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Enterprise Architecture for Payment System Industry in Industrial Era 4.0

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Abstract: Nowadays online payments are in demand by most people. Because of the practicality of making payments digitally. Business processes in the financing industry that have become digital payment platforms make companies in the financing sector carry out digital transformation. Processes that have been carried out manually have been replaced with digital and online processes which have brought many opportunities to the financing industry. At the same time creating market opportunities for the company. Thus creating a very broad market for companies carrying out digital transformation. Communities benefit from the changes made by the company. The benefit is that people do not need to make payments or transfer funds. No need to queue up for payment at the bank or payment counter. Just by clicking on the smartphone, payments can go directly to the intended account. This digital financial transformation revolution has both positive and negative impacts. Therefore, finance companies must protect or secure data when using payment platforms. A lot of education has been carried out for the public using the payment platform, where the platform must always update its version. For this reason, payment platform provider companies must be able to make changes continuously. Continuous improvement and continuous development is a must for companies providing payment system services. The purpose of this research is to create an Enterprise Architecture blueprint with all production components of information technology companies.

Keywords: Enterprise Architecture; Payment Platform Provider; Financing Industry; Payment Digital; Continuous Improvement

INTRODUCTION

One of the benefits of a payment system is the convenience for platform users. Various payment platform companies are competing in this business competition. This payment system service provider provides various benefits, starting from very low fees, being safe in transferring funds, and providing convenience in its use. People using this platform are not reported if they make payments for goods in other marketplaces. Payment system companies cooperate with sales marketplace companies. It is this collaboration that makes payment companies always develop business processes to pamper their customers. For example, providing convenience in transferring funds provides discounts and bonuses when using this finance platform service. So that customers feel cared for by giving discounts or bonuses, as a marketing attraction. So you can be sure this business is profitable if it continues. One of these services is similar to banking services where the profit is very large transactions. This payment system company provides security services from fund transfers if the customer experiences a transaction failure. This is what the company sells, namely customer trust in financial service providers.

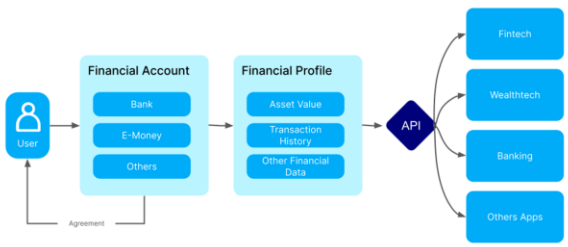

Fig. 1 How payment system work.
Source: Google Image

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Fig 1 is the workings of a financial services company. The user tops up through a bank or e-money or other then enters asset value if he makes a transfer or payment with certain parties, for example to banking or other fintech or the marketplace. Everything is done using the Application Programming Interface (API).

Regulations and laws from the Government and Bank Indonesia also apply several laws regarding digital transactions, such as 20/6/PBI/2018 on electronic money and 18/41/DKSP on implementing Payment Transaction Processing. There are still many regulations from the Government and Bank Indonesia related to payment transaction rules.

Payment system is a large system where before developing into a larger system, Enterprise Architecture is used so that the large system will be easier to develop and manage properly. The role of Enterprise Architecture apart from being Information Technology Planning also functions in managing large systems within the company. It will become more messy and overlapping so that the company's information system becomes ineffective. The development of technology and the latest trends today have brought extraordinary digital changes or transformations such as cloud (Shroff & Tall, 2010), (Bakshi, 2011), mobile (Landor, n.d.), (Abdallah et al., 2020), social (Rob et al., 2005), (Zandt, 2010) and green computing providing opportunities and challenges for financial services organizations. So that company management can make decisions about the latest technology and adopt this technology to achieve excellence in payment system services (Shroff & Tall, 2010), (Zandt, 2010).

The purpose of this research is to create an Enterprise Architecture for a payment system company and propose a method that the payment system can later make savings for customers. Maybe the government regulations are contradictory, but in this research, the system can be developed for online savings. In this research, there are several questions or research questions. How the enterprise architecture is created (RQ 1). How is the savings system developed in a company based on a payment system? (RQ 2). What about the application architecture, data architecture, and technology architecture in the payment system company being developed? (RQ 3).

