International Journal
of Applied Information Technology
http://journals.telkomuniversity.ac.id/ijait/

Enterprise Architecture Model for Vocational High School

Wawa Wikusna

Diploma of Informatics Management, Telkom University, Indonesia

A R T I C L E I N F O

Received 19 September 2017
Revised 30 November 2017
Accepted 25 April 2018
Available online 28 May 2018

Keywords
Enterprise Architecture Planning, data architecture, application architecture, technology architecture, roadmap implementation plan.

A B S T R A C T

Vocational High School (SMK) is established to prepare productive and competitive labor. Each SMK has the vision to be the best school that provides the best service to the stakeholders in generating the smart and competitive Indonesian people. The achievement of the mission would be succeeded by building an integrated information system at school. Currently, many SMKs do not have an information system development plan that suits the core business aspect as the primary drivers, such as the organizational issues, human resources, environment, information technology, and application development aspects. Therefore, the design of enterprise architecture model is needed to generate data architecture, application architecture, technology architecture, and direction of the implementation plan for the school. In this study, the authors designed the enterprise architecture for SMK that can build the achievement of school goals. The method used is Enterprise Architecture Planning (EAP). With the design of enterprise architecture, the development of information systems in SMK would have an appropriate and effective direction for achieving the goals.

* Corresponding author at:
School of Applied Science, Telkom University,
Jl. Telekomunikasi No. 1, Terusan Buah Batu, Bandung, 40257
Indonesia.
E-mail address: wawa_wikusna@tass.telkomuniversity.ac.id

ORCID ID:
Author: 0000-0001-7733-5376

https://doi.org/10.25124/ijait.v2i01.925
Paper_reg_number IJAIT000020104 2018

1. Introduction

SMK is established to produce a productive and competitive workforce. To carry out the mission, SMK must be supported by information systems to optimize all resources that provide the best services to the stakeholders. The development of information systems should be based on a blueprint for the development of information systems as a reference and systematic plan for the development of information systems in SMK.

In this research, the proposed blueprint used the Enterprise Architecture Planning that consists of a conceptual model of enterprise architecture including the business process model, data architecture, application candidate, technology platform used, and other aspects that are needed in the development of an integrated information system at school.

2. Methodology of Research

The research consists of several phases, i.e., understanding of organization vision, the framework of enterprise architecture planning, and generating a conceptual model of data, application, and technology as shown in Figure 1.

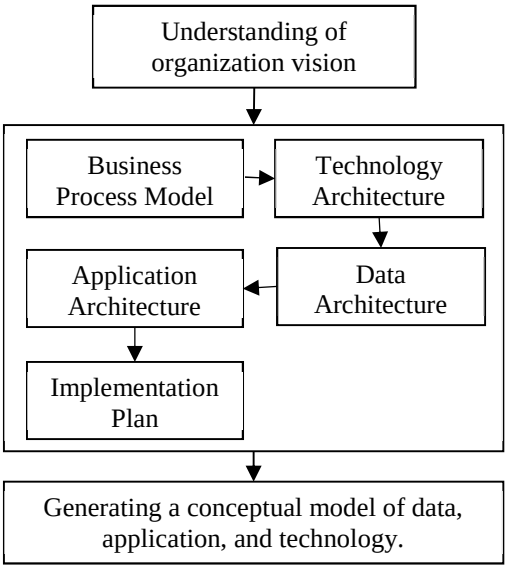

Figure 1 Research Methodology [1]

3. Related Work

There were some researchers that have been done to create a blueprint for the development of information systems in the form of enterprise architecture. Bradley et al. [2] proposed enterprise architecture for hospitals in the United States for IT effectiveness and the mediating role of IT alignment. His research provided evidence that enterprise architecture maturity directly influences the effectiveness of hospitals' IT resources for achieving strategic goals. Puschmann et al. [3] argued that the need to integrate the software applications package with the existing or legacy business applications driven the need for a standardized integration architecture to be more flexible in implementing new business processes across different organizations and applications. Boh et al. [4] identified four fundamental governance mechanisms for EA standards management and examined how each tool affected the use of EA standards. The results showed that the use of EA standards was useful in helping organizations to manage their IT resources better.

Roni et al. [5] recommended the Enterprise business architecture that could contribute to clarify the complexity within an organization and form a useful starting point from which to develop functional, information, process and application architectures. Besides, an explicit enterprise business architecture could help the structure of responsibilities within the organization (higher education), and within the primary process as well as about IT-support. Yunis et al. [6] recommended the design of enterprise architecture model with Togaf architecture development method (in Indonesia). Setiawan [7] suggested the strategy of information systems design for Telkom University towards world-class university (in Indonesia).

