so it is hoped that it can become a reference in developing an integrated school information system.

The problem limitation in this research is the design enterprise architecture school information system that focuses on mapping technology architecture using framework The Open Group Architecture Framework (TOGAF) with a case study at XYZ High School based on data dummy This study only covers the analysis of existing conditions and the design of technology architecture as the basis for school academic management, so other TOGAF stages such as business architecture, data architecture, and application architecture are not discussed in depth. This limitation is applied so that the research can be conducted in a focused and in-depth manner on aspects of information technology infrastructure that support data integration and increase the efficiency of academic management in the school environment.

This research is expected to be able to contribute to the planning and development of school information systems through design enterprise architecture-based framework TOGAF. With a focus on technology architecture, the results of this study produce a structured overview of information technology infrastructure that aligns with the needs of academic management at XYZ High School. The proposed architectural design is expected to serve as a reference for the school in making strategic decisions related to information technology development, as well as supporting increased efficiency, effectiveness, and quality of academic services in line with the demands of digital transformation in the field of education.

2. Research methodology

This research uses a qualitative approach with the method literature review. Literature review defined as the process of selecting, reviewing, and evaluating relevant scientific documents, which contain ideas, data, and research findings related to a particular topic, with the aim of supporting and directing the research to be conducted [3]. The aim of this research is to analyze and compare framework CIS Controls v8 and ISO/IEC 27001:2022 in the context of information security, to identify the differences in characteristics, scope, and control approaches of each framework, as well as providing references in the selection framework information security that suits the needs and conditions of the organization.

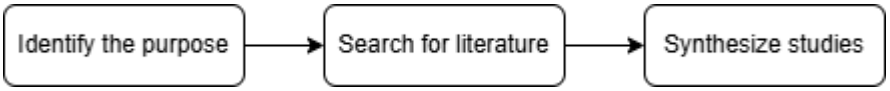


Figure 1. Stages Literature Review

Figure 1 illustrates the stages literature reviewapplied in this research. The research process was carried out in three stages, namely: 1) Identify the purpose; identifying the research goals and objectives to be achieved. At this stage, researchers identify the need for scientific references to support the analysis. 2)Search for literature; the process of searching for literature that is in line with the direction of the research objectives. At this stage, researchers collect reference sources in the form of journal articles or other scientific publications related to the topic. Framework which is compared. 3)Synthesize studies; the analysis stage which involves combining facts, concepts, and findings from various selected studies. In this stage, researchers make comparisons with framework, so that we get an idea of the similarities, differences, advantages and limitations of each frameworkas a basis for drawing conclusions [4].

3. Literature Study

3.1 Enterprise Architecture

Enterprise architecture is a comprehensive process for implementing and planning information technology systems including technology infrastructure simultaneously [5]. The main function of enterprise architecture It serves as a blueprint that maps out organizational structures, business processes, information systems, and technology infrastructure to maximize company resources. This ensures a standardized and systematic design process.

3.2 TOGAF (The Open Group Architecture Framework)

The Open Group Architecture Framework (TOGAF) as the main methodological foundation that provides a cycle or iterative development process. TOGAF provides methods and tools to build, manage and implement and maintain architecture enterprise, and information systems. TOGAF designs a process, namely Architecture Development Method (ADM) which has several stages that have goals, approaches, steps, and input as well output [6].

