Information Systems Design for Sustainability Financial Services Company using Enterprise Architecture Framework: A Case Study Approach

Yohannes Kurniawan, Siti Elda Hiererra
Bina Nusantara University
Jakarta, Indonesia
ykurniawan@binus.edu, shiererra@binus.edu

Abstract—**PT XYZ is a securities company which has the task of serving an intermediary for the sale or purchase of securities (brokerage). In conducting its business, PT XYZ has been utilizing the information systems such as network infrastructure and applications, however, its usage has not maximized yet, therefore it requires a good information system design. This research aims to generate information system design which can optimize the strategic role of information systems, which is increase the value of information and business enterprise. Research through several stages, namely the study of literature, a common method of determining the strategic planning of information systems, collecting data through observation and interviews, then analyzing internal and external data and business / IT. The results of data analysis will become input for a SWOT analysis (Strengths Weaknesses Opportunities Threats). The strategy that has been obtained through SWOT analysis calculation, then based on such analyzes will generate information systems strategy. The outcome of this research is a recommendation of strategic planning information system applications that will come in. The conclusion from this research that is information systems strategy must be aligned with the business strategy. Therefore, to ensure alignment between information systems strategy with business strategy, we need a good strategic planning of information systems in order to achieve organization goals.**

Keywords—Information Systems, Enterprise Architecture, Strategic

I. INTRODUCTION

In the business world generally, we know that business conditions can change very quickly and even abruptly. Many companies experience ups and downs due to some factors that escaped from the managerial attention of the company while running their business. One of the factors that influence this is how to perform an internal revamping that will have an impact on the strength of the companies in the market. This is not only in terms of human resources, but it should also be noted in terms of the infrastructure of the company.

The awareness of the company associated with business plans that are aligned with information system strategic planning is still very limited, which considers information system as only a small support of target achievement of the company. The planning and designing of a good information system will provide the smooth flow of business to develop. The planning and designing are the initial step in preparing or revamping the business. One of the plans that will be done is the planning and designing of information systems.

Today, the information system is not seen as a small part that supports the business anymore, but has become a major part of the business to perform an increase especially in the long-term improvement. Without knowing it, the company will get a profit, both the tangible and intangible, which will result in the growth of the company. Information system will help provide fast information distribution in internal company so that the information needed can be processed well, and it will also help produce a surplus or profit for the company, both in terms of the operational companies and in providing a view of the upcoming markets. Information system planning will change the view of each section in the company towards a far more extensive aim, which provides an opportunity to do new technology innovations.

PT XYZ is a financial services company whose field of business is securities trading, in which the company is the broker. In daily activities, PT XYZ is very depending on the usage of information technology (IT), starting from data collecting of the stock transactions to doing stock transactions for the customers, along with the billing process and the recording on the general ledgers. However, there is no long term information system planning strategy done by the company. The planning of information systems that has been conducted does not follow a master plan that has been made before. The purpose of doing this research is to create an information system that supports the success of a company. The planning of the system will be done by following the enterprise architecture framework, which means that the design of the information system must be adjusted to the company's strategies and initiatives.

The problems that arise from lack of information system strategy planning are: (1) the IT planning and developing processes that are not in accordance with the business, and (2) the lack of policy in the field of IT policies to support the needs of the company.

II. Literature Review

Information system strategy planning is a collection of long term goals that describe the purpose of the system and the architecture of the information technology that will achieve the goal of the company [1]. According to Wijaya [2], information technology system is known by the name *weapon strategy* because it can be used to implement a strategy that can provide competitive advantages.

The planning of the information system starts by identifying the needs of the organization. The development of various types of systems based on the computer should respond to the needs, starting from the level of transaction processing to the more complex level of applications (support systems). Information system planning is very similar to the strategy planning of science management. Objectivity, priority, and authorization of a project information system need to be formulated. The system development plan should identify specific projects for the future of the company, in which the priority of every project is adjusted to the company resources, general procedures, and obstacles in each application area [3]. Understanding of the strategy and objective of business is one of the first steps in creating an information system plan. By understanding the strategy and objective of the business, the function of the information systems will result in a positive and proactive contribution. Without the understanding, the IT investment will not effectively meet the needs of the company [4]. Information technology not only implicates how individuals do the tasks, but also implicates the flow of information, which gives a great influence in improving the company's ability to connect activities within the corporate, both the internal and external ones. In short, technology will really result in competitive advantages for the company. Information system allows companies to coordinate activities in the value chain of the company to achieve the competitive advantages from the cost side. In addition, the competitive advantages can be created by making differentiation of the value chain that is owned by the company through the information system [5].