4. Enterprise Architecture Model

4.1. Business Process model

The business process in SMK consists of primary activities and support activities. The implementation of this method requires the support of information systems to serve the needs of data and information to the stakeholders. The business process is described using the value chain in Figure 2.

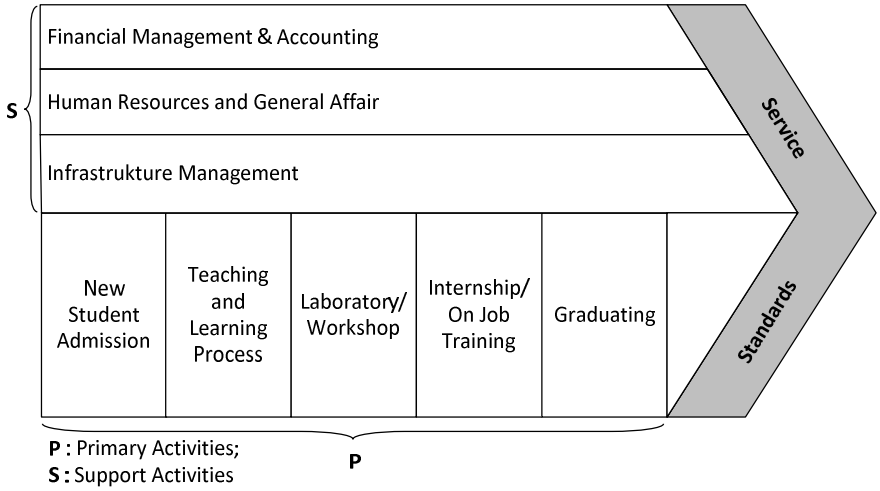

Figure 2 Value Chain SMK

Figure 2 shows the new student admission, teaching and learning process, internship, and graduating that supported by three supporting processes, i.e., financial management and accounting, human resources and general affairs, and infrastructure departments. Primary and support processes were done to create the standard services for the students and other stakeholders.

4.2. Data Architecture

Data architecture aims to define the data that will be used to build the application architecture. Based on the steps in the EAP, the data architecture defines 2 (two) terms, i.e.

1. Data Entity Candidate
2. Entities Set, Attributes, and Relationships.

The entity candidate depends on the business functions that exist within the organization based on the value chain. The entities candidate is shown in Table 1.

Table 1 The Entities Candidate

Business Entities	Data Entities
New Student Admission/PSB Entities	1. Entity PSB Team 2. Entity PSB Budget 3. Entity Socialization Strategy of PSB 4. Entity Determination of New Students 5. Entity New Students
Teaching and Learning Process Entities	1. Entity Student 2. Entity Registration 3. Entity Subjects 4. Entity Teacher 5. Entity Quiz 6. Entity Grade 7. Entity Tuition 8. Entity Presence 9. Entity School Exams 10. Entity National Examinations 11. Entity Graduation
Financial Management & Accounting Entities	1. Entity School revenue and expenditure (APBS) 2. Entity Proposed Budget 3. Entity Budget Realization Report 4. Entity Estimated List 5. Entity Ledger 6. Entity Journal 7. Entity Transaction 8. Entity Transaction Details 9. Entity Balance Sheet 10. Entity Financial Statements
Human Resource & General Affair Entities	1. Entity Recruitment 2. Entity Selection 3. Entity HR 4. Entity Departement 5. Entity Assessment 6. Entity Position
Infrastructure Management Entities	1. Entity Asset Inventory 2. Entity Asset Status 3. Entity Proposal 4. Entity Procurement 5. Entity Maintenance 6. Entity Disposal Asset 7. Entity Asset Report

4.3. Entity Relationship Diagram

Entity Relationship Diagram is created to describe the data requirement on every business process in SMK as shown in Figure 3.

4.4. Application Architecture

The application architecture is the determination of applications that support every business process in SMK. Examples of application candidates are shown in Table 2.

Figure 4 shows each layer of the information system. The segment consists of layers of infrastructure and platforms, databases, applications that were built to support every business process, Executive Information System, and Web Site (Academic Information System of SMK).

