Analysis Of Binus International University Information Technology's Business Architecture

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Abstract—**without doubt, IT has become an enabler that transform Binus from a computer training center to become one of the best IT university in Indonesia. In order to maintain to be the best computer university, IT based business processes are needed. Binus University attempts to improve their quality of graduates by continuosly applying the development of IT in the curriculum and subject syllabuses without ignoring the conditions outlined by the government. It is not only applying IT in the curriculum but also to support business activities.**

The method used to achieve the objective is done through interviews, done by interviewed the dean of program, quality assurance, operations manager and head of IT department. The data gathered will then be processed which results can be analyzed thus reaching a conclusion in the form of diagram that represents the business architecture and the gap analysis.

With the commitment of Binus International University to continuously improve the quality of education using Information Technology (IT) as an enabler not only to support its academic operation but also its business activities, the overall IT architecture, in particular Business architecture, becomes the key driver of its organization. This paper will provide the analysis result of Binus International University's Business Architecture using a combination of IASA ITABOK and TOGAF framework. The data gathered through interview across various departments and benchmark with other STMIK are presented and an overall Binus Business Architecture was proposed.

Keywords : component; IT Architecture, Business Architecture, IASA ITABOK, TOGAF

I. INTRODUCTION

Looking to the continuity of improving IT system in Binus, it is needed for them to have a Business architecture so Binus can control, monitor and maintain IT and can carefully choosing the to be system for helping Binus in managing their staff, students and their business development in order to align with the strategy.

The purpose of this paper is to analyze business architecture according to the standard and also analyze whether the IT component in the business architecture is already adequate to support Binus International to become a world class knowledge institution or not. By making Binus International a digital campus, IT has supported Binus International to become a world class knowledge institution.

The view of digital campus means to provide services to administration, academic material, academic evaluation, and library with IT.

With Binus International University (BI) vision to become a world-class university by 2020, IT plays an important role in the organization, not only supporting BI business operations but also enabling business to compete and achieve its mission. To align its Binus Business Strategy and it IT strategy, Binus need to establish Binus Business architecture, which is defined as "a blueprint of the enterprise that provides a common understanding of the organization and is used to align strategic objectives and tactical demands" [1]. Business Architecture, which is part of Enterprise Architecture, has 5 components that include strategic business planning, strategic IT planning, value stream, integrated enterprise architecture and IT architecture. The purpose of this paper is to assess Binus Business Architecture according to the available standard and to assess whether the IT component in the business architecture capabilities to support BI to become a world class knowledge institution.

II. THE OPEN GROUP ARCHITECTURE FRAMEWORK

Many Enterprise Architecture Frameworks have been developed over the last 25 years, and comparison for these frameworks has been documented [2]. One of the frameworks used in this paper is TOGAF Framework, which is a standard framework, by the Open Group Forum, that may be used by any organization to develop IT architecture within a particular organization [3]. TOGAF divides Enterprise Architecture into 4 categories which consist of Business Architecture, Data Architecture, Application Architecture, and Technical Architecture. Business architecture describes the business process to meet its goals. Application architecture describes designing of application and the interaction between them. Data architecture describes the organizing and accessing the data stores. Technical architecture describes how the interaction of the application and the application will be supported by the hardware and software infrastructure.

TOGAF is using a process from the general to specific, from the enterprise continuum to the organizational

architecture and the Architecture Development Method (ADM) is the process driving from the general to the specific. In the Fig. 1 in the below, the relationship between the ADM and the enterprise continuum is shown clearly [2].
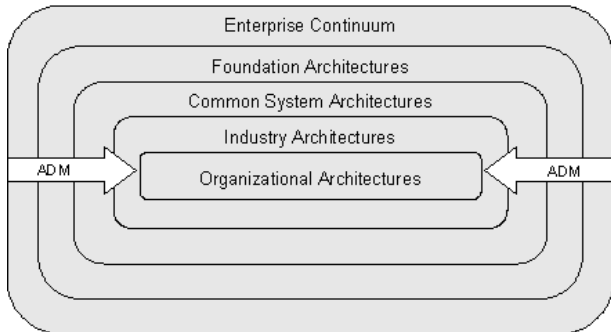

