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DESIGN ENTERPRISE ARCHITECTURE FOR INDUSTRY OF TEXTILE USING ZACHMAN FRAMEWORK

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Abstract

PT. Sutera Indah Utama is a vertically integrated industry of Textile Company, which supplies domestic and international markets with high quality knit and garment fabrics. PT. Sutera Indah Utama is professionally integrated in-house knitting, knitting coloring, sewing facilities along with supporting facilities, such as screen printing and embroidery. With a fully automatic hanging sewing system, it uses a modern product management system. Therefore the company requires a well-planned planning application, so that it is planned according to the interests and needs of the company. Planning the entire company system in which it has aspects of business and organization called EA. This is used to design company architecture by analyzing, communicating, and integrating architecture in a company. So that business processes reach one of the frameworks and solve or solve a problem, to build an information system in a company that needs a Zachman Framework. IS and IT can be more effective and efficient in supporting a business activity to achieve an organization's or company's goals and interests. With an Enterprise Architecture in the company, it can achieve a goal that is optimally expected according to the company's business strategy.

Keywords:

Industry of Textile, Enterprise Architectures, Business Strategy, Zachman Framework

1. INTRODUCTION

The development of clothing and fashion is the biggest contribution to the development of the textile industry today. The clothing industry is one of the biggest sales and within the framework of economic growth both nationally and internationally [1]. In recent years, trends and demand have increased progress in the clothing industry. Instead of traditional ready-to-wear clothes, tailored for clothes that are tailored to the customer's posture, current trends and body shapes with material, style, pattern or color. Production demand is becoming more important in the current garment supply chain to accept trends and increase current trends [2], [3]. The clothing industry is divided into several processes with different operations. The operation process that must be completed to change the material that has been prepared into clothing such as, replace and finish clothes according to the style for the current trend [4], [5]. On workers needed for high production processes. Accurate production and process, so that those who have standardized, trained and controlled up to supervision are very important to achieve optimal productivity [6], [7]. Demand for customer and market trends, clothing companies often make progress, companies are involved in the transition process, in the industrial world must face challenges, namely instability in trade environments, to increase the value of money and increase production increases [8]. The clothing industry requires new strategies to be developed, such as the design of new materials, quality, and not advantages [9], [10]. Company excellence requires a role for Enterprise Architectures (EA), which has a relationship with design of business strategies and the development of EA that has an overview of the direction of the business that runs and implements [11]. The EA is known as a general or approach to business with IS/IT in an organization [12]. EA also connects the activities carried out by the company from strategy and operations, regulates better in sensing, optimizing, integrating, and all related to the organization [13]. The main purpose of EA is to achieve organizational goals and objectives, with the EA having several agreements, namely: TOGAF, Zachman, and Federal Enterprise Architecture. This EA framework has the main objectives in SI/IT with business, but each organization uses different utilities in the development and development of IS/IT, according to business objectives [14]. PT. Sutera Indah Utama is a company engaged in textiles, also known as apparel production, in manufacturing made with merging and sewing and cutting, to become a form of clothing and clothing that is used by humans every day. Quality and quantitative processes support is needed to improve performance and performance in accordance with expectations [15]. This strategy is needed to make decisions about company information, collects data, offers, suggestions, proposals as well as internal and external needs. The objectives of the main plan, and determine the range of businesses that must be pursued and developed by the company [16], [17]. Based on the explanation, PT. Sutera Indah Utama (SIU) has a business strategy that produces quality, effective production and good quality control. Companies must improve and use production equipment to make better quality. The company still has problems in the production system, that is, there is a company's work process, often the material is lost in preparation, inventory is not in accordance with the data that comes out, old raw material orders, and reports do not match. Related to work processes become hampered, and are increasingly controlled or controlled on the system, when making production. Where business strategies and IS (Information Systems) are needed, they are successfully harmonized, used to prove how corporate architecture can make a positive contribution to corporate alignment. Therefore, IT companies need IT explanation to fit their business strategies.

Based on the explanation of Enterprise architecture (EA) which represents various work that is used to describe all IS/IT. In this study using the Zachman Framework architecture work, in this case the work is used to approve, complete and also construct architectures [18]. Zackman Framework can solve problems and solve them by making IS/IT planning so that it can run effectively and efficiently, and support the company's business strategy [19].