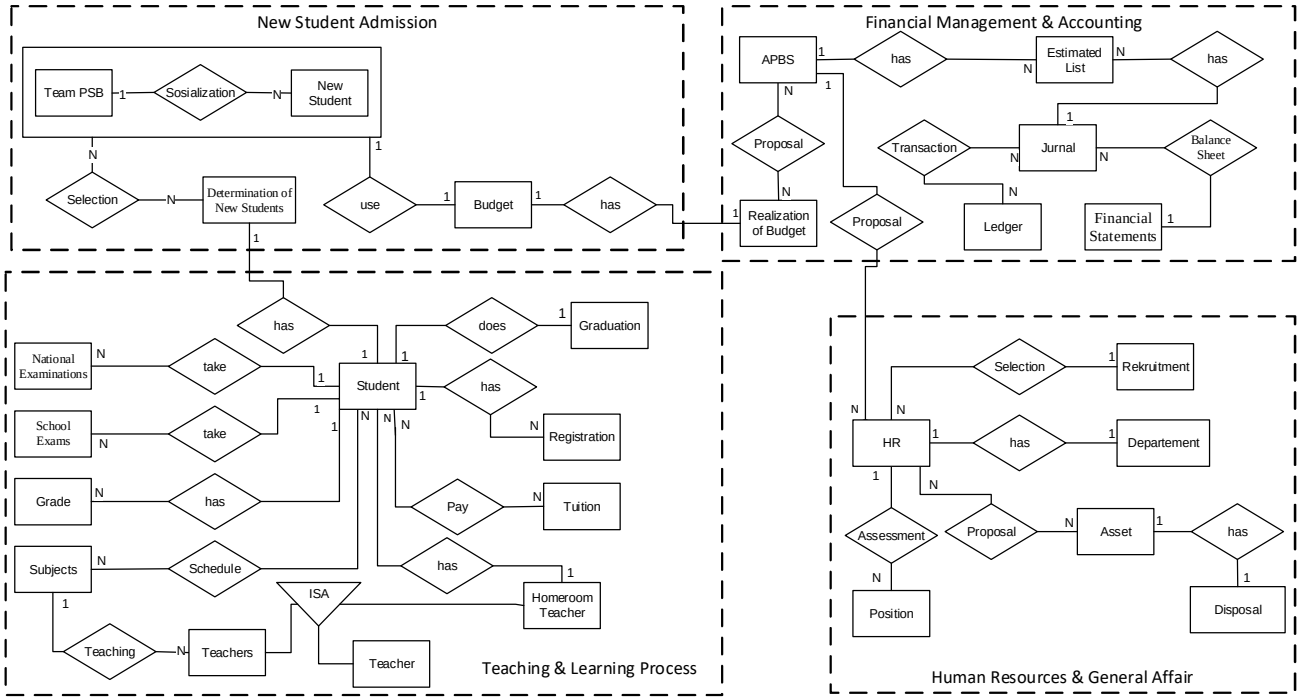

Figure 3 New Student Admission ERD

Table 2 The Application Candidate

Process Business	Application Candidate
1. New Student Admission	1. PSB Analysis System 2. PSB Budgeting System
2. Teaching & Learning Process	1. Alumni System 2. Academic Report 3. Libary online 4. Academic online System 5. Academic online Mobile System 6. E-Learning 7. Procter system
3. Financial Mangement & Accounting	1. Financial Analysis System 2. Balance Sheet System 3. Cash Flow System
4. HR & General Affair	1. Recruitment System 2. Asset Management System 3. HR Management System 4. Knowledge Management System

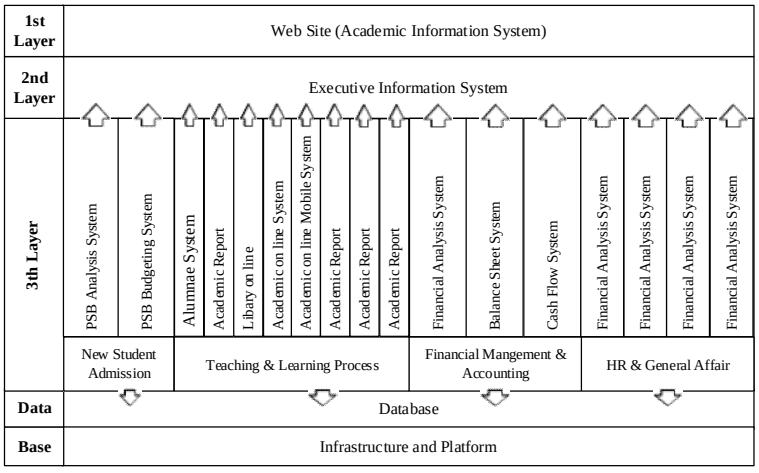

Figure 4 Application Architecture

Application support for business processes is described in matrix form in Figure 5.