FIGURE 1. ENTERPRISE CONTINUUM

The TOGAF Enterprise Continuum specifies Technical Reference Model (TRM) consists of a model about the Application system, Application Platform and Communication Infrastructure and their inter-connectivity. How the service quality of the system is also presented in the TRM [4]. Foundation architecture is the most generic architectures that are architectural principles that theoretically can be used by IT organization. The common systems architecture is a system that any organization would like to have it [2]. To more specific, the industry architectures are principles to integrate the common system with the specific system within an organization and then create an industry solution for the specific customer problem. The most specific is the Organization Architectures that are described and guided the final of the solution component and the network base on the customer problem and customer IT environment [4].

In the Fig. 2 below, describes the process of ADM that contains a preliminary phase and then the 8 phases that are cycled. The activities inside each phase are well defined but it depends on the implementation to determine the suitable activities to get a required system and the required outcome.
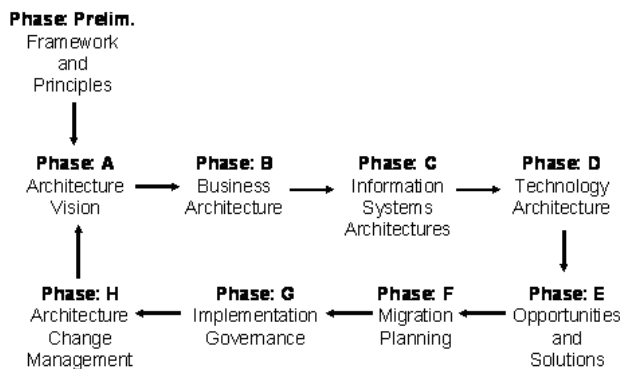

FIGURE 2. TOGAF Architecture Development Method (ADM)

Fig. 3, below, shows the model based on the TOGAF – ADM and COBIT model [5]. The vision and mission of institution refer to the regulation of institutions. The scope & requirement refer to the vision and mission of each institution. The business architecture, information systems architecture and technology architecture refer to the available resources.
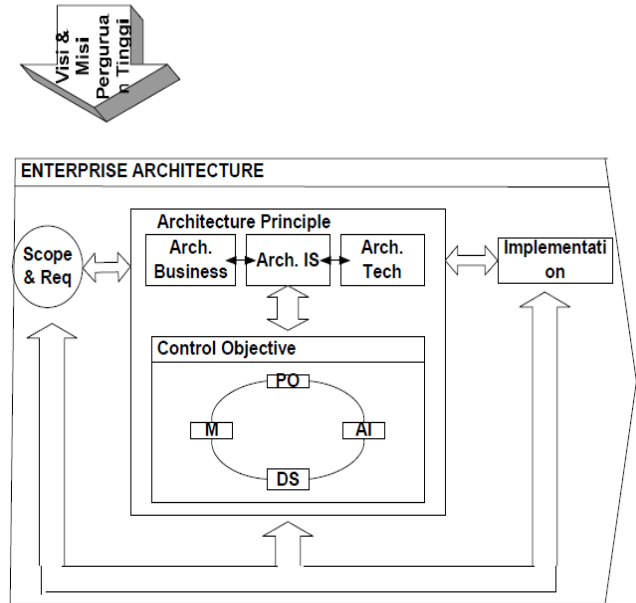

FIGURE 3. TOGAF – ADM and COBIT Model

Table 1 shows the comparison between Zachman, FEAF and TOGAF [4]. The capital N is no, Y is yes, and P is partial. The result of the comparison is TOGAF framework is the most comprehensive framework compares to the other framework. TOGAF is chosen by the researcher as the framework to analyze the business architecture in BI. It is also because TOGAF has a complete process, reference model, neutral with vendor, and information is available.