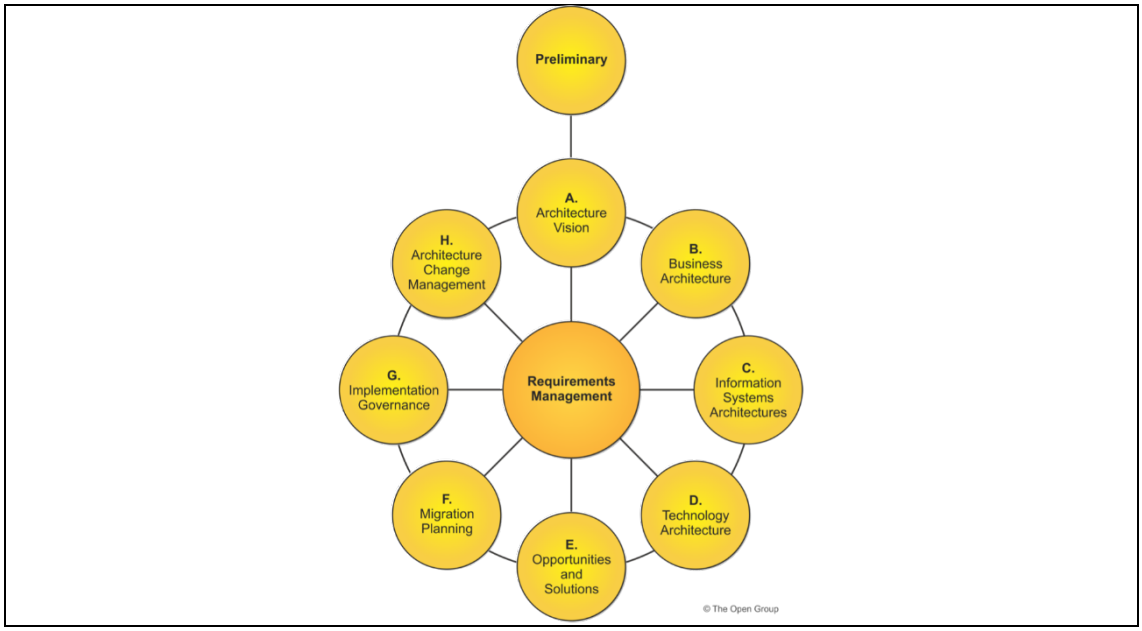


Figure 2. TOGAF ADM Stages

Figure 2 illustrates the flow of stages in TOGAF ADM. TOGAF ADM has planning stages. enterprise architecture which is divided into 10 phases. This research focuses on phase 6, with the following details.

1. Preliminary Phase: This phase is the initial stage of TOGAF ADM which aims to determine the scope of the architecture and define the organizational structure within the company.
2. Phase A: Architecture Vision- this phase describes the condition of the IT infrastructure in the company and identifies stakeholder, vision and mission in architectural design.
3. Phase B: Business Architecture - business architecture describes the development of the business architecture that has been defined in the architectural vision that will be used in the development.
4. Phase C: Information System Architecture - Information System Architecture develop an independent information system that is developed based on company needs.
5. Phase D: Technology Architecture - Technology Architecture determine the technology and software that will be used to help implement information technology in the company.
6. Phase E: Opportunities and Solution - Opportunities and Solution This stage describes the results of the formation blueprint from Information System Architecture until Technology Architecture to analyze the gap between the old system and the new system.

4. Results and Discussion

4.1 Preliminary Phase

Preliminary Phase is the initial stage which is the preparatory stage in carrying out enterprise architecture This stage aims to determine the scope and define the architectural principles that will guide system development at XYZ High School. The following is an explanation of determining the scope and defining architectural principles at XYZ High School.

1. Architectural principles: it is established that the system should user-friendly, integrated to eliminate excel data redundancy, and student data is protected.
2. Organizational Structure: identifying key stakeholders (Stakeholder) namely the principal (Decision Making), Administration Section (Data Operator), Teachers (Academic Users), and Students/Parents (Service Receiving).