LITERATURE REVIEW

The section discusses the literature review of some research that discusses Enterprise Architecture for several companies engaged in the finance industry sector. Enterprise architecture has helped companies a lot in achieving their goals to map the business with the technology used. Various supporting platforms of the payment system are used such as mobile technology, cloud technology, and data center technology that exist in cloud technology. This research is not looking for weaknesses, but this research is to support previous research, where the weakness of previous research is a proposed improvement in this research, meaning that this research is a complement to previous research.

Firstly, An Empirical Analysis of Cloud, Mobile, Social and Green Computing Financial Services IT Strategy and Enterprise Architecture (Gill et al., 2011). The research discusses cloud, mobile, social, and green computing technologies. The business has been explained to social, and technology has been explained to mobile phones and clouds, but application architecture, data architecture, and other Enterprise Architecture domains such as Opportunity and Solutions, Migration Planning, Implementation Governance, and Architecture Change Management have not been discussed although they do not discuss them in detail. The discussion in this research has discussed details about architectural technology but does not discuss other domains such as Opportunity and Solution, Migration Planning, Implementation Governance, and Architecture Change Management.

Secondly, Business architecture and information system architecture design in savings and payment unit Koperasi Pegawai Republik Indonesia (KPRI) Diponegoro University using TOGAF 9 framework (Noranita et al., 2021). This research discusses the design of the system load, payment and saving, discusses the application architecture complete with the Unified Modeling Language. The explanation is good and only shows the UI/UX from the development process to become a product of the system for Indonesian Civil Servant Cooperatives. However, discussions such as Opportunity and Solution, Migration Planning, Implementation Governance, and Architecture Change Management are not discussed.

Thirdly, Analysis and Design of Enterprise Architecture to Support Functions Related to the Online Payment Point System Using the TOGAF ADM Framework at PT Pos Indonesia (Herucakra et al., 2015). The discussion in this study is related to the payment point system using the TOGAF Framework. The advantage of this research is the discussion of online payment systems by explaining application architecture, business architecture, data architecture and technology architecture. The explanation is quite good and in more detail, but the discussion about the domains in the TOGAF Framework for Opportunity and Solutions, Migration Planning, Implementation Governance, and Architecture Change Management is not explained. This causes this research to be lacking if it does not discuss other domains in the TOGAF Framework.

Fourth, Enterprise Architetcure System Information Design of Pawn Companies using The Open Group Architecture Framework (TOGAF) (Pratiwi & Adrian, 2022). This research discusses enterprise architecture in non-banking financial companies. Many discussions with Enterprise Architecture use domains ranging from Application Architecture, Information Data Architecture, Business Architecture, Technology Architecture and

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Opportunities Solution. The weakness of this research is not discussing other domains such as Migration Planning, Implementation Governance, and Architecture Change Management. In the discussion that the enterprise architecture is good but there is still a lack of information if you haven't discussed other domains in the Enterprise Architecture. It will be felt that it has not fully discussed the Enterprise Architecture.

Fifthly, Sustainability of Implementing Enterprise Architecture in the Solar Power Generation Manufacturing Industry (Hindarto et al., 2021). This research discusses Enterprise Architecture in Manufacturing companies of solar power plants. Indonesia is a country with the highest level of sunlight exposure, because this country is exposed to the sun almost every day. So if it is not used it will lose money, as a country with a high level of solar radiation, it is necessary to make manufacturers engaged in creating materials for solar cells. This research discusses Enterprise Architecture in manufacturing companies. Where discussed are Business Architecture, Application Architecture, Information Architecture, Technology Architecture, Opportunity Solution. The weakness of this research has not yet discussed other domains within the Enterprise Architecture with the TOGAF Framework.