TOGAF has characteristic for university and information system [6]:
1. University needs a flexible method to integrate all information units and do information systems planning. TOGAF able to integrate for different systems.
2. Characteristic of TOGAF is general and flexible that can anticipate for artifact that might arise because TOGAF has adequate resource base, the standards is acceptable and can handle changes.

TABLE 1. FRAMEWORK COMPARISON TABLE

	ZF	FEAF	TOGAF
Goals			
Architecture Definition and Understanding	P	Y	Y
Architecture Process	N	Y	Y
Architecture Evolution Support	N	Y	Y
Architecture Analysis	Y	Y	Y
Architecture Models	Y	Y	Y
Design Tradeoffs	P	P	P
Design Rationale	P	P	Y
Standardization	N	P	Y
Architecture Knowledge Base	N	Y	Y
Architecture Verifiability	N	N	Y
Inputs			
Business Drivers	P	Y	Y
Technology Inputs	N	Y	Y
Business Requirements	Y	Y	Y
Information System Environment	P	Y	Y
Current Architecture	P	Y	Y
Non Functional Requirements	P	P	Y
Outcomes			
Business Model	Y	Y	Y
System Model	Y	Y	Y
Information Model	Y	Y	Y
Computation Model	Y	Y	Y
Software Configuration Model	N	N	Y
Software Processing Model	Y	Y	Y
Implementation Model	P	P	Y
Platforms	Y	Y	Y
Non-functional Requirements Design	P	P	Y
Transitional Design	N	Y	Y
Design Rationale	N	N	P

III. RESEARCH METHOD

The data is gathered using qualitative method. It also uses primary and secondary sources. This research to get an accurate data uses both primary and secondary sources. The primary source is using interview approach. The interview is categorized as an appropriate source to get an in depth understanding of business and IT in Binus International. The study also uses secondary sources. Secondary sources are source to get information from other research that is existed. The secondary sources for this study include books, journal, paper, reliable website in the Internet, etc. The aspects of question that will be asked to the interviewee cover strategic business, IT planning, and value stream.

The interviewees are staffs from Binus International that know the business or IT in Binus International for gathering data for the business architecture. People who are interviewed are IT directorate, dean of programs, quality assurance, and operations manager.

IV. BINUS INTERNATIONAL BUSINESS ARCHITECTURE

To develop BI Business Architecture as shown in figure 1, we always start from organization's Vision and Mission – BI Vision is to become a world-class knowledge institution in continuous pursuit of innovation and enterprise; Its mission is committed to developing people with the knowledge, skills and attitudes by delivering international

quality education and relevant research for the advancement of our stakeholder [7].

A. Business Strategic Planning

The next assessment is to document Binus JWC Business Strategy, i.e. Binus JWC Strategy Map, which includes BI Business Strategy and Binus JWC IT strategy align with the business strategy. A strategy map is a diagram that describes how an organization creates value by connecting strategic objectives in explicit cause-and-effect relationship with each other in the balance scorecard objectives (financial, customer, processes, learning and growth) [8]. Since Strategy Map is also used to describe strategies for value creation [9], the implementation of each of the strategy with the relevant value chain becomes much more achievable.

B. Value Chain

Using Michael Porter value chain [10] as a reference Binus JWC key activities are assessed and documented in Fig 4. The value chain represents Binus JWC primary activities that need to work together to deliver an output of value to the customer. The primary activities are program development, teaching and learning processes, career services, marketing and admissions and alumni services and management. The supporting activities are Binus system infrastructure, lecturer development, teaching and learning process development, research and research centers.

FIGURE 4. Binus JWC Value Chain

C. Binus JWC Strategy IT Plan

Binus JWC Strategic IT Plan includes existing Binus JWC IT plan, future Binus JWC IT plan and Binus JWC IT architecture. Since its establishment, Binus has always used IT to support operation and provide services to its stakeholder and this is also clearly seen in Binus JWC operations. Binus JWC has its own IT department to develop and maintain the information systems, network infrastructure, operational support, and teaching and learning support. Binus JWC information systems used to support its operation is backed with a solid network backbone system, using fiber optic cable that interconnects its application servers and databases. The effort is now underway to integrate the critical applications such as ACCESSBI - Binus own learning management system, Library, and System

supporting Post-graduate study. In addition, to integrate all of its systems, Binus JWC is also reengineering its business processes to streamline its business processes and implementing Binus Enterprise Education System (BEES), an integrated web based system, that support Binus JWC entire operations.

