Vocational Education Enterprise Architecture Framework (VEEAF) for supporting business processes on vocational high school

B P Adhi, W Widodo* and H Ajie

Informatics Education, Faculty of Engineering, Universitas Negeri Jakarta, Jakarta, Indonesia

*widodo@unj.ac.id

Abstract. Technology supports organizational business processes. Advanced and well-established organizations have a variety of activities that are well managed with a framework or architecture. Company architecture is an illustration of how business processes can be managed with the support of various technologies in their environment. The purpose of this study is to develop a framework using enterprise architecture in Vocational High Schools which is an organization in the field of education that needs to develop and adapt to the times. Many activities and business processes in the education sector began to shift from manuals to information technology-based. Research methods developed using the Federal Enterprise Architecture Framework (FEAF) method but are limited to level IV where this level focuses on modeling produced by each cell in the matrix, and the matrix used is in the first row, namely the appearance of planning objectively or coverage. The perspective planner explains the views or estimates of the scope of the system, whether the resulting system will be valuable and how the system will operate. The results of this study are matrix perspective and vocational enterprise education architecture (VEEAF) model in the scope of perspective: finance and assets, registration, cooperation with industry, career center and alumni, academic, Professional Certification Institutions (LSP).

1. Introduction
The rapid development of information and communication technology is very influential on various fields that utilize information systems (IS) and information technology (IT) for a business process as a solution to improve business quality and competitiveness. IT is expected to be able to become part of the business strategy of the organization to achieve its goals. To manage IT to be able to be finalized with a business strategy is not easy. Failures such as lack of understanding of the advantages of IT utilization, lack of good and comprehensive planning to develop and develop information system applications, lack support and differences of opinion within organizations and business opportunities that cannot be utilized because existing IT is not used optimally for support company goals. Therefore, the right solution to harmonize business strategy and technology strategy is that the organization must implement an enterprise architecture (EA) information system architecture planning that will provide a framework for making long-term information technology decisions that are appropriate by considering the overall interests of the organization to achieve organizational goals with effective support from business operations with the right IT [1]. The corporate architecture consists of business architecture,
process architecture, integration architecture, software architecture, and technology architecture which includes business artifacts such as goals, products, and services, markets, business processes [2,3].

School is an institution designed for teaching students or students under the supervision of educators or teachers. Most countries have a formal education system that is generally mandatory in an effort to create students who progress after experiencing the process through learning. The school is also an organization that has a noble goal, vision, and mission for the nation's generation both at the elementary school level and equivalent, junior high school, and equivalent, high school, and equivalent and vocational high school [4]. Vocational high school foster and improve the quality of education held in accordance with the vision and mission of each school, namely creating human resources. Of course, human resources can compete in the world of work and industry. Vocational high school is taken because it is closely related to skills and the outside world, especially the world of work, industry and Professional Certification Institutions (LSP). There needs to be an effort and also a strategy to always foster and improve the quality of education a very important thing, as well as being the main goal of Vocational high school. Furthermore, in an effort to achieve that goal, continuous improvement and improvement of the here and there will be carried out while at the same time striving to be more competitive both academically and administratively. In order to realize organizational alignment that exists in Vocational High School, it is necessary to make a school information system architecture plan. With the existence of EA, it is expected to be able to improve school performance and as an organizational strategic planning design in schools, both in terms of organizational structure, business processes, people or stakeholders, applications, data, infrastructure, interrelationships among stakeholders, especially industry, technology, and systems built. Traditionally the discourse on EA revolves around the Zachman Framework, the Federal Enterprise Architecture Framework (FEAF), or The Open Group TOGAF® Standard where the framework provides recommendations on how to properly compile and organize EA documentation and provide references in the form of guidelines, tools and some practical recommendations in EA [5]. Basically FEAF is relatively more complete than the Zachman Framework because it integrates sent taxonomies with Zachman, TOGAF in terms of the process [6]. Vocational schools are basically formed to produce job-ready graduates where graduates produce productive and competitive workforce and to produce this vision, Vocational Schools must be supported by enterprise architecture to optimize all resources both from an information system whose purpose is to provide the best service to stakeholders [7].

The contribution in this study is to map the elements that build enterprise architecture and then develop an enterprise architecture model using the framework that already exists in this case that is used is FEAF. In this study, researchers chose to use the FEAF method in designing enterprise architecture.

After the introduction in part two describes the research method were in this study using FEAF, in section three shows the results of the research in the form of matrices and models and several things that can be discussed, stage four contains conclusions and last stage acknowledgment.

2. Method
The Federal Enterprise Architecture Framework (FEAF) is a Framework that was introduced in 1999 by the Federal CIO Council. The aim is to jointly develop common processes in the federal government, the ability to communicate and share information between Federal agents and other government agencies [8]. FEAF provides a standard for developing and documenting architectural descriptions in areas of top priority. FEAF is suitable for describing an architecture for the Federal government. FEAF divides architecture into business, data, application and technology areas, where now FEAF also adopts the first three columns in the Zachman Framework and the enterprise architecture planning methodology by Spewak [8].
In the FEAF component structure which in figure 1 is intended as a reference point to facilitate effective and efficient coordination of general business processes, technology insertion, information flow and investment in Federal Agencies [8]. FEAF provides a structure for developing, maintaining and implementing an operational environment at the top-level and supporting the implementation of IT systems.