Sixthly, Enterprise Resource Planning Research in the Bamboo Processing Manufacturing Industry uses Enterprise Architecture (Oroh et al., 2022). This research discusses Enterprise Architecture in companies processing bamboo into bamboo processed materials, such as wooden planks which so far have been made of logs. Remembering that logs will destroy the forest. Meanwhile, bamboo does not damage the forest, because bamboo grows fast in less than two years. The application of Enterprise Architecture is used to support company operations. The discussion on Enterprise Architecture includes Enterprise Architecture Applications, Information, technology and opportunity solutions. Weaknesses do not address other domains of Enterprise Architecture.

Seventhly, Enterprise Architecture Design in Service Sector Companies Using The Open Group Architecture Framework (TOGAF) (Ratnasari & Turang, 2018). This research discusses service companies using Enterprise Architecture. Service products used are Package Services, Financial Services or payments and others. Enterprise Architecture which discussed about Application Architecture, information and data architecture, technology architecture. However, the drawback is not discussing the domains involved in architectural development such as the opportunity solution domain, the migration process and Change Management, where other domains must be discussed so that they can display complete and complete information from implementing Enterprise Architecture in these service companies.

From a comparison of previous research discussing Enterprise Architecture, almost all research does not fully discuss the TOGAF Framework used. So in the previous research on the seven studies presented above there is a **Gap**, namely not all previous research fully and completely discusses the Togaf Framework used. The **State-Of-The-Art** of this research is to discuss all of the TOGAF Framework, so that the researcher presents complete information from the TOGAF Framework.

METHOD

This research uses the TOGAF Framework as Enterprise Architecture. There are various frameworks of Enterprise Architecture, such as the Zachman Architecture, Federal Enterprise Architecture Framework (FEAF) and many more.

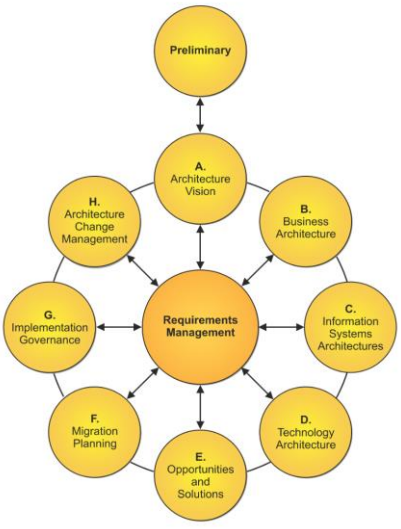

Fig. 2 The Open Group Architecture Framework
Source: TOGAF Property

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In Fig. 2 is the Framework of The Open Group Architecture Framework. The following is an explanation of the domain of the TOGAF Framework:

Preliminary, At this stage, the business principles are defined and the goals of the Enterprise Architecture are established (Group, 2013). Then carry out the stages of developing the application architecture, information architecture and selected technology to produce better performance. In planning later, it cannot be separated from the term 5W + 1H in enterprise architecture. In general, planning needs to look at all aspects for application and data development in accordance with the planning of the business payment system. Not only thinking about what needs to be developed at this time but need to think about future customer needs, thinking horizontally (right to left and rotating up to 360 degrees) in the sense of thinking as wide as possible ideas that are useful in future business development.

Architecture Vision, This stage carries out a uniform view of the very importance of implementing enterprise architecture in achieving company goals (Group, 2013). The formulation of Enterprise Architecture is in accordance with the company's strategy. Determining the scope of the company can create an Enterprise Architecture that will be developed in accordance with the company's vision and mission. This process can adapt to the needs according to the design of the enterprise architecture, namely company profiles, definitions of the company's vision and mission, company goals and objectives, business processes of the company, and company units (Herucakra et al., 2015).

Business Architecture, discussion at this stage discusses a lot about the company's business requirements. The company's business requirements can be taken from external companies or from customers (Group, 2013). It could also be business requirements from internal companies. The results of the survey can also provide system requirements to be developed, problems that exist at the technical level such as system performance which continues to decline, many system errors are still found, market development for payment systems and others. For example, how will the system be developed with a savings module for customers on the grounds that saving at a bank is currently difficult in procedure. So by adding a savings module, customers don't have to bother going to the bank to deposit funds. The system requirements of all stakeholders are then carried out by analyzing the system requirements. In the analysis process later it can be used for the implementation time to be developed. Later related to the implementation of project management to set when the development process.