Information Technology Architecture is a high-level map or plan of the information assets in an organization, which guides current operations and is a blueprint for future directions [11]. Fig. 5 shows the new BI IT architecture, that integrate existing and future systems to be implemented. As shown in the figure, BI utilizes existing Binus own ACCESSBI and Library System; these systems are accessible from the Internet, allowing lecturers and students to find resources and collaborate their works. Found only in the intranet, when completed, BI will have an integrated web based system that consist of ABIOS, OprJWC and BEES.
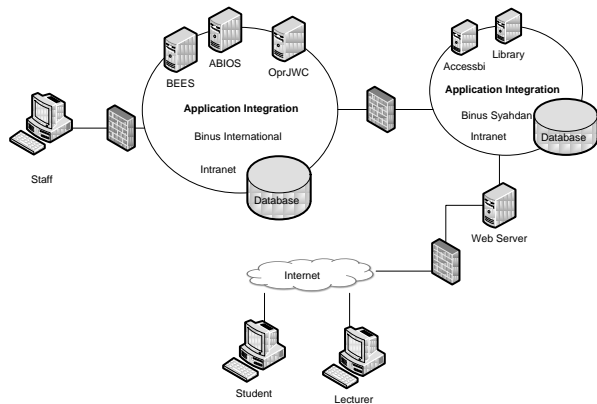
FIGURE 5.   BINUS IT ARCHITECTURE

BI Business Architecture shown in Fig. 6, summarizes our findings. At the very top of the diagram, BI vision and mission with its business architecture need to comply with the accreditation regulation and BI vision and mission should align its business architecture. BI Business Architecture contains both BI value chain and BI modified value chain. BI value chain consists of BI primary and secondary activities and the bottom figure of value chain describes how each of activities in the value chain is interrelated. The primary activity in the modified value chain begin with marketing & admissions, program development, teaching & learning processes, alumni services & management and end with career services. These activities are supported by the secondary activities that include teaching and learning process development, lecturer development and research & research center. Both primary and secondary activities are supported by Binus Systems Infrastructure, which in turn supported by BI applications that support activities in the value chain.
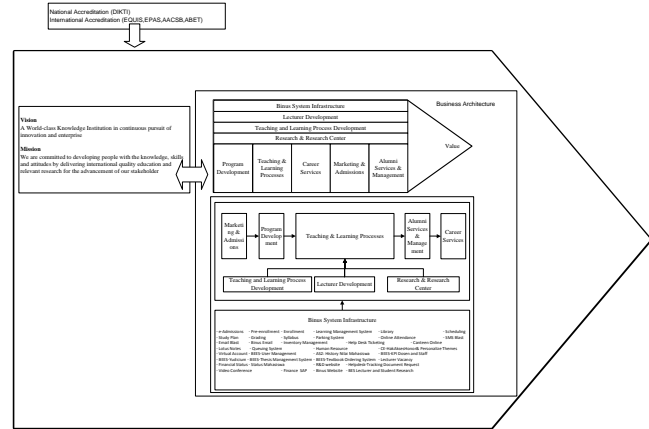
FIGURE 6.   BINUS INTERNATIONAL BUSINESS
ACHITECTURE

V.   ANALYSIS

This paper focuses its analysis using TOGAF ADM 3 phases that include architecture vision, business architecture, and information systems architecture (application architecture). The results are benchmarked with the analysis done by Gunawan in 2007 at STMIK-Mikroskil Medan because the similarity in IT goals that is striving to be a digital campus [6].