According to Earl [6], in creating a strategic application, the analysis of technology should not be the only thing that gets focused on. Earl suggested that the effective path to generate benefits from the information system (IS) and the information technology (IT) is by concentrating on the idea of business, namely: analyzing the business problems and the changes in their surroundings, ewwhich results in the realization that SI or IT policy is only one form of solution offered because it was found that the strategy of the current IS/IT policies today mostly identify the technology and technical terminology, but they little identify the needs of the organization of the business applicaions and needs. "Earl" recommends that the IS strategy focus on identifying the information system needs of the company and the IT strategy focus on identifying the information technology and infrastructure needs.

The important point of information system strategic planning is the process must be the part of the organization plan [7]. The organization success, it's depending on the organization strategic directions [8]. Basically information system strategic planning objective can be divided into four dimensions (alignment, analysis, cooperation, and improvement in capabilities) for successful organization [9]. Information system strategy always related to the business strategies in the organization [10]. Information system strategic planning consists five phase: 1. Strategic business planning; 2. Information system assessment; 3. Information system vision; 4. Information system guidelines; 5. Strategic initiative. And this paper focus on information system strategic planning in the organization [11]. Information system strategic planning is positively related to implementation system adoption [12].

III. Research Methodology

The collection of data in the information system strategy planning is conducted by collecting input and output documents that flow within the company and pay attention to all the information system that is running and will be developed as a primary source, in which data the collection technique directly consists of: (1) Interview, which is conducted by doing questions and answers sessions directly with the stakeholders in this research. The stakeholders are the managing director, general operational manager, manager, and IT staff of PT XYZ to help create SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis process of organization; (2) Observation (documenter), in which the author of this research performs direct observation of business processes related to IT that takes place in PT XYZ; (3) Questionnaire, which is conducted by providing questions in form of both open and closed questionnaires to the stakeholders in this research. They are the managing director, IT manager, marketing manager, staff of PT XYZ, and their clients, while the collection of data is neither directly obtained from Indonesian Stock Exchange (IDX) nor from Indonesia's Central Securities Depository or Kustodian Sentral Efek Indonesia (KSEI). After the data collection, the next step is the using methodology analysis and searching for books that are related to the problems found as a secondary data source. In this research, the author uses the enterprise architecture method to plan an information system that is derived and based on the company's strategic objectives and initiatives.

IV. Results and Discussions

A. Strategic Goal and the Initiative

At the time a company is planning the design of information system, the company must consider the information system strategies that function as the guidelines. The company's information system strategy can be generated from the results of the analysis of the internal environment, external business, and IS/IT enterprise, so that it can be deduced from the internal and external factors of SWOT analysis. Internal and external factors will become the basis in doing SWOT analysis on PT XYZ. The following table is PT XYZ SWOT analysis from the evaluation result of internal and external factors (Table 1):