Information System Architecture, The discussion at this stage is to explain the architecture of the application and data for the company's payment system (Group, 2013). The discussion includes modules related to the system or payment module. By explaining the payment application architecture, a data or information architecture can be created. Analysis of the application modules will make the application of several aspects of system requirements fulfilled and not create overlapping applications that cause business processes to become inefficient. Application and Information Architecture then requires a place to put the payment system, so what is needed is storage media. Storage media can be discussed in Technology Architecture by installing both local and cloud infrastructure. Application systems used such as Software as Service (SaaS) to meet the needs of the company's internal management. This is what drives companies to pay great attention to all architectures that will be designed.

Technology Architecture, This technology architecture stage is the most important stage, if analysis is not carried out, the application system and data will make the system performance slow and inefficient (Kornyshova & Barrios, 2020). The technology architecture that is built will adapt to the application system and data. The choice of technology architecture must be an ideal solution. This technology is not only installed locally but is installed with cloud technology. For this reason, it is necessary to think about the state of the application and data. So that the system is safe from cyber attacks and hackers who target it. Therefore, in designing the system, you have to think about data security. Because in the payment business is a business of trust. If the customer loses money, it is not only the company that loses, but the company's image makes the customer lose trust. Analysis of this infrastructure system must be carried out with care and caution.

Opportunies and Solutions, the purpose of this stage is the opportunity to develop a payment system and be able to find every opportunity (Noranita et al., 2021). All of these processes are carried out by starting from an analysis of the needs of the information system. The need for additional modules, solving problems from customers with the payment system. Therefore the advantage of this stage is the development of system features. The target of this stage is to make all application architecture designs, data and technology.

Migration Planning, this stage is needed if all application or data systems want to make changes or move servers or infrastructure. This process requires a very mature plan, if doing the migration process. Everything is planned so that none of the old features are left behind or updating to the latest system.

Implementation Governance, this stage carries out the process for implementing the latest system or module. Governance in implementing the latest system (Group, 2013), using the Project Management method. With the Project Management method, all system requirements must be planned. And all relevant stakeholders to be involved in project governance. In carrying out this process, the most important thing is to be able to deliver

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the project according to the agreed time, with faster delivery, the company will not lose a good moment, so that it can achieve very high revenue or profit. In project management for problems with payment system companies, the Agile-based project management method is not Waterfall-based. At this stage, there should be no mistake in choosing the project management method and it will be fatal.

Architecture Change Management, is a stage if there is a change to the module of the application system, data, and technology or infrastructure (Group, 2013). In operating the payment system, system changes are due to changes in business processes. This is reasonable because the module changes are caused by changes in the company's business. Because of this, it is necessary to use the change management method in the business process change process to regulate the system that will change, so that system documents are updated every time a change occurs or a change request from the relevant stakeholders.

RESULT

The results of this research are designing Enterprise Architecture for payment system service companies and making suggestions for savings for corporate customers. This is what differentiates the existing payment system service companies.

Preliminary, In designing Enterprise Architecture, it is necessary to understand the company's payment system. Therefore the need for these principles and set forth in a table catalog of principles of understanding or understanding catalog. The design of the Enterprise Architecture is carried out by conducting interviews with the management so that there is no GAP between the Enterprise Architecture Designer and the Company's Management. Can be seen in table 1. Principal catalog