2. REVIEW OF LITERATURE

2.1 ENTERPRISE ARCHITECTURE

Enterprise architecture is used by many specialized organizations to provide mature business and SI / IT solutions for

sustainability and competitiveness. EA activities are carried out through a work assignment, which is a process of completion and efficiency, which arises from tasks that do not add value and are excessive, provide information flow, up to strategic system placement and business restructuring [20]. EA activities are delivered through the domain, which is equipped with business functions and IS/IT provided by work assistance. Related to EA into four domains, namely business, information, technical architecture and application. Each domain has its own results, which determine its implementation. Business-approved business architecture from a business perspective, which complements the business vision and mission as well as the objectives needed to guide its strategic and daily operations [21]. The architecture contains business strategies, the process of achieving stages and the business plan process, where information architecture is developed. Organizational information needs related to policies, governance, and information products determined by the information architecture. Describes high verification and quality of information, so that it is easy for organizations to make changes and make appropriate decisions [22]. Basically, information architecture describes the structure of logical and physical data assets and data management resources, which complement the application architecture. The application architecture of the blueprint of the individual application system that will be used, including interactions and relationships with key business processes. Architecture also works on transparent communication and design tools for application developers. The domain of technical architecture is approved to support and support the organization's needs from strategic planning to implementation planning [23].

2.2 ZACHMAN FRAMEWORK

The Zachman framework is designed to involve representation of information systems for all parties involved in developing, managing, maintaining, and using organizational information systems. Zachman's framework describes a company architecture in six components, namely data, function, network, task, time, motivation. Each component explains and uses six different perspectives, namely the perspective of the planner (planner) that produces architecture (contextual description), the owner's perspective that produces the company model (conceptual design), the system perspective model (logical design), perspective builder to present details (design physical), the perspective of subcontractors to represent details (design out of context), and finally a model of corporate functionalization [19].

The Fig.1 shows the Populated Zachman Framework, where the framework consists of two dimensions as follows, What, Where, When, Why, Who, and How, following from the explanation of each of the 6 components. What (data), building unity is considered important in business. These units are things whose information is managed. Functions, functions, and activities determine. Inputs and outputs are also compared in this column. Where (network), geographical event, location, and the relationship between activities in the organization, which includes the main business geographical location. Who (human), represents humans in organizations and metrics to measure their abilities and performance? When (time), represents time and shows work criteria. This is useful for designing schedules and processing architecture. Why (motivation), describes the motivation of the organization and its work. Here we see goals, objectives, business plans, knowledge architectures, reasons and decision making in organizations [18].

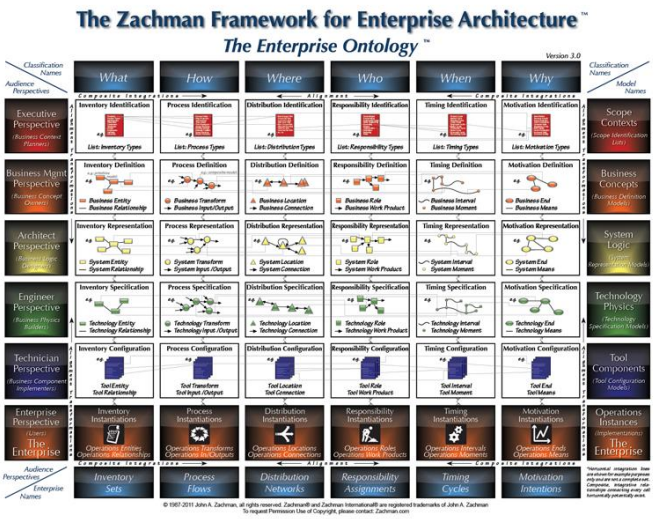

Fig.1. Populated Zachman Framework [19]

Zachman Framework is a scheme to classify the organization of Zachman Framework company artifacts consisting of 6 columns and 6 lines. Each column represents the focus, abstraction, or topic of corporate architecture, namely: data, function, network, human, time, and motivation. Each row represents the following perspective:

- **Planner's Perspective**: sets the context, background, and purpose.
- **Owner Perspective**: establishes the company's conceptual model.
- **Perspective Designers**: model information systems while bridging the things that the owner wants and things that can be realized technically and physically.
- **The Builder Perspective**: establishes the technical and physical design used in overseeing technical and physical implementation.
- **Subcontractor's perspective**: establish roles and references for those responsible for developing information systems.
- **Functional Perspective**: represents the user's perspective and tangible manifestations of implementation [24].