This framework is composed of four levels; each level contains the following meanings [8]:

- **Level I** is the highest display level that is related to the architecture drivers or the external drivers and strategic direction of the architecture. Both transform the current architecture towards the target architecture by applying architecture standards and managing the architecture process.
- **Level II** explains in more detail by analyzing business drivers and design drivers from architecture. The results of this process are business architecture targets and target design architecture.
- **Level III** displays architecture in more detail with the appearance of business, data, applications, and technology to model the target architecture.
- **Level IV** combines the Zachman Framework (ZF) and the Enterprise Architecture Planning (EAP) method of Spewak. The data, functions and network columns in the Zachman Framework are also done. EAP is used to define the architectural planning process [9].

**Table 1. Federal enterprise architecture framework level IV [4].**

| Perspective          | Data Architecture (entities=what)      | Applications Architecture (activities=how) | Technology Architecture (locations=where) |
|----------------------|----------------------------------------|------------------------------------------|-----------------------------------------|
| Planner’s View       | List of Business Objects                | List of Business Process                  | List of Business Locations              |
| Objective/Scope      |                                        |                                          |                                        |
| Owner’s View         | Semantic Model                         | Business Process Model                    | Business Logistics System               |
| Enterprise Model     |                                        |                                          |                                        |
Table 1. Cont.

| Designer’s View Information Systems Model | Logical Data Model | Application Architecture | System Geographic Deployment Architecture |
|------------------------------------------|--------------------|--------------------------|---------------------------------------------|
| Builder’s View Technology Model          | Physical Data Model| System Design            | Technology Architecture                     |
| Subcontractor’s View Detailed Specifications | Data Definition “Library or Encyclopedia” | Program “Supporting Software Component (i.e., Operating Systems)” | Network Architecture                     |

In this study only developed at level IV where this level focuses on the modeling produced by each cell in the matrix, and the matrix used is in the first row, namely the view of planning objectively or coverage. The perspective planner explains the views or estimates of the system scope, whether the system produced will be valuable and how the system will operate.

3. Results and discussion

3.1. Vocational Education Enterprise Architecture Framework (VEEAF)

Vocational Education Enterprise Architecture Framework (VEEAF), each line has its own scope. Field and estimation of the scope of this system based on the standards used in the accreditation process. An understanding was given by each perspective of the matrix in table 2.

Table 2. Perspective matrix VEEAF.

| Perspective coverage | Data Architecture | Application Architecture | Technology Architecture |
|----------------------|-------------------|--------------------------|-------------------------|
| Finance and assets [10] | Financial income data, financial expenditure data, inventory data items | Financial transactions, the addition of items, reduction of items, data collection | Web-based |
| Registration | Data on prospective students | Student admission | Web-based |
| Cooperation Industry With Career Center and Alumni | Collaborative industry data, the data type of work | Internship cooperation | Web-based |
| Academic | Subject data, student data, teacher data, value data, attendance data, study material | Learning, attendance, learning | Web-based |
| Professional Certification Institutions (LSP) | SKKNI data, professional data, assessor data | Profession, examination process, the process of aces | Web-based |

3.2. Model VEEAF

From the results of the perception range, a VEEAF model is created which is an architectural model wherein each point can exchange information. It can be possible that later some processes communicate with each other because their scope collaborates with each other.
3.3. Discussion of research results
The VEEAF model consists of six parts including the first; Finance and assets, second; Registration, third; Cooperation with Industry, fourth; Career Center and Alumni, fifth; Academic, and sixth; Professional Certification Institution (LSP). The VEEAF model is certainly not an ideal model. Need control from stakeholders so that the enterprise architecture that is created can really be developed and implemented in the future so that weaknesses can be identified. Besides seriousness to various parties.

4. Conclusion
Some business processes in Vocational High Schools need to be detailed in detail so that later when built Enterprise Architecture can be implemented in similar or similar organizations. Some of the coverage used in the development of the VEEAF model includes Financial and Asset, Registration, Cooperation with Industry, Career Center and Alumni, Academic and LSP. This coverage is the main business model in vocational secondary schools that can later be developed later.

Acknowledgment
This work was supported by Universitas Negeri Jakarta under grant of Hibah Penelitian Universitas Negeri Jakarta (Research Grant of Universitas Negeri Jakarta) 2019.

References
[1] Sandkuhl K 2017 Towards Integration Methods of Product-IT into Enterprise Architectures 23–28
[2] Winter R and Fischer R 2006 Essential Layers, Artifacts, and Dependencies of Enterprise Architecture Proceedings of 10th IEEE International Enterprise Distributed Object Computing Conference Workshops (EDOCW’06) 1-30
[3] Drews P and Schirmer I 2014 From enterprise architecture to business ecosystem architecture: Stages and challenges for extending architectures beyond organizational boundaries Proceedings-IEEE International Enterprise Distributed Object Computing Workshop, EDOCW 13–22
[4] Curriculum Corporation on behalf of the Ministerial Council on Education, Employment, Training, and Youth Affairs. A new framework for vocational education in schools Implementation. Eureka Corporate Group

[5] Kotusev S, Singh M and Storey I 2017 Article A Frameworks-Free Look at Enterprise Architecture Journal of Enterprise Architecture 13(1) 15

[6] Alamri S, Abdullah M and Albar A 2018 Enterprise architecture adoption for higher education institutions International Journal of Simulation: Systems, Science and Technology 19(5) 16.1-16.8

[7] Wikusna W 2018 Enterprise Architecture Model for Vocational High School IJAIT (International Journal of Applied Information Technology 2(01) 22

[8] Developed by: The Chief Information Officers Council 1999 Federal Enterprise Architecture Framework

[9] Iyamu T 2018 Implementation of the enterprise architecture through the Zachman Framework

[10] Science C and Science C 2016 Roadmap for Simplification of Enterprise Architecture at Financial Institutions 43–51