Table 1. Principal Catalog

Architecture	Principal Objective	Objective
Business	The business architecture that will be changed is required to use the rules set out in the activities and objectives of the changes regarding the existence of additional modules for storing customer funds. Changes can occur starting from the customer registration process to become a company customer, deposit payment rules, rules regarding applying for loan funds for customers.	Supporting changes and additions to the payment system module. Adding modules such as savings for customers, providing credit to customers, accepting deposits for customers.
Application	Making applications tailored to the objectives of the activities in Business Architecture, so that the application architecture will be in accordance with the needs of the system that will be developed. For this reason, the architectural process must be in accordance with the architectural business, so that targets are met.	Adding new features such as savings module, deposit module, investment module in accordance with the business architecture. Application support systems will increase, so caution needs to be exercised in deploying new systems or modules. Operations are also carried out because it supports new modules and monitors existing modules. So that the new operation module can operate without significant interruption.
Information / Data	Data storage must match the storage of the application system. For this reason, it is necessary to carry out an analysis so that the development of a database management system is in accordance with the needs of the application system or application architecture.	Provision of database server in accordance with the requirements of the application architecture.
Technology	The technology used is in accordance with the requirements of the application architecture and data architecture.	Infrastructure must be adequate with application and data architecture. If there is no suitability then the performance is not optimal.

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Architecture Vision, in the existing system, payment systems only have entity payments, while savings and time deposits are modules or products to be developed. After entering the new feature, the payment system gets 3 entities, namely payment for payments to the marketplace, savings for customers and deposits. The saving feature is similar to the Top-up module where top-ups for wallet funds do not experience an increase in yield. With additional saving and deposit features, customers get benefits or financial services. This is one strategy to increase the market or marketing of payment system companies.

Business Architecture, with the addition of new features is a step to achieve customer satisfaction. Payment companies will benefit if the customer's funds become large so that capital development can be done quickly. Credit will be channeled to Small and Medium Enterprises entrepreneurs. If currently the credit channel is a bank, then the payment system will change to become a digital bank if it carries out a digital transformation.

Information System Architecture, addition of saving, deposit, and loan modules for payment systems in financial services companies. This architecture creates or adds features to the company's payment system. This is a novelty in the proposed payment system research. Of course, according to regulations, it can be proposed to the government of the Republic of Indonesia and Bank Indonesia. Technologically this can be applied, just waiting for regulations from the government. This research only discusses application problems and architectural data. Later, with the addition of features, the payment system company will carry out a Digital Transformation to become a Digital Bank. The benefits of this new system make companies, governments, and communities better at performing banking services. The government as a policy maker can add regulations to the banking sector. Companies as financial service operators get benefits, namely expanding markets and profits. Communities as users benefit from being a member of Digital Bank. Payment system service companies carry out Digital Transformation to become Digital Banks. The illustration in fig 3 is a digital transformation by adding saving, deposit, and loan features.