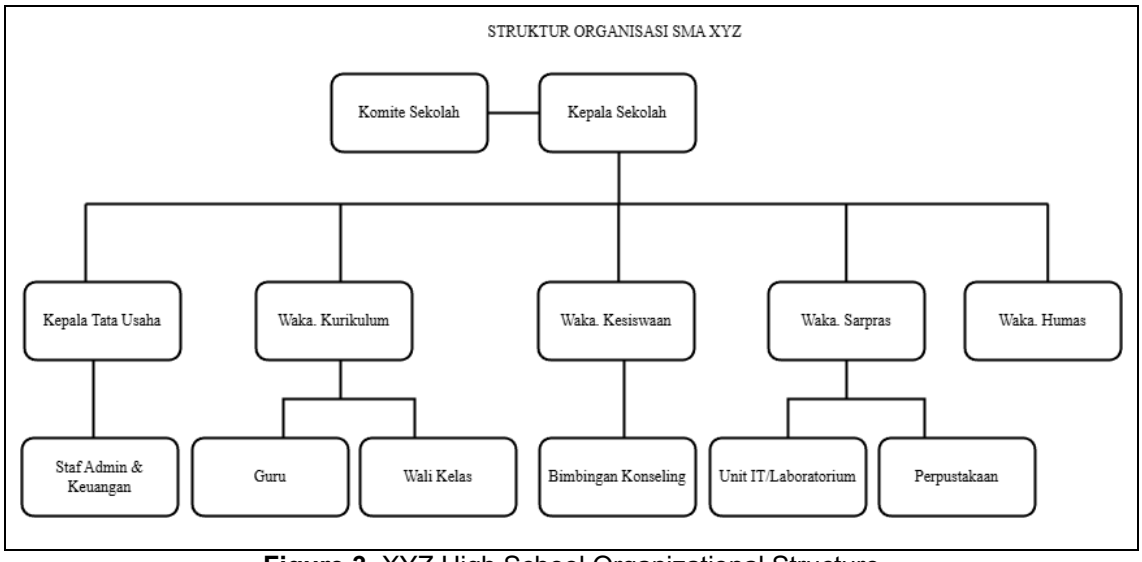


Figure 3. XYZ High School Organizational Structure

Based on Figure 3, the organizational structure of SMA XYZ is Preliminary Phase in architectural development enterprise serves as a basis for understanding governance, command flow, and role division within the school environment so that the architecture can be designed according to the actual needs of the organization. This structure shows the parties with authority, such as the School Committee and the Principal, as well as functional units such as the Deputy Head of Curriculum, Student Affairs, Facilities and Infrastructure, Public Relations, Administration, Teachers, Guidance and Counseling, Library, and IT/Laboratory Units who are the main stakeholders in gathering needs, determining the scope, and prioritizing architectural development. By looking at this structure, architectural designers can identify the main business

functions, processes carried out by each unit, and determine the architectural governance model, including who are the decision makers, directors, and technical implementers in the EA project. This makes the organizational structure the initial foundation to ensure that the architecture is built in line with the roles, authorities, and needs of all parts of the school.

4.2 Phase A: Architecture Vision

Phase A: Architecture Vision is a phase that shows how agency planning focuses on the leadership's attention and agency goals during the implementation process. Defining the scope of EAP at XYZ High School is illustrated through a Value Chain, the following is the explanation.