A.   Architecture Principle

As mentioned previously, the architecture principle used in this paper is adopted from STMIK-Mikroskil that has implemented TOGAF to develop their information systems [9]. The Architecture principles are created based on the following important aspects:

1. Organization business plan
2. The needs of IT as a strategy
3. External factor likes policy
4. Current system and technology
5. The development of IT

Below are few architecture principles that are used to develop BI Business Architecture:

1. The architecture should refer to BI business strategy
2. The management of architecture should be simple
3. The architecture should not depend on the platform and can be accessed globally.
4. It should be safe.
5. It is designed to easily add and develop.
6. If possible uses open standard.
7. Adopt product and platform that is standardized to reduce differentiation.
8. The definition of data should be consistent in all division.

B.   Architecture Vision

The vision of Binus International is to become a world-class knowledge institution. To be a world-class

university, Binus should be a digital campus to deliver an excellence in teaching and learning activities, administration, research, academic activities, and library resources.

The BI key factors to improve their IT are:

1. Continuous improvement on its IT systems
2. Significant increase in total number of stakeholder and with supported by IT to provide a higher service quality
3. Changes in business environment.

And BI attracting factors to be considered are:

1. Enhance BI business value, in the area of staff productivity, cost reduction and improve student capacity.
2. Provide a better service to the stakeholder
3. Enable BI to provide a new program such as e-learning and self study.

C. Business Architecture Benchmarking

Based on the benchmarking results, following are the key areas BI to include in its plan for the future:

1. E-Learning
   E-learning allows students to study remotely without location and time boundaries and reduce both student and university cost and time.
2. E-Project
   E-Project facility enables project or research team to interact with each other in the electronic forum, download or upload previous project or research, etc.
3. E-Services
   a. E-Library
      Students will be able to access study material using website. The university and student can participate in developing e-books and place it on the web. Student and staff can access e-books anywhere and anytime.
   b. E-Admission
      With E-Admission, BI will be able to increase its potential students and reducing overall cost and time involved during admission of new students.
   c. SMS Services
      Students or staff will be able to do registration or e-payment through SMS.

Facility to support those services is:

1. Internet hotspot
   Internet connection should be provided everywhere on campus either in class or outside class room.
2. Audio/video conference
   With this facility, university will be able to support long distance teaching, tapping into lecturers from other cities that would be too costly otherwise.
3. Smart card

Every student has electronic student smart card that can be used as identity card, attendance card, credit card, discount card, voucher card and etc.

D. Information System Architecture

Information systems architecture is derived from the needs of business and it is supported by the information technology systems. Information systems architecture consists of application architecture and data architecture. The data architecture will not be discussed here because it is out of scope of this paper.

BI Application architecture should consist of the following:

1. Administration and decision making application
   a. Management information System (MIS), Decision Support System (DSS), and Executive Information System (EIS). These systems should enable the board of management to:
      i. Produce a report or performance indicator, monitor the financial performance and ratio that is represented in financial report
      ii. Monitor university financial (to know the university is profit or loss)
      iii. Know the revenue from the tuition fee, the total active students, etc.
      iv. Monitor the rank of study program compare to other institution
      v. Monitor the staff career level and also the lecturer career level

For the study program, these systems should be able to perform the following:

i. Identify the total and profile every lecturer and academic staff, complete with award, work result and track record.
ii. Enhance the quality of resources and academic implementation through monitoring to the important ratio such as lecturer ratio compare with the total students, the composition of lecturer based on specialty, the total patent that is obtained, the total scientific journal published, the total of number of books publish in library, etc.
iii. Identify the students candidate with the total accepted students year by year
iv. Identify the student index achievement average, the total scholarship that is given to students and the total students graduated every year

For the lecturer, these systems should be able to perform the following:

i. Include lecturer suggestion in the enrollment process
ii. Provide a list of students that is able to take thesis on the particular semester, to help

students to complete their study on time or faster.

b. Resource optimization system

Resources such money, laboratories, human resources (staff, lecturer, teacher assistant, etc), classroom need to be allocated and utilized efficiently and effectively.