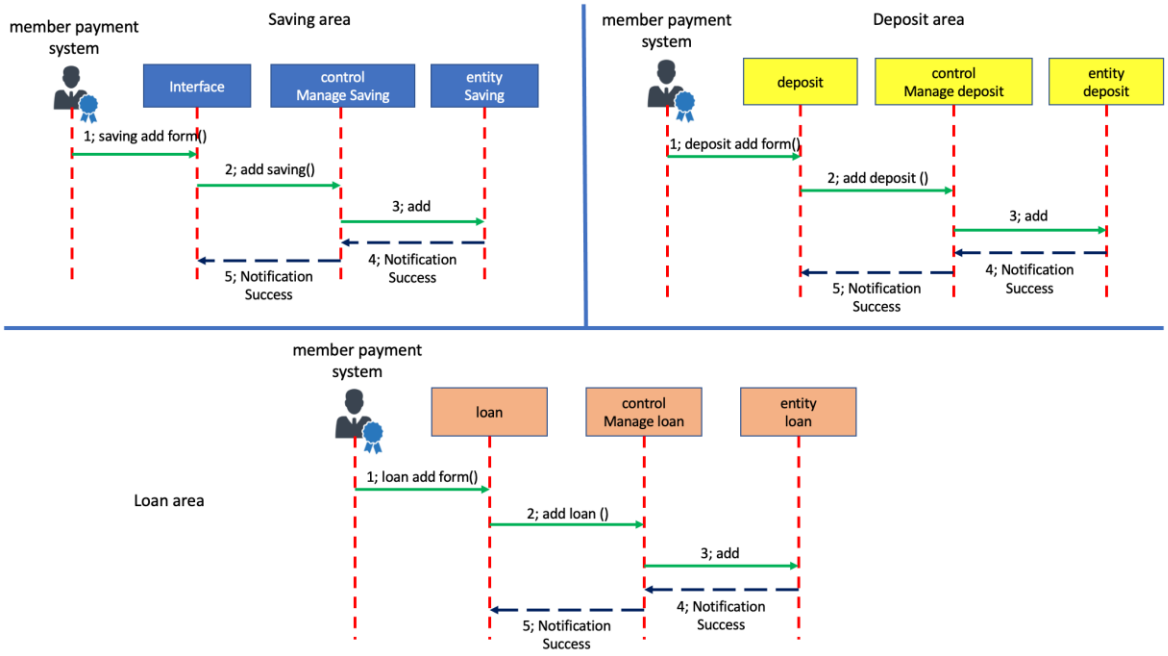

Fig. 3 Application and Information Architecture Payment, Saving, Deposit, Loan System
Source: Reacher Property

Technology Architecture, in carrying out its application technology stages using cloud platforms and infrastructure. In fig 4, there is Infrastructure As A Service (IAAS), Platform As A Service (PAAS), Software As A Service (SAAS), Security As A Service (Sec AAS).

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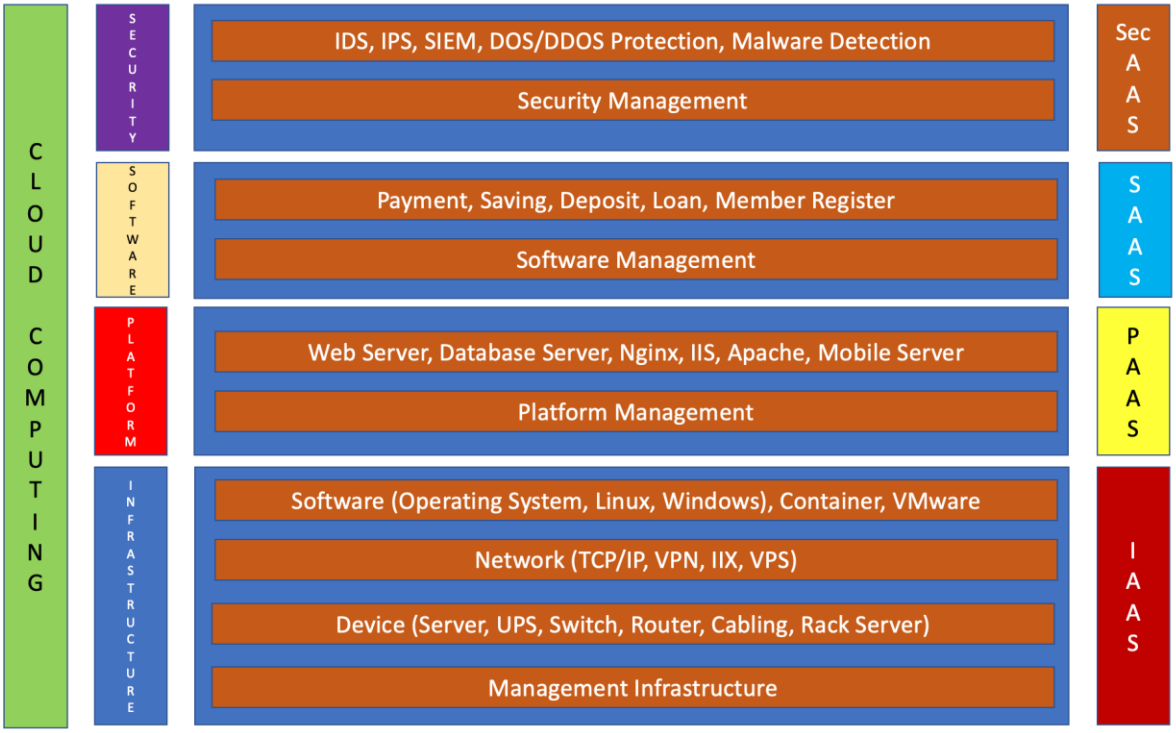

Fig. 4 Cloud Computing, SAAS, PAAS, IAAS, Sec AAS
Source: Reacher Property

The use of infrastructure already uses industrial era 4.0 technology, which is now a very common thing to do for companies that have digitally transformed.