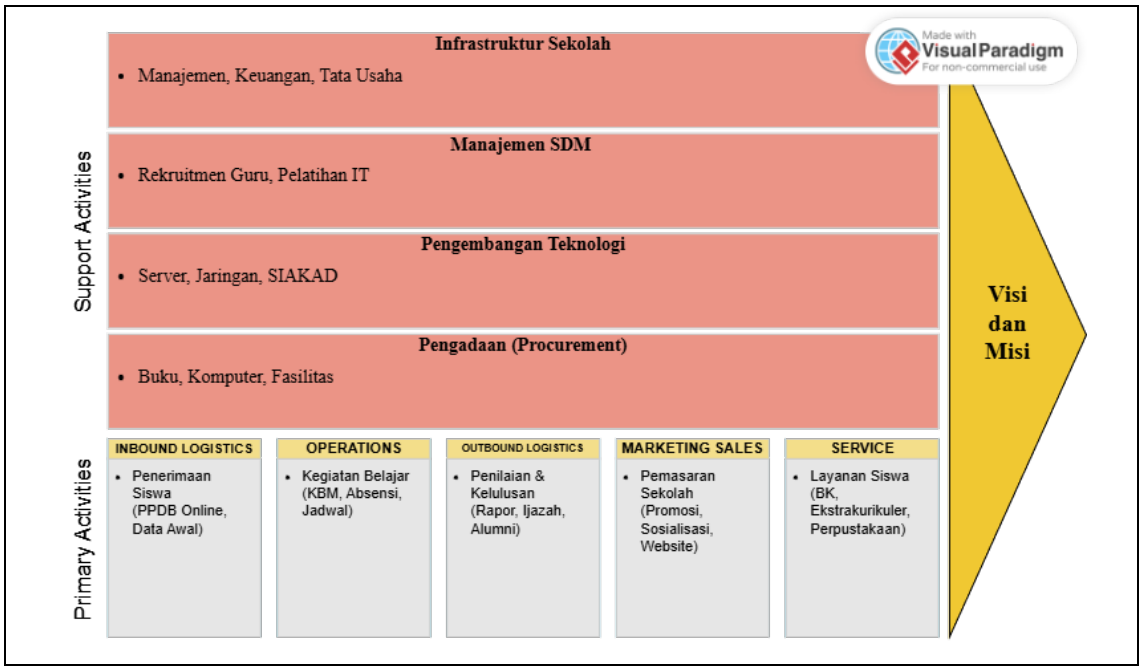


Figure 4. Value Chain SMA XYZ

Figure 4 illustrates Value Chain from XYZ High School. Analysis Value Chain is a tool used to analyze internal activities within an agency or company. Its purpose is to define the primary and supporting activities within a business process. Value Chain divided into two types of activities, namely primary activities and support activities. On Value Chain XYZ High School has five main activities, namely:

1. Inbound Logistics

This activity is the school's operational gateway, focusing on managing new student admissions. The process begins with prospective student registration (PPDB), administrative selection, entrance exams, and re-registration of accepted students [7]. Currently, entry logistics activities still rely heavily on paper forms, so initial student data often must be entered. input manually re-entered into the master book, which causes the risk of data duplication and inefficiency of the work time of the Administration staff.

2. Operations

This stage is the core of the school's business, namely the implementation of Teaching and Learning Activities (KBM). This activity includes preparing lesson schedules, assigning classrooms, conducting daily teaching by teachers, and recording student and teacher attendance. In the current architectural context, the biggest challenge in the operational stage is the lack of a system real-time to monitor attendance and schedules, so that information regarding empty hours or teacher absences is often discovered too late by the duty or curriculum [8].

3. Outbound Logistic

This activity is related to the results of the educational process, namely assessment and graduation. The process includes the implementation of exams (mid-semester, final semester, and school exams), processing grades, printing learning outcome reports, and issuing diplomas to students who graduate [9]. Without the support of an integrated system, the process of recapitulating grades from various subjects becomes the most time-consuming activity (a bottleneck) because the homeroom teacher must combine data from file different excels from each subject teacher.

4. Marketing Sales

This activity aims to maintain the sustainability of the student population through school promotion. Activities include socializing the school profile to junior high schools (SMP/MTs) and equivalent schools, publishing student achievements through banners or social media, and managing the school's web profile information [1]. This activity is crucial for building a positive image of XYZ High School in the eyes of the public so that the annual target quota of new students can be met.

5. Service

This activity serves as a supporter of student well-being and self-development beyond purely academic activities. The scope of this activity includes Guidance and Counseling (BK) services to address behavioral or talent-related issues, library services, and extracurricular activity management [1]. Technological support at this stage is needed to monitor students' historical track records of discipline and non-academic achievements.

Support activities serve as a foundation, providing the infrastructure, human resources, technology, and procurement mechanisms necessary for the school's core activities to operate effectively. Based on observations at XYZ High School, support activities are divided into four key elements:

1. School Infrastructure (Firm Infrastructure)

This element includes general management, secretarial administration, strategic planning, and school financial management. At XYZ High School, these activities are carried out by the Principal and the Administration Unit (TU). Currently, the main challenge in school infrastructure is the management of administrative correspondence and tuition payments which are still separate from student academic data, so that financial reporting and school statistics to the foundation or related agencies are often delayed due to the manual recapitulation process [10].

2. Human Resource Management (Human Resource Management)

These activities include the teacher and staff recruitment process, competency training, performance assessments, and payroll management. Given the school's vision for digital transformation, HR management plays a vital role in preparing teachers to be technologically literate [10]. The architectural requirement for this aspect is the provision of an accurate personnel data system to monitor teacher workloads and training history, to ensure the quality of teaching.