TABLE 1 SWOT MATRIX

	Strengths (S)	Weaknesses (W)
	1. Online trading system (Prime Online and Prime Reporting). 2. Good control of Risk Management program. 3. Having qualified human resources in the field of finance with the support of the human resources management. 4. Have adequate MKBD (Modal Kerja Bersih Disesuaikan) – Adjusted Work Capital to guarantee limit transaction. 5. Free training and product investment education program.	1. There is no research team to monitor the market conditions. 2. Mobile trading has not yet been fully implemented. 3. There is no information system strategy planning. 4. Customer relationship management system is not yet implemented. 5. There is no product investment diversification.
Opportunities (O) 1. Investment market opportunities outside of Jakarta. 2. There is a limitation of permission to establish securities by BAPEPAM (Badan Pengawasan Pasar Modal) - Capital Market Supervisory Agency, which limits the number of competitors. 3. The potential growth of the Indonesian economy. 4. Higher public awareness of the importance of investment. 5. There is a policy in the formation of the Financial System Safety law for LKBB (Lembaga Keuangan Bukan Bank) – Non Bank Financial Institution.	**SO Strategy** Reaching out to a wider market (outside Jakarta) by taking advantage of the reputation of the company (S1,S2, S3, S4, S5, O1, O3, O4, O5) Improving the ability of the company in providing the right solutions to problems faced by the customer (S3, S5, O3, O4)	**WO Strategy** Doing internal consolidation by building information systems that support the implementation of the work and the service of all the units in the organization (W1, W2, O1, O3). Utilyzing the information system that can help analyze the market in order to know the needs of the market . (W1, W2, W3, O4).
Threats (T) 1. Global crisis threats. 2. The potential penetration of foreign securities companies to become the members of the exchange in Indonesia. 3. There are many alternative investments and more aggressive financial institutions besides securities in looking for customers. 4. Inflation that occurres in the country. 5. Unstable social and political situations	**ST Strategy** Improving the utilization and dissemination of information on the services that are located on the PT XYZ with internet as the medium (web-based application) (S1,S2, S5, T2, T3). Improving the quality of human resources in the field of marketing and market analysis, which is conducted in the form of training (S3, S5, T2, T3).	**WT Strategy** Building information system strategy planning and developing product investment diversification. (W4, W5, T1, T4, T5). Increasing the understanding of customers' needs on data and information to facilitate the monitoring of the condition of the stock. (W1,W4, T2, T3). Increasing the accessibility of data and information for customers through the development of information system that enables users to access information that is on the PT XYZ (W2, W3,W4, T2, T3).

Based on the SWOT matrix in table 1, PT XYZ have two strategies in relation to the utilization of the system information obtained from the results of the internal and external analysis, namely: the information system development strategy to produce competitive advantages and the development of the customer relationship management strategy.The following is PT XYZ business strategy, formulated from the SWOT matrix, namely:

1. **Information system development strategy to produce competitive advantages**. (The grouping of ST strategy (point 1), WT Strategy (point 1 and 3), and WO Strategy (point 1 and 2).
   The main activities of information system application development is directed to provide the application

packages required to support administration process/office management, to manage data, and to provide a system that is needed by analysts, planners, and customers in general. The developed package application is directed by using integrated information technology so that the operational management can be expected to be more simple. The action that can be done to support this strategy is through the development of mobile applications for the process of trading.

Increased data accessibility and information for the user, improved quality of data collection (complete, accurate, on schedule, and trusted), and the presentation of information and data. The developed application package in general can be grouped into two. The first group is the information system application package that is developed internally, and the second is the information system application that is developed by a third party (outsourced).

2. **Development of the Customer Relationship Management (CRM) strategy. (**The grouping of the SO Strategy (point 1 and 2), the ST Strategy (point 2), and the WT Strategy (point 2).

   The development of the management of relationships with the customers of company is done through: **(1)** Completing and stabilizing the order of the organization that develops according to the increase of the amount of the company's information systems activities and the increase of the intensity of the company's development. Reaching out to a wider market (outside Jakarta) is done by taking advantage of the reputation of the company; (2) Increasing the company's ability to provide the right solutions for problems faced by the customers; (3) Increasing the understanding of the customers' needs on data and information to facilitate the monitoring of the condition of the stock by the customer.

   This includes the improvement of the quality of human resources. Improvement on the quality of human resources who are able to utilize, develop, and master the customer relationship management and methodology of the collection and analysis of statistical data of the market is conducted through: (1) organizing various training programs in the field of customer services and method of statistics; (2) increasing the capability (quality and capacity) to hold training events for customer services and method of statistics.