2.3 ENTERPRISE ARCHITECTURE PLANNING

Enterprise Architecture Planning (EAP) is a method used to provide information systems and organizations. However, EAP does not have business and architecture, but requires its business and architectural needs. In EAP, architecture considers the data, applications and technology needed to support an organization's business [25].

a) **Layer 1 (Starting Position)**

i. ***Planning Initiation***: start Planning Company Architecture on the appropriate track (including: determining what is used, who will be involved, the tools needed). At this stage a work plan will be produced, certainty of management commitment.

b) **Layer 2 (Current position)**
   i. ***Business Modeling***: gathering knowledge about business and information used in conducting business.
   ii. ***Current Systems and Technology***: determine existing systems and technologies for long-term development plans.

c) **Layer 3 (Where we want to be in the future)**
   i. ***Data Architecture***: determines the main data types needed to run a business
   ii. ***Application Architecture***: special applications needed to manage data and support business.
   iii. ***Technology Architecture***: needed to provide an environment for applications that require data and support business.

d) **Layer 4 (How to achieve it)**
   i. ***Implementation Plan***: determine application planning, implementation schedule, and propose a clear path to migrate from the current position to the desired position in the future [26].

3. RESEARCH METHOD

In this study, the research steps refer to the methodology of Enterprise Architecture Planning (EAP). Enterprise Architecture Planning has 7 (seven) main components shows the stages for determining and planning the implementation of information systems and technology architectures. The steps in this study can be seen in Fig.2, EAP components and layers [25]: thin client.

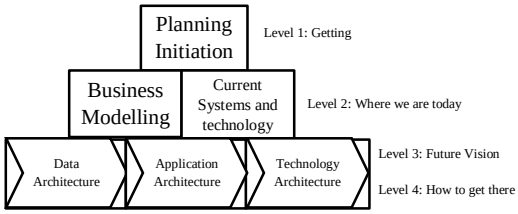

Fig.2. EAP Components and Layers [25]

i. ***Initialization or Planning***, in this activity includes literature study in the form of material trust in the design of Enterprise Architecture and designing case studies of corporate architecture carried out by others before and determining the architecture of the scope, vision and mission in order to achieve the goals of the organization or company, plans and commitments from the parties concerned to design this development process.
ii. ***Business Modeling***, this process, collecting and observing documentation from the company's organizational structure, identifying business functions, and making a beginner or initial business model.
iii. ***Current System and Technology***, the process of identifying systems and technologies that are currently running and analyzing conditions in the organization.
iv. ***Data Architecture***, the activity of examining the definition of data entities that involve in the organization then design the data architecture.
v. ***Application*** Architecture, this activity includes the definition of processes involved in the company or organization and the design of application or process architecture.
vi. ***Technology Architecture***, this activity includes the flow of data from the processes involved in the company or organization and the design of technology that supports the flow.
vii. ***Implementation/Migration Plans***, this activity the application or action carried out based on the plan that has been prepared, so that planned activities can achieve the objectives of the organization.

4. RESULTS AND DISCUSSION

4.1 PLANNING INITIATION

4.1.1 Scope:

PT. Sutera Indah Utama is engaged in the production of clothing or textiles, the company has several parts of the process, which are production, storage of goods, and sales. PT. Sutera Indah Utama wants to improve the inventory and production section, where in the process there is a delay in production, because the inventory section has problems in preparing materials for clothing production, PT. Sutera Indah for having timeliness in existing business processes, and in production has an increase and quality of excellent control, and preparation of raw materials for production, so that products produced in accordance with the time are appropriate, and can be more efficient and have good and also excellence in competing with other competitors. This can work together with other companies, to produce clothing and have good quality, to maintain confidence in cooperating with companies.

4.1.2 Purpose:

- Being the largest company in the field of clothing textile industry in the clothing industry both nationally and internationally.
- Produce quality and innovative products, according to customer needs.
- Increase production performance with effective and efficient time.