3. Technology Development (Technology Development)

supporting activities which are the focus in this architectural design research. These activities include the provision of hardware (hardware), software (software), as well as internet and intranet network management. In the current conditions (baseline), technology development at XYZ High School has not been managed centrally, where computers still operate independently (stand-alone). Therefore, the designed architecture targets strengthening in this sector through the procurement of a central server and installation of a LAN network to support the entire school information system (SIAKAD, PPDB, and e-Rapor) [1].

4. Procurement (Procurement)

This activity is related to the process of purchasing educational support facilities, starting from the procurement of library books, office stationery, to building maintenance and technology assets [10]. In the context of information system architecture, the procurement function must be aligned with the designed technology specifications (for example, server specifications or network

devices) so that the investment made by the school is on target and supports long-term operational needs.

4.3 Phase B: Business Architecture

Phase B: Business Architecture discusses the series and forms of existing business processes by grouping them based on concepts Value Chain. The following is an explanation of the proposed business architecture design that describes the business processes at XYZ High School.

Table 1. PPDB Business Process

Process	Activity
PPDB (New student Admission)	Registration
	Selection stage
	Announcement
	re-registration

Table 1 outlines the New Student Admissions (PPDB) business process. The PPDB process is a school-wide process that plays a role in recruiting prospective students. This process consists of registration activities, selection stages, announcements, and re-registration, all conducted online.

Table 2. Attendance Business Process

Process	Activity
Absence	Digital attendance recording of students and school staff
	Automatic recap of student and school staff attendance
	Student attendance information is sent to parents
	Monitoring and analysis of student and school staff attendance patterns

Table 2 describes the attendance business process. The attendance process is a business process that functions to record and monitor the attendance of students and school staff. This process consists of digital attendance recording activities, which are expected to record attendance data online real-time and minimize manual recording errors. Furthermore, automated recording facilitates quick attendance reports for schools. Transparency and parental involvement are also encouraged in monitoring student learning activities. Furthermore, attendance patterns of students and school staff are monitored and analyzed.

Table 3. Business Process of Teaching and Learning Activities

Process	Activity
Teaching and learning activities	Academic calendar
	Lesson timetable
	Student data
	Learning materials
	Daily teaching activity report
	Media for practice questions or quizzes
	Media analysis of values and test items
	e-Rapor

Table 3 outlines the business processes for teaching and learning activities. This process helps facilitate the implementation of school learning. Activities within this process include an academic calendar as a reference for the timing of learning activities throughout the school year. A lesson schedule regulates the allocation of learning time for each subject. This process is also supported by student data, learning materials, daily teaching activity reports, practice questions or quizzes, grade and item analysis tools, and e-Report Cards.

Table 4. Library Business Process

Process	Activity
Library	Book search
	Book lending
	Book returns
	Book data management
	Management of book loan/return reports

Table 4 outlines the library's business processes. These processes facilitate book management, including book searching, book borrowing, book returns, book data management, and book loan/return reporting.

Table 5. School Operational and Resource Management Business Processes

Process	Activity
School Operational and Resource Management	School administration management
	School financial management
	School personnel data management
	School asset management
	School guidance activity data management
	Extracurricular management
	School promotion management

The School Operational and Resource Management Process is a business process that plays a role in ensuring the effective running of all school activities. This process encompasses the management of various school resources, including human resources, financial resources, and other operational support assets.

Activities in this process include managing school administration related to document recording and archiving, as well as managing school finances to support budget planning, implementation, and oversight. Furthermore, school personnel data is managed, and school assets are managed to ensure the availability and optimal utilization of facilities and infrastructure. This process also includes managing school guidance data and extracurricular activities as part of developing student potential outside of academic activities. Furthermore, school promotion management is carried out to support the school's image and sustainability, particularly in attracting prospective students.

4.4 Phase C: Information System Architecture

Phase C: Information System Architecture It's divided into two stages: application architecture and data architecture. This stage aims to design a target information system architecture that aligns with business needs, thereby supporting and enhancing the effectiveness of the designed business architecture. The following is an explanation of application architecture and data architecture.