B. Business Products and Services

In creating the design of business products and services, one of the tools that can be used is use case diagram. Use case diagram that is designed by PT XYZ can be seen in figure 1. Use case diagram focuses on the development of CRM services for the customers of the company. The development of CRM is in line with the **development strategy of the customer relationship management and with the information system development strategy for the competitive advantages of the company.**
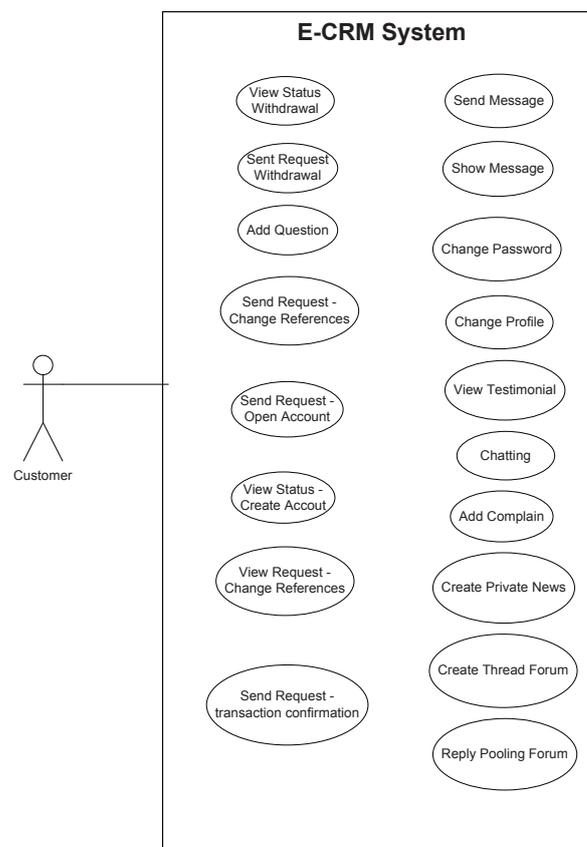

Fig. 1. Use Case Diagram for CRM System

C. Data and Information

In relation to the data and information planning for this company, one of the appropriate tools is the service list of services provided by the company, specifically to support the implementation of mobile trading. The process of making this services list is the right thing to do, considering that the company is already implementing trading web. Thus, at this stage, what is required are of the following steps:

1. **Initial investigations of applications**
   Initial investigations (preliminary investigation):
   - Investigation of the system that is currently being used on the business process that is running, along with the information technology that is used.
   - Initiation, which is the process of doing *'kick started'*. This process includes: determining the objectives that must be achieved and the priorities in data integration.

2. **Initial investigations of services**
   In this second scenario, the company will release the services that are available on the applications that are located on the PT XYZ (core business application), in which services were released on the enterprise

service bus. This service analysis is conducted by considering: (1) the services must be accessible through a technology standard that is available on certain environment or used by society in general. The mechanisms that are used must be received by the standards of industry; (2) the services must be easily identified as high level of abstraction that is related to the activities in the real world and business functions so that the needs of your business and technical capabilities can be properly synchronized; (3) the services available must be meaningful or easily understood; (4) the services must be loosely coupled; (5) a group of services must have the same document type, which is the XML document. This is to facilitate the exchange of information between the services, the structure, and the semantics of the document so that it can be agreed on and be well understood; (6) the services must provide specific tasks and a simple interface to access or use the functionality provided; (7) the services must provide information that explains the capabilities and the limitations of the services provided. The information must be available on the repository.

3. **Analysis of the services or application services**

Today, application analysis is done to understand the condition of the infrastructure and business processes. The results of the analysis application now determine the strategy that will be implemented for the integration of the applications that are available on the PT XYZ. The most important element in doing service analysis is to find the service that will be provided by each of the application and can be used by user with centralized database. All stakeholders (customers and potential customers) can access the front end system through their PC/notebook, mobile phones, and PDAs. The front end system is related to the Backend system (ERP Securities) through the internet network. This network infrastructure includes data infrastructure and all of database, and applications are stored in the server (figure 2).

Now, with this system, the discontinuity among applications of one unit with another unit or a unit with its customer is regulated by the system, in which the modules and the applications are bridged by ESB (Aqualogic). All of the operating result data and application modules are stored in the database, where the data/information is displayed to the unit that requires it and other units which also which also require said data. In figure 3 is explained the logical relationship between web-based information services (CRM) and services from other applications. This diagram is used to describe the relationship services that will be used in the applications which interact with each other between the interfaces, which describe an interchange between the independent data platforms.
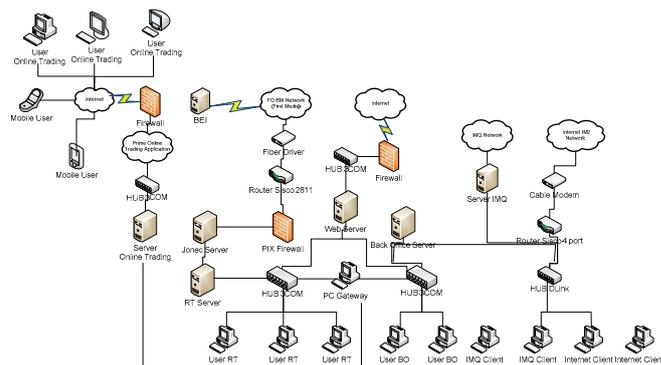