4.1.3 Vision:

Become the best company in the field of textile marketing and distribution that has excellence in innovation, and presents new clothing products with high-quality materials.

4.2 BUSINESS MODELING

Defining the current system of PT. Sutera Indah Utama, as described in Fig.3, where the Current Running System addresses the activities of a company's organization, namely finance, human resources, inventory, production, sales and services.

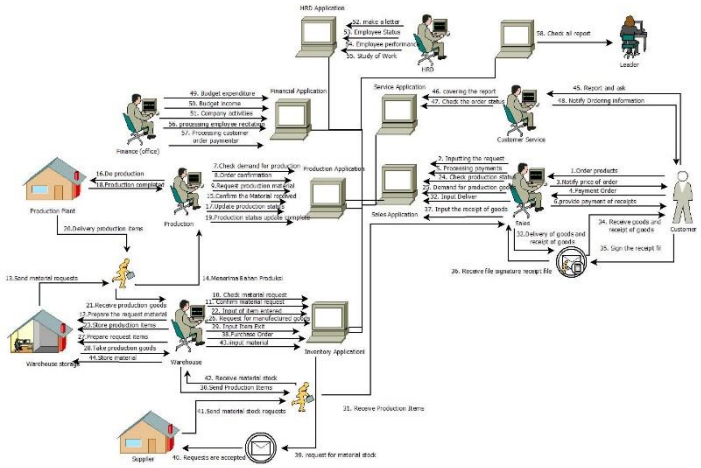

Fig.3. Current Running System

4.3 CURRENT SYSTEMS AND TECHNOLOGY

The system that is running on the company, in the process the company already has a structured system which is, starting from the marketing process that has the selling value of clothing to customers. Customers order a garment to marketing, provided that the amount, material, color, model, size of each garment, then enter the design process by following the requirements of the data that has been provided by the marketing department, from the design process to the production process. for clothing manufacturers according to the design that has been determined previously, in the production process is the process of making clothes, before making production part of the production requesting material in the inventory section, the inventory section provides materials and sends materials to the production section, then proceed to the process of making clothes production also has a production status that tells that the manufacturing process is complete or in process, after the clothing production process is finished, then the part checks the clothes, then from the tested results, the production department sends clothes to the inventory to store, from the inputting clothes enter the new inventory, and packing to be sent to the customer or the store and input the goods out. If the material inventory for production is empty or lacking, the inventory section will order material into the supply department, and provide the order report to the finance department, after successful ordering, the supplier sends the goods to the factory, the inventory input material goes into the inventory.

The technology that is running on the company is started, from computers and Microsoft Office to the needs of companies to make reports, finance, employee data, employee salaries, design and support company activities for the needs of company processes or objectives, in companies using CCTV technology to monitor activities, which are carried out on companies and also as security technology within the company, on the technology of making clothes or production, using an automatic machine that is controlled to carry out the production process, namely 10 units of embroidery machines/20 heads (Barudan), 1 unit of Automatic Screen Printing Machine (Challenger), 8 Lines Hanging System, 7 Lines Normal System with around 700 units of machines.

4.4 DATA ARCHITECTURE

4.4.1 Entity Candidate Data:

The purpose of this stage is to define all potential data entities that are needed to support the business, as shown in Table.1. Entity Data.

Table.1. Entity data

Business Entity	Data Entity
Inventory Management	1. Goods and Material 2. Delivery Goods and Materials 3. Inventory Report 4. Warehouse 5. Purchase Order
Production Management	1. Request Materials 2. Production Status 3. Production Report 4. Production Request 5. Production process
Marketing Management	1. Customer Request 2. Product Sales 3. Sales report
Financial Management	1. Budget 2. Budget Disbursement 3. Company activities 4. Financial Report
Human Resource Management	1. Correspondence 2. Employees 3. Employee Salaries 4. Employee Performance 5. Assets
Service Management	1. Billing 2. Information 3. Service Report

4.4.2 Entity Relations:

This stage aims to describe each entity that is contained in the data architecture and provides graphical illustrations of the interrelation between them. The results of the relation between entities can be seen in Fig.4, Entity Relation Inventory Management.