Table 6. Application Architecture

Application Code	Application	Explanation
AP.1	SIPPDB	PPDB information system: Registration & selection of new students
AP.2	IS	Attendance information system: Attendance management
AP.3	SIKBM	KBM information system: Management of teaching and learning systems
AP.4	SIP	Library information system: Book management
AP.5	SIMS	School Management Information System: Administrative management

Table 6 presents the application architecture used and planned to support business processes at XYZ High School. Each application is grouped based on its primary function, ranging from new student admissions, attendance management, teaching and learning activities, library management, and school administration. This list of applications is compiled to illustrate the relationship between the applications and the school's operational needs, thus supporting information system integration.

Table 7. Data Architecture

Business Entity	Data Entity
New student admission entity	PPDB
Absence entity	Students, school staff
KBM process entity	Students, classes, class details, subjects, grades
Library entity	Books, borrowing, returning
School management entity	School staff, positions, job details, types of activities

Table 7 illustrates the data architecture that maps the relationships between business entities and data entities at XYZ High School. Each business entity is represented by a set of data entities used to support the implementation of the associated business processes. This mapping aims to ensure that the data requirements for each business process are clearly defined, consistent, and integrated, serving as the basis for developing an effective information system.

4.5 Phase D: Technology Architecture

Phase D: Technology Architecture is something that is the focus in architectural design enterprise in this study, the technology architecture phase contains technology designs to support the business processes and information systems developed in the previous phase. The following is a technology design in the form of a proposed network topology that can be implemented at XYZ High School.