Fig. 2. Recommendations Network Architecture

In relation to the architecture network from PT XYZ, there is no change in the architecture before the implementation of the system. The only thing that distinguishes it is the *delivery channel* that grows by adding *channel mobile users*.
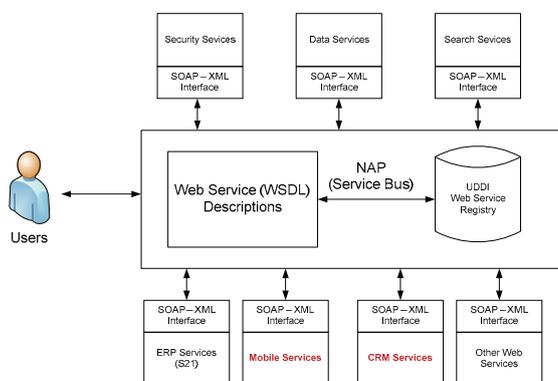

Fig. 3. The Application Diagram

The following are the IT security policies, recommended for the company:

- The rules and security policies
- The monitoring and audit of the IT security
- The monitoring and audit of the physical Security
- Encryption
- Contingency plan
- The use of the firewall on the server
- Security awareness and training
- Security management
- Email, password, intranet and internet policy

V. CONCLUSION

Based on the results of the SWOT analysis, the strategy of the information system development for CRM applications (strategic category) that are oriented to the users is produced. These information systems are a strategy that can support the business process of the company and its customer services, which aims the company to be able to compete and overcome the threats that come from rival companies. Furthermore, the

IS/IT management strategy/enterprise is directed to implement the IT strategy as a centralization, which directs the company to improve the function of IT management in the perspective of the orientation of the future by doing an innovation that implements user-oriented IT, as well as involving the users more in the information system development process. In addition, to optimize the data services and information, it is recommended that the company do a recruitment of database administrator staff. On the PT XYZ IT Strategy, we do not recommend adding more infrastructure hardware, because the IT infrastructure that the company currently has is capable to support the recommended information system strategy.

REFERENCES

[1] Turban, Rainer, Potter. (2003). Introduction To Information System. Second Edition. John Wiley & Sons, Inc, New Jersey.

[2] Wijaya, R. (2006). Analisis Model IT Menggunakan Balanced Scorecard Untuk Pengembangan Sistem Teknologi Informasi. Available: http://jurnalmanajemenn.blogspot.com/2009/06/analisis-model-it-menggunakan-balanced.html [2010, January 2]

[3] Pant, S.,& Hsu, C. (1995). Strategic Information Systems Planning: A Review. Information Resources Management Association International Conference, May 21-24, Atlanta, Georgia.

[4] Teo, T.S.H., & Ang, J.S.K. (2000). How useful are strategic plans for information systems?. Behavior and Information Technology, 19, 275

[5] Porter M.E, & Milar, V.E. (1985). How Information Gives You Competitive Advantage. Harvard Busineess Review, Jul/Aug 1985, Vol. 63 Issue 4, 149-162.

[6] Ward, John, Peppard, Joe. 2002. Strategic Planning For Information System. 3rd Edition. John Willey & Sons, Buffins Lane, Chicester.

[7] Pollack T. A., (2010), ―Strategic Information Systems Planning‖, Proceedings of the ASCUE, pp.112-135

[8] Bruque S. and Moyano J. (2007), "Organisational determinants of information technology adoption and implementation in SMEs: The case of family and cooperative firms", Vol. 27, No. 5, pp. 241-253.

[9] Newkirk, H.E., Lederer, A.L.,(2006), "Incremental and Comprehensive Strategic Information Systems Planning in an Uncertain Environment," Engineering Management, IEEE Transactions , vol.53, no.3, pp.380-394.

[10] Pearlson, K. & Saunders, C. (2010). Managing and Using Information Systems: A Strategic Approach, 4th Ed. Hoboken, New Jersey: John Wiley & Sons, Inc.

[11] Piccoli, G. (2008). Information Systems for Managers: Text & Cases. Hoboken, New Jersey: John Wiley & Sons, Inc.

[12] Mak, S. (2001), A model of information management for construction using information technology, Automation in Construction, Vol. 10, pp. 257-263.