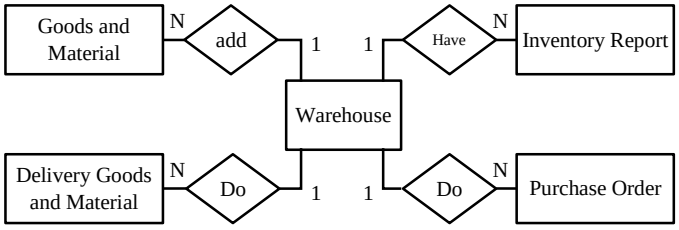

Fig.4. Entity Relation Inventory Management

4.5 APPLICATIONS ARCHITECTURE

4.5.1 Application Candidates:

This stage requires to support the applications needed to manage data and support business, shown in Table.2. Candidate Application.

Table.2. Candidate Application

Business process	Application Code	Application Candidates
Inventory Management	APK_1	Inventory Application
Production Management	APK_2	Production Application
Marketing Management	APK_3	Marketing Application
Financial Management	APK_4	Financial Application
Human Resource Management	APK_5	Human Resource Application
Service Management	APK_6	Service Application

4.5.2 Relationship of Candidates for Applications with Business Processes:

This stage aims to identify business functions that are directly supported or carried out by the application, based on Fig.5, Candidate Relation Application with Business Process.

Information: C = Create, U = Use, V = View

Application Candidates		Inventory Application	Production Application	Marketing Application	Financial Application	Human Resource Application	Service Application
Business Process	Inventory Management	C, U, V					
	Production Management		C, U, V				
	Marketing Management			C, U, V			
	Financial Management				C, U, V		
	Human Resource Management					C,U,V	
	Service Management						C, U, V

Fig.5. Candidate Relation Application with Business Process

4.5.3 Application Candidate Decomposition:

The following is an analysis of the features of each application, as follows:

i. ***Inventory Management***
   1. Collection of Data Goods and Materials Enter (Input, Update, Delete, View);
   2. Collection of Data Goods and Materials Exit (Input, Update, Delete, View);
   3. Check Goods Stock (Input, Search, View);
   4. Purchase Order (Input, Update, Delete, Search, View);
   5. Inventory Report (Search, View, print);

ii. ***Production Management***
   1. Inventory Material Request (Input, Update, Delete, Print, View);
   2. Production Status (Input, Update, Delete, Search, View);
   3. Production Requests (Input, Update, Delete, View);
   4. Production report (Search, View, print);

iii. ***Marketing Management***
   1. Data Collection of Customer Requests (Input, Update, Delete, Print, View);
   2. Product Sales (Input, Update, delete, Print, View);
   3. Sales Report (Search, View, print);

iv. ***Financial Management***
   1. Budget (Input, Update, Delete, View);
   2. Budget Disbursement (Input, Update, Delete, View);
   3. Financial Statements (Search, View, print);

v. ***Human Resource Management***
   1. Correspondence (Input, Update, Delete, View);
   2. Escort (Input, Update, Search, Delete, View);
   3. Employee Salary (Input, Update, Delete, View);
   4. Employee Performance (Input, Update, Search, Delete, View);
   5. Assets (Input, Update, Delete, View);

vi. ***Service Management***
   1. Billing (Search, View, print);
   2. Information (Input, Update, Delete, View);
   3. Service Report (Search, View, print);

4.5.4 Candidates for Applications based on Portfolios:

Depending on Table.3, the candidates for application are selected based on application portfolios.

Table.3. Application Candidates Based on Application Portfolio

Strategic	High Potential
1. Production Management 2. Marketing Management	1. Inventory Management
Key Operational	Support
1. Financial Management 2. Human Resource Management	1. Service Management

4.6 TECHNOLOGY ARCHITECTURE

4.6.1 Technology Definition Platform:

The purpose of this stage is to determine the application and data distribution strategy and define technology that will be an environment for applications and data to support business functions as in Fig.6, Company Technology Definition.