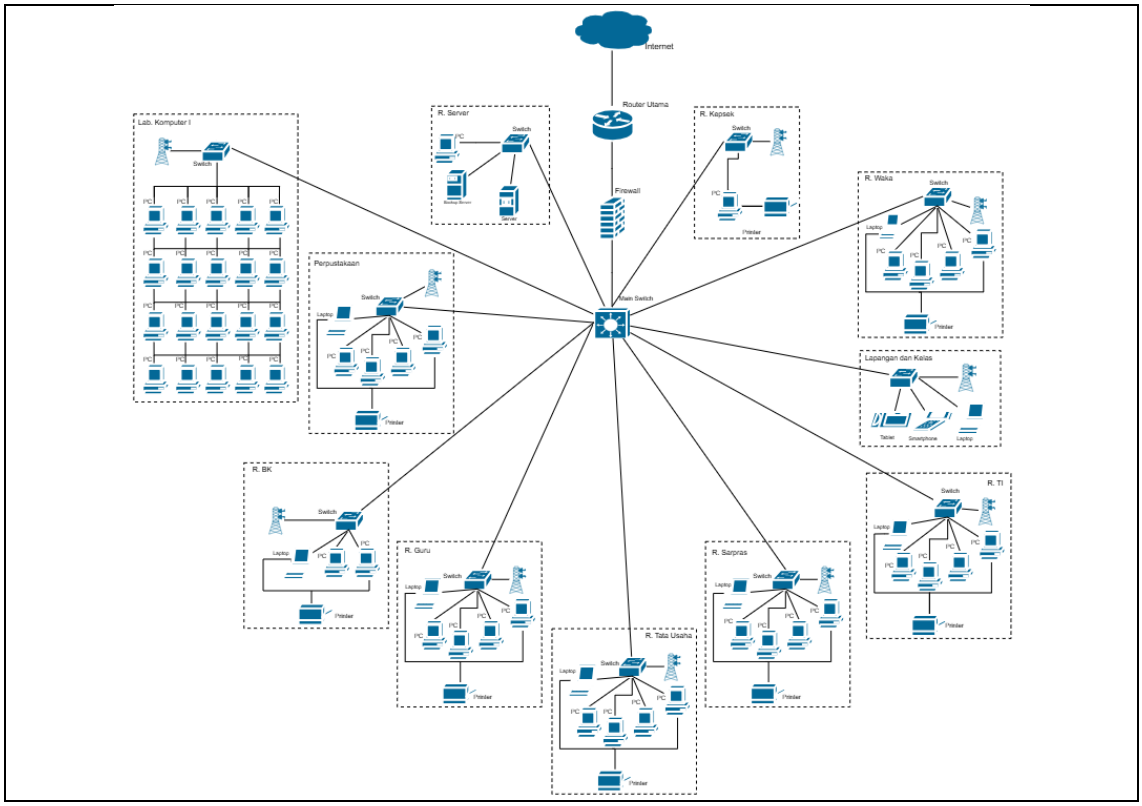


Figure 5. XYZ High School Network Topology Design

Figure 5 shows the technology architecture design in the form of a network topology at XYZ High School. The network topology design adopts the topology star (star) which is centrally managed to ensure efficient data integration and eliminate information silos. Data traffic starts from the internet gateway which is managed by router main and protected by firewall to maintain the integrity of sensitive school data, such as student and teacher data. Main switch as a network topology center that unites all parts of the school. Main switch connected directly to the Server Room where there is server main as the center data base and information systems, as well as backup server which ensures data continuity (data availability) if at any time a system failure occurs. Manual recording using file Excel that has the potential to cause redundancy can switch to the same data warehouse (central database).

Network integration is distributed to various rooms in XYZ High School with LAN going to sub-switch located in each area, such as the Principal's Office, the Vice Principal's Office, the Field and Classrooms, the IT Room, the Facilities and Infrastructure Room, the Administration Room, the Teachers' Room, the Guidance and Counseling Room, the Library, and the Computer Lab. Accessibility in each room is improved by installing Wireless Access Point (WAP) which allows teachers and school staff to access the information system wirelessly, so that inputting grades and monitoring attendance can be done online, real-time. Overall, this infrastructure not only facilitates internal needs through PCs and printer which is connected to the network but also provides an access path for students and parents via the internet, so that it can realize a responsive and effective digital transformation of XYZ High School.

4.6 Phase E: Opportunities and Solution

In Phase E: Opportunities and Solutions, an analysis is carried out to see the gaps (gap) between the current conditions (as-is) and targeted conditions (to-be). The purpose of this phase is to create alignment between the business process design, information system architecture design, and technology architecture design to suit the conditions at XYZ High School. The following is a gap analysis of the current conditions at XYZ High School with the designed architecture.

Table 8. Gap Analysis

Business Area	Present condiition (As-Is)	Target Architecture (To-Be)	The gap (Gap)
Student Admissions (PPDB)	Registration is still done manually and uses paper forms.	The PPBD process is carried out entirely online (online) with SIPPDB	Implementation of the registration system (PPDB) online centralized
Absence	Attendance recording is done manually, so it is prone to errors and late reports.	Digital attendance recording and real-time, automatic recap, and direct information to parents (SIA)	Faster attendance recording and minimize errors
Teaching and Learning Activities (KBM)	The material and grade recap are spread across file Excel for each subject teacher which causes data redundancy	Management of lesson schedules, learning materials, practice question media, teaching activity reports, and e-Reports in SIKBM	Digitization of class schedules, teaching materials and quizzes, as well as standardization of grade reporting (e-Report)
Library	Manual book search and book management	Library management is carried out through an integrated SIP system.	Ease of accessing information about books in the library
School Operational and Resource Management	Asset, financial and human resource management is still fragmented	Integrated school operational management through SIMS	Digitalization of operational management by demanding one database

Table 8 shows the results of the analysis to identify gaps between the current operational conditions (as-is) and the target conditions (to-be) that were designed in the previous phases. Broadly speaking, XYZ High School is transforming from a manual, fragmented, and paper-based administration system to an integrated digital ecosystem through five main applications: SIPPDB, SIA, SIKBM, SIP, and SIMS. The gaps identified lie in the need for data standardization and process digitization, such as online student registration and centralized grade management and school operational management in a single centralized database.