To support these systems, these are the requirements:

1. Manage the room schedule based on the courses that is opened with the limitation of classroom and lecturer schedule
2. Manage the budget from cost center in university
3. Manage the availability of things in university

c. Student Management System

Manage study plan, courses, grading, student status, duration to finish study and etc.

d. Lecturer management system

Help in manage the lecturer material content, manage the students learning and monitor their development

e. PMBP system

Helping the candidate student to start the recruitment process

f. Alumni system

Collecting alumni profile and also as a media to communicate among the alumni.

g. Workflow management system

A collaboration, cooperation, and communication processes in the university management involves a group of individual to do a group of activities that needs validation, agreement, and authentication. Start from lecturer or staff having leaved, students want to present their thesis and the procurement process of goods or service can use this system.

h. Document repository system

A centralized documentation and archive in electronic format

i. Financial and accounting system

Registering the university financial until financial report is produced

2. E-learning application

a. Learning (course) management system

To help lecturer and student in interacting, cooperate, and communicate in the implementation of lecture class. With this application based on web student will be able to download lecture material, program administration, and assignment.

b. Virtual class

Implementation of virtual class with using IT, for example, distributes assignment and quiz with online.

3. Digital library application

Students can access library collection anywhere and anytime in electronic format that enable the user to use the library service to search. The system also provides book a collection.

4. E-services application

a. Collaboration service
b. Admission/registration service
c. Payment service

5. E-Project/research application

a. Email

This is used to communicate with each other in terms of research

b. Mailing list

It is used as forum communication to discuss about the research.

c. Discussion forum

It is an application that enables everyone to discuss about any research.

d. Chatting

It is a real time communication that enables for people to discuss about the research at the same time.

e. Audio/video conference

It is a communication that involves video and audio.

f. Search engine

This search engine will help in findings project fund, seminar, scientific journal or article.

6. Website corporate

Web site is used to introduce the organization business unit.

Using the activity diagram of BI, those applications are checked to know how IT supports business in the business process. Based on the activity diagram, applications that are not currently used by BI are new student acceptance systems, workflow management systems, and alumni system. The other applications that have been developed by BI supports the business process of BI.

E. Gap Analysis

The gap analysis of IT in the business architecture focuses the component of BI value chain that is the Binus System Infrastructure. The gap analysis shows that there are few differences. One of the differences is in the area of payment service: BI uses virtual account while STMIK payment service uses SMS. BI uses SMS service to distribute information not for payment. Other differences from the gap analysis are: the lack of new student acceptance system, alumni system, and workflow messaging system in BI system infrastructure.

Furthermore, the gap analysis shows that BI lacks in several systems compare to the STMIK. It means IT in BI in order to achieve the world class university by transforming BI to become a digital campus, should improve the current system by adding new system. The systems that BI is lacking are new student acceptance system, alumni system, and workflow messaging system. BI quality will increase by adding those systems. With the new system, IT in BI can provide better support to the primary value chain. Alumni system can support the alumni services and management activities and also support student alumni relation division. By having the alumni system, alumni can share their experience and socialize to student and also to other alumni. The new student acceptance system can support the marketing and admissions activity. The marketing will be able to give services better to new student.

VI. Conclusion

General Business Architecture components and BI Business Architecture is derived from their vision and mission, have been described in this paper. BI strategic business plan and its value chain have also been discussed. Benchmarking between STMIK and BI strategic plan has been presented and it shows that both STMIK and BI are aiming to become a digital campus.

Nevertheless, based on the gap analysis presented in this paper, it is recommended that a new student acceptance system, an alumni system and a workflow management system should be part of BI Architecture, if BI is to become a world class institution. The alumni system is recommended to have discussion group, notice board, online chatting, business exchange strategies, group blog, and socialize. Workflow management system consists of collaboration, cooperation and communication process in the management of university that involves a group of individual that should do a group of processes of activity that needs validation, aggreement and authentication so with workflow management system the processes will be managed better. New student acceptance system is a system that helps student candidate from recruitment process until selection. It is also recommended to Binus International to enhance their sms services in the future not only using sms for distributing information but also to do payment. It is also shown that Business Architecture become one of the key component to determine how well the IT has aligned with its Business objectives.

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