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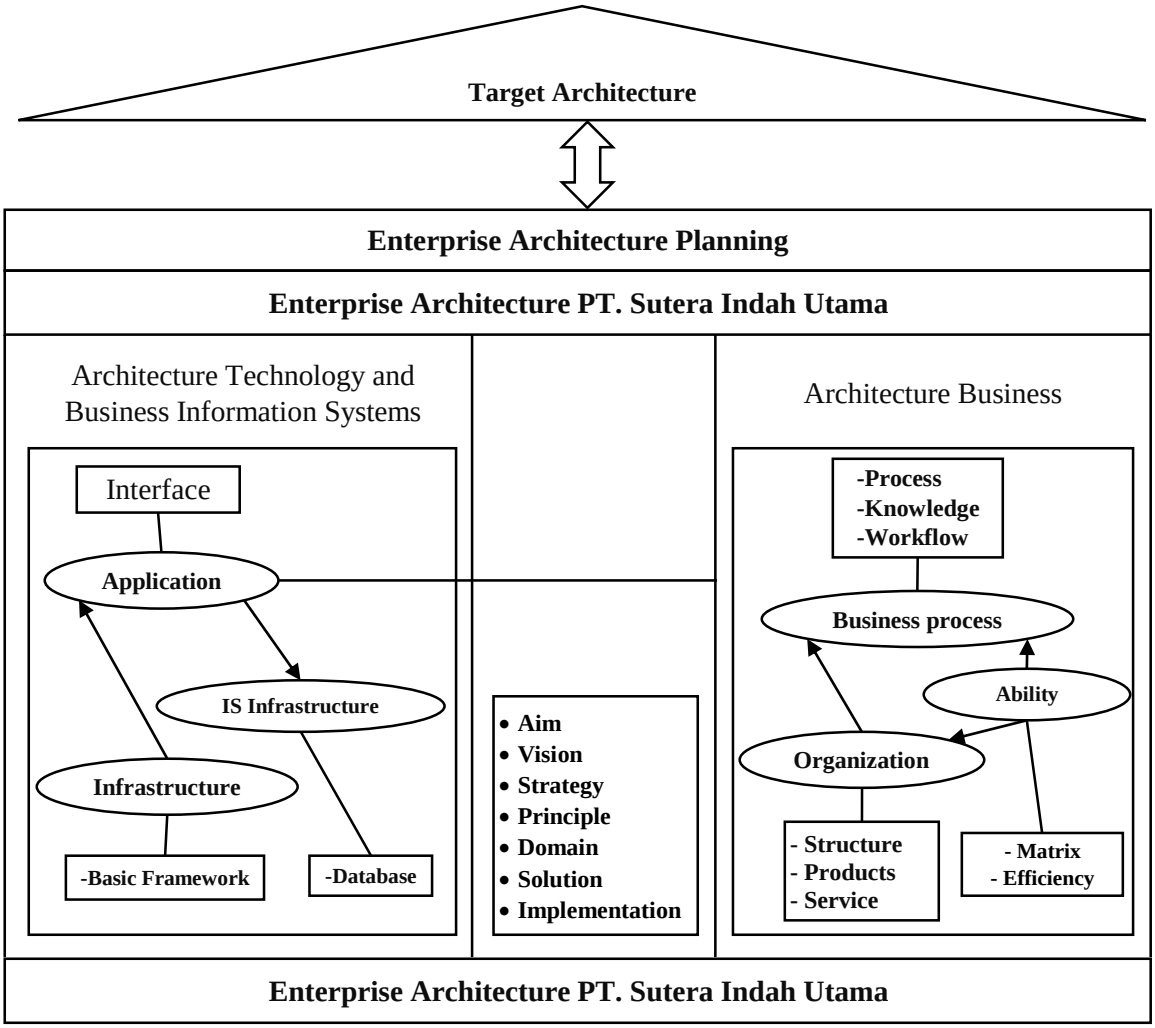

Fig.6. Company Technology Definition

4.6.2 Relationship of Technology Platforms with Applications:

This stage is intended to justify the technology platform in a way relate it to applications that are defined by application architecture that requires technology. Based on Fig.7, Relation of Technology Platforms with Applications.