5. Conclusion

Enterprise architecture design at XYZ High School using the TOGAF ADM framework and data dummy successfully formulated a comprehensive system integration solution to address the key issues of data redundancy and manual operational inefficiencies. Starting from Preliminary Phase which establishes the principles of information technology governance, development continued in Phase A: Architecture Vision which illustrates the main and supporting activities at XYZ High School with Value Chain, Phase B: Business Architecture which transforms the business processes of PPDB, attendance, KBM, libraries, and resource management into a systematic digital workflow. Phase C: Information System Architecture designed five main applications, namely SIPPDB, SIA, SIKBM, SIP, and SIMS which are supported by centralized data entities such as student data, staff, grades, and books to ensure consistency of information across all parts of SMA XYZ's work. Infrastructure support on Phase D: Technology Architecture with the use of topology Star, data center (server main and backup server), and network coverage throughout the school area is the main foundation in ensuring fast and secure data accessibility. And, through Phase E: Opportunities and Solution, it was found that the gap (gap) between the current manual state and the target architecture can be closed through process digitalization and centralization database, so that SMA XYZ can significantly improve the quality of educational services and transparency of reporting to all stakeholders (stakeholders).

Reference

[1] I. A. M. Fabio Mangatas Silaen, “ENTERPRISE ARCHITECTURE DESIGN USING TOGAF (CASE STUDY: MARIA MEDIATRIX HIGH SCHOOL),”*J. Bus. Audit Inf. Syst.*, vol. 4, no. 2, pp. 32–40, 2021, doi: http://dx.doi.org/10.30813/jbase.v4i2.3002.

[2] J. F. A. Jason Steven Antouw, “ENTERPRISE ARCHITECTURE DESIGN AT PT. GADINGPUTRA SAMUDRA USING THE TOGAF ADM FRAMEWORK,”*J. TEKNOINFO*, vol. 14, no. 2, pp. 71–80, 2020, doi: 10.33365/jti.v14i2.642.

[3] T. L. Sajeevanie, “Literature Review and Academic Research,” *Int. J. Creat. Res. Thoughts*, vol. 9, no. 1, pp. 2713–2720, 2021.

[4] C. Okoli, “A Guide to Conducting a Standalone Systematic,” *Commun. Assoc. Inf. Syst.*, vol. 37, pp. 879–910, 2015.

[5] F. Annisa Hardianta Sikumbang, Fathira Alifa Ahsan, Tania Dwi Dermawan, "Implementation of Enterprise Architecture as an Effort to Improve the Quality of Educational Services at SMA N 1 Sibolangit,"*JETBUS (Journal Educ. Transp. Business)*, vol. 1, no. 2, pp. 897–908, 2024.

[6] G. T. P. Hilarius Alfan, “Enterprise Architecture Planning Using the TOGAF Architecture Development Method Framework,”*Digit. Transform. Technol.*, vol. 4, no. 2, pp. 1252–1259, 2024, doi: 10.47709/digitech.v4i2.546.

[7] D. F. Marisa Kamalia Aryani, Gat, “Implementation of TOGAF ADM in Academic Enterprise Architecture Planning at Bawari Islamic High School, Pontianak,” in*CORISINDO NATIONAL SEMINAR*, 2025, pp. 595–601.

[8] P. Setiawan, "Designing Enterprise Information System Architecture at SMK Budi Utama Using Togaf ADM,"*J. Sist. Inf. Dan Inform.*, vol. 2, no. 2, pp. 29–39, 2024.

[9] I. G. A. G. Dewa Nyoman Adi Sista, I Made Candiasa, “ARCHITECTURAL DESIGN OF ENTERPRISE INFORMATION SYSTEMS USING TOGAF ADM AT STATE SENIOR HIGH SCHOOL 1 SINGARAJA,”*Science and Technology.*, vol. 10, no. 2, pp. 316–328, 2021.

[10] M. Ananda Cipta Pamungkas, Rosalin Samihardjo, “Enterprise Architecture Design Vision Architecture and Business Architecture Stage Using Togaf Adm at SMA ABC,” *Int. J. Adv. Data Inf. Syst.*, vol. 6, no. 1, pp. 62–79, 2025, doi: 10.59395/ijadis.v6i1.1351.