Application List / Business Process	1. PSB Analysis System	2. PSB Budgeting System	1. Alumnae System	2. Academic Report	3. Libary on line	4. Academic on line System	5. Academic on line Mobile System	6. E-Learning	7. Procter system	1. Financial Analysis System	2. Balance Sheet System	3. Cash Flow System	1. Recruitment System	2. Asset Management System	3. HR Management System	4. Knowledge Management System
New Student Admission	C	C	U	U	U	U	U	U	U	U	U	U	U	U	U	U
Teaching & Learning Process	U	U	C	C	C	C	C	C	C	U	U	U	U	U	U	U
Financial Mangement & Accounting	U	U	U	U	U	U	U	U	U	C	C	C		U	U	U
HR & General Affair	U	U	U	U	U	U	U	U	U	U	U	U	C	C	C	C

Note : C = create; U = use (Reuse, Update)

Figure 5 Matrix between applications to business processes

4.5. Technology Architecture

After identifying the data architecture and application architecture, the next step is to propose the development of technology architecture in order to improve the system performance, as shown in Figure 6.

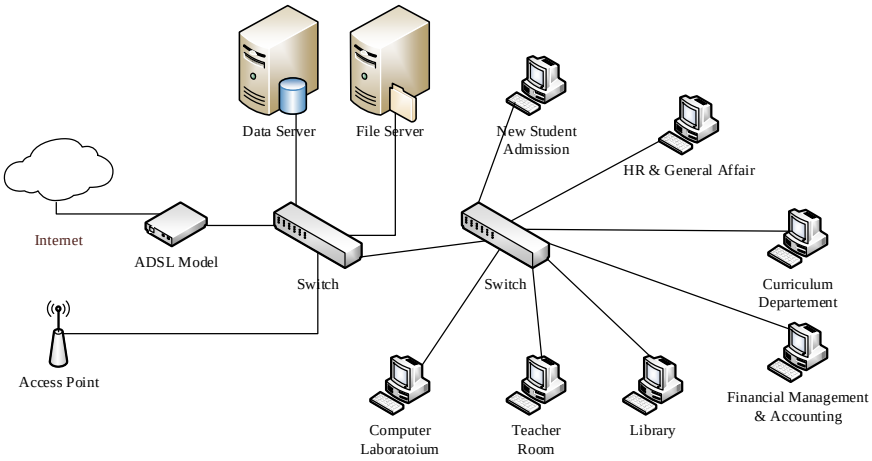

Figure 6 Technology Architecture

4.6. Implementation Plan

The implementation plan is a plan that is prepared to implement the enterprise architecture with an orientation to produce the information system. The implementation plan stage begins by creating a priority sequence of application development; make resource estimates, cost and time/schedule implementation; and determine the success factors.

Many factors that influence the successful implementation of information systems that will be implemented in SMK, including:

1. The existence of commitment and consistency of the stakeholders in SMK so that the built system can meet various needs and solve multiple problems that occur.
2. Agreement and determination of the implementation plan.
3. Availability of SOP (Standard Operations Procedure).

4. Adequacy of resources, technology, and infrastructure.
5. Knowledge and competence of human resources enough to support the system to be built.
6. The existence of guidelines for development and development of SI in the form of roadmap implementation plan.

5. Conclusion

The results of Enterprise analysis show that SMK requires the development of enterprise architecture to improve services to the stakeholders will achieve a perfect level of satisfaction.

The roadmap implementation plan can be used as a reference in the development of applications that support the business functions of the organization. The roadmap implementation plan suggested by EAP is based on data-driven, and the ap application that produces data must be built first, then followed by applications that use data.

Bibliography

[1] S. H. Spewak, S. C. Hill, and J. A. Zachman, Enterprise Architecture Planning (Developing a Blueprint for Data, Application, and Technology), Jhon Wiley & Sons, Inc., 1992.

[2] R. V. Bradley, R. M. E. Pratt, T. A. Byrd, C. N. Outlay and D. E. Wynn, "Enterprise architecture, IT effectiveness and the mediating role of IT alignment in US hospitals," *Information System Journal*, vol. Vol. 22, pp. Pages 97-127, 2012.

[3] T. Puschmann and R. Alt, "Enterprise application integration systems and architecture – the case of the Robert Bosch Group," *Journal of Enterprise Information Management*, vol. Vol. 17, no. 2, pp. 105-116, 2004.

[4] W. F. Boh and D. Yellin, "Using Enterprise Architecture Standards in Managing Information Technology," *Journal of Management Information Systems*, vol. Vol. 23, no. 3, pp. 163-207, 2014.

[5] R. Yunis, K. Surendro and K. Telaumbanua, "Enterprise Business Architecture in Indonesia Higher," in *Annual International Conference on Infocomm Technologies in Competitive Strategies (ICT 2010)*, 2010.

[6] R. Yunis and K. Surendro, "The Design of EnterpriseArchitecture Model with TOGAF Architecture Development Method (in Indonesia)," in *Proceeding SNATI*, 2009.

[7] B. E. Setiawan, "The Strategic of Information Systems Design for IT Telkom Towards World Class University (in Indonesia)," *Proceeding SNATI*, pp. A97-A102, 2009.