Strategic Planning for Polytechnic Information Systems with an Enterprise Architecture Planning Approach

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Abstract. Higher education institutions in implementing information systems need strategic planning, especially for Polytechnics in Indonesia. It is intended that the application of the information system is in accordance with the vision, mission and objectives of the Polytechnic. The Polytechnic information system strategic planning uses the Enterprise Architecture Planning method. The Enterprise Architecture Planning method provides an overview of data architecture, application architecture and technology architecture from the application of information systems so that the Polytechnic is not wrong in implementing information systems. The result of this research is the form or formulation of information system strategic plan which is suitable for higher education especially for Polytechnic. The information system strategic plan consists of a data architecture, there are 41 entities, while for data and application architectures there are 8 application candidates. In addition, the results of the information system strategic plan in the technology architecture section to support the Polytechnic business processes are also built.

Keywords: information technology, information systems, architecture, Enterprise Architecture Planning.

1. Introduction

Higher education institutions as implementing education are currently implementing information systems both for the learning process and for higher education management. In implementing the information system for higher education, especially the Polytechnic, it requires planning, namely a strategic plan. This is necessary so that the application of the information system at the Polytechnic is in accordance with the needs and objectives of the Polytechnic.[1][2][3]

One of the problems that arise in the development of large-scale SI is planning. There are 2 scope of planning in information system development, namely the time needed in implementing information system development and consistency between information system development and polytechnic business processes. The objective of the strategic plan for implementing information systems is that information systems and information technology can support the development of polytechnics in the future, both in the short and long term. The strategic plan for implementing the polytechnic information system is in the form of a blue print. The results of the blue print are used to explain the components of the Information System and Information Technology being developed, the direction of their development and the goals to be achieved at the Political Science. [4]
In addition, what needs to be considered in the application of Information Systems and Information Technology is the alignment between organizational strategies and IT implementation strategies. In order to align IT with the strategic direction of the organization and the management of areas in the organization’s IT governance, this has led to the importance of preparing an Information Technology Strategic Plan. So that all the steps that will be taken by the organization can be in line with the efforts to achieve the objectives of the organization and can translate the vision and mission of the organization into information needs as an integral part in supporting routine activities in organizational activities.[5][6][7]

2. Research Method

One of the methodologies used in developing organizational architecture is Enterprise Architecture Planning (EAP). Enterprise Architecture Planning (EAP) is a methodology for planning an enterprise architecture that focuses on data architecture, application architecture, and technology architecture that is oriented to business needs and how to implement the architecture that is made so that it can support organizational goals in implementing information systems. As for the initiation of EAP planning, it can be seen in Figure 1

![EAP Planning](image)

**Fig. 1. EAP Planning**

3. Research Result

3.1. Value Chain

The analysis is carried out from the main business and supporting businesses based on the results of defining the main and supporting business functions based on the value chain analysis.

![Value Chain of Polytechnic Business Model](image)

**Fig. 2. Value Chain of Polytechnic Business Model**
3.2. Data Architecture

After analyzing the value chain of the Polytechnic business model, then the data architecture stage will be carried out, where this data architecture will identify and define a description of the data entities that will be needed and support functions. The first step in designing an information system architecture is defining data, this is the basic data of the information system function to be built. From the data architecture, it will describe all data entities that are generated, as well as managed and used by all business processes and functions in the system. The data entities that have been defined can be seen in the following table.