Opportunies and Solution, This process is a proposal, where currently payment system companies do not have savings features and deposit features. For funds to enter the wallet, the business process is through Top-Up from banks or via transfers from fellow payment system customer users. Payment system companies will get double benefits, namely benefits through fund transfer fees and developing savings and deposit funds. Then the company and customers will benefit from both parties. The proposed savings and deposit features are the main focus in discussions with payment system companies. **The Novelty** of this research is that payment companies can add new businesses by adding savings and deposit features.

Migration Planning, This process in this research is migrating to a new system and a new infrastructure. The goal is to get the best system performance. The stages of the process of adding features will have a significant impact on performance if migration planning is not carried out. Of course, using project management as a planning method to execution and evaluation of the payment system.

Implementation Governance, is the process of building, testing and deploying modules. The process of adding features is a breakthrough in that the payment system has powerful features, namely savings and time deposits. Because how can the system that is developed not be on time. This will be detrimental for the company. For this reason, an Agile or Scrum-based Project Management (Indra, 2015) method is needed. This method is very suitable for use because this company is a dynamic company so it is necessary to develop systems very quickly and agilely (Sjödin et al., 2020). If there is a discrepancy, the method of work changes very quickly. So that this method of implementing new features can be delivered quickly.

Architecture Change Management, Changes in company management are very flexible in running the company. One thing that never changes is change itself. Because management change is one way to carry out operational tuning in order to achieve a company goal. Changes in management have an impact on changes in business processes and the effect can be changes in the payment system, for example by adding saving and deposit modules which can increase sales significantly. This is a way to deal with the problem of customers who do not have a bank account number.

DISCUSSIONS

How the enterprise architecture is created (RQ 1). This research has discussed enterprise architecture in payment system companies. Complete by discussing all the domains in the TOGAF framework. Starting from the Preliminary domain, Architecture Vision, Business Architecture, Information System Architecture, Technology Architecture, Opportunity and Solution Architecture, Migration Planning, Implementation Governance,

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Architecture Change Management. The discussion is not in detail, but the discussion is focused on Opportunities and Solutions so as to make the company transform digital into Digital Banking.

How is the savings system developed in a company based on a payment system? (RQ 2). Saving, Deposit, and Load have been discussed in the results section. Where there are these features that make many changes and additions occur, such as Standard Operating Procedures, Information System Governance using the COBIT Framework. Information Technology Services to manage company operations.

What about the application architecture, data architecture, and technology architecture in the payment system company being developed? (RQ 3). This architecture has been discussed in the results section, including additional modules namely savings, loans and deposits. Including a discussion of architectural technology using Cloud Computing equipped with infrastructure regarding Security as a service as cyber security protection.

CONCLUSION

The conclusion of this research is to discuss payment systems in financial services companies, where these financial services are financing companies that are currently growing rapidly. This company both profitably and technologically is an entity in life that is very influential in today's modern society. Conceptually and the application of these financial services can already be carried out or is very feasible. Both in terms of government regulations as stakeholders making legality, companies as operations and the community as users of financial services. However, currently many people from the banking side cannot enjoy this because people do not have a bank account and use banking services such as saving and investing in deposits. Of course the banking sector will feel the element of competition. Competition in business must be carried out to excite and provide more benefits to users or customers. Competition will be healthy if rules are made that do not favor certain parties. As a research party this can be carried into the system, of course the government as a policy maker thinks about what is better for the community.

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