Technology		Software			Networking	Media
		Operation System	Programming Language	Database	Network and Device	Platform
		Microsoft Windows	C#	Mysql	Internet and LAN	Device and Thin Client
Application	Inventory Management	✓	✓	✓	✓	✓
	Production Management	✓	✓	✓	✓	✓
	Marketing Management	✓	✓	✓	✓	✓
	Financial Management	✓	✓	✓	✓	✓
	Human Resource Management	✓	✓	✓	✓	✓
	Service Management	✓	✓	✓	✓	✓

Fig.7. Relationship of Technology Platforms with Applications

4.7 IMPLEMENTATION/MIGRATION PLANS

4.7.1 Implementation Order Plan:

This stage is intended to justify the technology platform in a way relate it to applications that are defined by application architecture that requires technology based on Fig.4. The order of plans is implemented with a data driven model, as suggested by the EAP, based on Table.4. The plan for implementation sequences.

Table.4. Plan for Implementation Sequences

Application	Information
Inventory Application	New Development
Production Application	New Development
Marketing Application	New Development
Financial Application	New Development
Human Resource Application	New Development
Service Application	New Development

4.7.2 Roadmap for the Implementation Plan:

This roadmap for information system development will be carried out sourcing as in Fig.8, Roadmap Implementation Plan.

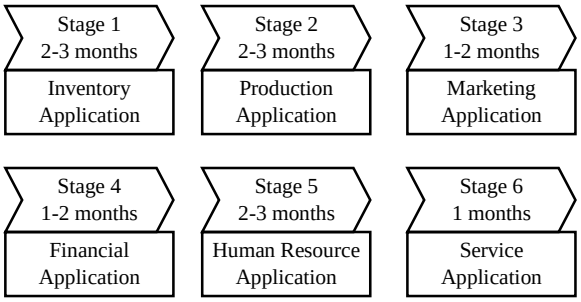

Fig.8. Roadmap Implementation Plan

5. CONCLUSIONS AND SUGGESTIONS

Based on the results of the stages of research that have been carried out in the previous chapter, the authors draw conclusions as follows:

- The EAP method can be used to plan the information system architecture of PT. Sutera Indah Utama oriented to organizational needs consisting of data architecture, application architecture and technology architecture and implementation plans for architecture that have been made to support business activities to achieve the mission of PT. Sutera Indah Utama.
- To support business processes at PT. Sutera Indah Utama, an information system is needed in which there are several applications, namely application inventory, production application, marketing application, financial application, human resource application, service application.
- In order for the information system to be in accordance with the development of technology that is currently developing then proposed that applications to be built are based on network technology.

6. SUGGESTIONS

The suggestions that the author can suggest for development and implementation this research is as follows:

- To help accelerate implementation, strong management commitment is needed and consistent and direct involvement.
- From the results of planning the information system architecture that has been done, it is expected to can proceed to the next stage, namely design so that implementation can be realized.
- PT. Sutera Indah Utama needs to establish a special unit that is competent in the IT field so that implementation can be realized as expected.

REFERENCES

[1] M. Hasan, "Significance of Marketing Activities in Garments Industry: A Study on Bangladesh", *Management Science*, Vol. 5, No. 1, pp. 17-29, 2015.

[2] K. Ma, S. Thomassey and X. Zeng, "Simulation Modelling of Central Order Processing System under Resource Sharing Strategy in Demand-Driven Garment Supply Chains", *Proceedings of IOP Conference Series: Materials Science and Engineering*, pp. 1-6, 2017.

[3] C.N. Verdouw, A.J.M. Beulens, J.H. Trienekens, and J.G.A.J. Van Der Vorst, "A Framework for Modelling Business Processes in Demand-Driven Supply Chains", *Production Planning and Control*, Vol. 22, No. 4, pp. 365-388, 2011.

[4] D. Rajput, M. Kakde, P. Chandurkar and P.P. Raichurkar, "Enhancing Efficiency and Productivity of Garment Industry by using Different Techniques", *International Journal on Textile Engineering and Processes*, Vol. 4, No. 1, pp. 5-8, 2018.

[5] P. Chandurkar, M. Kakde and A. Bhadane, "Improve the Productivity with Help of Industrial Engineering Techniques", *International Journal on Textile Engineering and Processes*, Vol. 1, No. 4, pp. 35-41, 2015.

[6] T. May Plumlee and T.J. Little, "Proactive Product Development Integrating Consumer Requirements", *International Journal of Clothing Science and Technology*, Vol. 18, No. 1, pp. 53-66, 2006.

[7] S. Borse, V. Shrinivasan and V. Shivankar, "Improving the Garment Productivity by Using New Designs of Folder", *International Journal of Textile Engineering and Processes*, Vol. 2, No. 2, pp. 61-65, 2016.