| Business Entity                  | Data Entities                                                                 |
|----------------------------------|-------------------------------------------------------------------------------|
| Student Admissions               | 1. Student registration entity                                                |
|                                  | 2. The entity paying the registration fee                                      |
|                                  | 3. Entity exam schedule                                                       |
|                                  | 4. Entity exam results                                                        |
|                                  | 5. Entity re-registration of new students                                     |
| Academic Operational Entities    | 1. Study program entity                                                        |
|                                  | 2. Classroom entities                                                         |
|                                  | 3. Entity semester period                                                      |
|                                  | 4. Old student registration entity                                             |
|                                  | 5. Student entity                                                             |
|                                  | 6. Student entity                                                             |
|                                  | 7. Subject entities                                                           |
|                                  | 8. The lecturer entity                                                         |
|                                  | 9. Entity class allocation                                                     |
|                                  | 10. Trustee entities                                                          |
|                                  | 11. Entity class schedules                                                    |
|                                  | 12. Entity minutes of the exam                                                |
|                                  | 13. Entity exam schedule                                                      |
|                                  | 14. Entity minutes of the exam                                                |
|                                  | 15. The entity's value                                                         |
| Student Release Entities         | 1. The final reporting entity                                                  |
|                                  | 2. Entities diplomas and certificates                                          |
| Socialization Entities           | 1. Market share entities                                                       |
|                                  | 2. The target entity                                                           |
| Alumni Entities                  | 1. The alumni entity                                                           |
|                                  | 2. Alumni agency                                                              |
| Financial Entity                 | 1. The cost component entity                                                   |
|                                  | 2. The entity's tuition fees                                                   |
|                                  | 3. Student accounts receivable entity                                          |
|                                  | 4. Entities managing lecturers' fees                                           |
| Human Resources Entities         | 1. The HR plan entity                                                          |
|                                  | 2. Employee or lecturer entity                                                 |
|                                  | 3. The entity's presence                                                       |
|                                  | 4. Salary entity                                                              |
|                                  | 5. The performance entity                                                      |
|                                  | 6. The training entity                                                         |
| Infrastructure entity            | 1. The entity plans the means                                                  |
|                                  | 2. The procurement entity                                                      |
|                                  | 3. Infrastructure entity                                                       |
|                                  | 4. The listing entity                                                          |
|                                  | 5. The reporting entity                                                        |
3.3. Applications Architecture
This application architecture is related to business processes that have been analyzed and designed, from the design of the information system architecture that is done is expected to provide solutions in helping the progress of data delivery and processing in business processes. Applications that will become part of the Polytechnic information system can be seen in the following Table 2.

| Application Code | Candidate application          |
|------------------|--------------------------------|
| AP.01            | Admission of new students      |
| AP.02            | Academic Operations            |
| AP.03            | Release of Students            |
| AP.04            | Socialization                  |
| AP.05            | Alumni                         |
| AP.06            | Finance                        |
| AP.07            | Staffing                       |
| AP.08            | Infrastructure                 |

3.4. Interaction of Information Systems Design Models
In the interaction of the information system design model, it will describe the integration of information system applications at the Polytechnic through designs that have been done such as business architecture, data architecture and application architecture, where each information system is linked to data, as for the information system interaction can be seen in the following figure 3:

Fig. 3. The interaction of information system design models

3.5. Technology Architecture
The technology architecture will define the type of technology required in the application application to manage data. In making the technology architecture Polytechnic refers to the principles of technology principles, the principles of technology are summarized in the design of technological architecture so that the design of technological architecture will be more efficient. Hardware is designed with the aim of supporting client-server and meeting business needs and can adapt to changes without disrupting other operations.[8] The system must be able to integrate data such as database applications that have been prepared on the application server so that it will answer data and information needs. In designing this technology architecture, three servers will be designed where the
first server is a web hosting server, while the second server is an application server and a third server is a DNS server, these three servers are designed to answer the needs of business processes at the Polytechnic such as internal and external analysis. The web hosting server is designed to serve online sharing such as creating information blogs, writing news and study groups on the Polytechnic campus as shown in Figure 4.

Fig. 4. Polytechnic web hosting server network

4. Conclusion

Based on the descriptions that have been delivered in the previous discussion, here are the results of the conclusions obtained:

a. Information system strategic plans that are suitable for Polytechnic colleges can be prepared using the Enterprise Architecture Planning (EAP) method.

b. The main business modeling described in the value chain has 5 main activities, namely new student admission, academic operations, student discharge, socialization and alumni.

c. The preparation of an information system strategic plan using the Enterprise Architecture Planning (EAP) at the Polytechnic gave the results of 41 candidates for data architecture entities, 8 candidates for application architecture and application of new technology architectures to support business processes.

d. The enterprise architecture model that has been produced can be used as a first step to achieve the strategic goals of the organization, besides that it can be used as a guide so that the direction of information system development policies becomes measurable and clear.

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