[8] W.K. Wong and C.K. Chan, "An Artificial Intelligence Method for Planning the Clothing Manufacturing Process", *The Journal of The Textile Institute*, Vol. 92, No. 2, pp. 168-178, 2001.

[9] T.K. Bhattacharjee and S. Sahu, "A Heuristic Approach to General Assembly Line Balancing", *International Journal of Operations and Production Management*, Vol. 8, No. 6, pp. 67-77, 2008.

[10] Y. Lu and E. Karpova, "Comparative Advantages of the Indian and Chinese Apparel Industries: An Analysis of the Global Value Chain", *International Journal of Fashion Design, Technology and Education*, Vol. 4, No. 3, pp. 197-211, 2011.

[11] C. Van Zijl and J.P. Van Belle, "Organisational Impact of Enterprise Architecture and Business Process Capability in South African Organisations", *International Journal of Trade, Economics and Finance*, Vol. 5, No. 5, pp. 405-413, 2014.

[12] T. Besker, R. Olsson and K. Pessi, "The Enterprise Architect Profession: An Empirical Study", *Proceedings of International Conference on Management and Evaluation*, pp. 1-8, 2015.

[13] L.A. Kappelman and J.A. Zachman, "The Enterprise and its Architecture: Ontology and Challenges", *Journal of Computer Information Systems*, Vol. 53, No. 4, pp. 87-95, 2013.

[14] B.M. Alshammari, "Enterprise Architecture Frameworks: A Critique Review from a Security Perspective", *International Journal of Computer Applications*, Vol. 174, No. 5, pp. 975-987, 2017.

[15] K. Vergidis, A. Tiwari and B. Maieed, "Business Process Analysis and Optimization: Beyond Reengineering", *IEEE Transactions on Systems, Man, and Cybernetics, Part C*, Vol. 38, No. 1, pp. 69-82, 2008.

[16] A. Lemanska-Majdzik and M. Okreglicka, "Identification of Business Processes in an Enterprise Management",

Procedia Economics and Finance, Vol. 27, No. 15, pp. 394-403, 2015

[17] V. Lendel, S. Hittmar and M. Latka, "Application of Management of Innovation Processes in Enterprises: Management Approach, Problems and Recommendations", *Procedia Economics and Finance*, Vol. 34, No. 15, pp. 410-416, 2015.

[18] M. Varga, "Zachman Framework in Teaching Information Systems", *Proceedings International Conference on Information Technology Interfaces*, pp. 161-166, 2003.

[19] M. Mani, S. Uludag and C. Zolinski, "On Evaluating the use of Zachman Framework in Computer Science and Information Systems Classes", *Journal of Computing Sciences*, Vol. 31, No. 1, pp. 47-59, 2015.

[20] B.D. Rouhani, N. Mahrin and F. Nikpay, "Current Issues on Enterprise Architecture Implementation Methodology", *Proceedings International Conference on New Perspectives in Information Systems and Technologies*, pp. 85-94, 2014.

[21] F. Kitsios, "Enterprise Architecture Management for Business Strategy Modelling", *Proceedings of International Conference on British Academy of Management*, pp. 1-25, 2017.

[22] D. Kang, J. Lee and K. Kim, "Alignment of Business Enterprise Architectures using Fact-based Ontologies", *Expert Systems with Applications*, Vol. 37, No. 4, pp. 3274-3283, 2010.

[23] T. Iyamu, "Understanding the Complexities of Enterprise Architecture through Structuration Theory", *Journal of Computer Information Systems*, Vol. 59, No. 3, pp. 1-9, 2017.

[24] J.M. Nogueira, D. Romero, J. Espadas and A. Molina, "Leveraging the Zachman Framework Implementation using Action-Research Methodology-A Case Study: Aligning the Enterprise Architecture and the Business Goals", *Enterprise Information Systems*, Vol. 7, No. 1, pp. 100-132, 2013.

[25] B. Jahani, S. Reza Seyyed Javadein and H. Abedi Jafari, "Measurement of Enterprise Architecture Readiness within Organizations", *Business Strategy Series*, Vol. 11, No. 3, pp. 177-191, 2010.