

INFORMATION SYSTEM STRATEGIC PLANNING IN IS / IT SERVICE PROVIDER

Muhammad Malik Hakim¹⁾

¹⁾Informatics Department, Universitas Muria Kudus
Gondangmanis, Bae, Kudus
e-mail: malik.hakim@umk.ac.id¹⁾

ABSTRACT

Information System (IS) should be an enabler for the business, enabling the company to innovate, persist and evolve in fulfilling customer needs. This research is a case study in constructing information system strategic planning at one of the national IS / IT solution and product provider. Using the method developed by Ward and Peppard, this study investigates the urgent and necessary IS for future development and future needs, with data collected directly and indirectly in the form of primary and secondary data. Based on the results of the research, the company can implement IS based on Mc Farlan's Grid, which sort IS required by priority and grouped it into support, key operational, strategic, and high potential applications which have different benefits respectively. Furthermore, it is expected that the implementation can be carried out gradually in four years with the new IS / IT policies that should be applied within the company's organization.

Keywords: *strategic information system, ward and peppard, mc farlan's strategic grid, SWOT, CSF, value chain*

I. INTRODUCTION

In the business world today, IS is growing in accordance with the development of human needs. IS which was originally developed as a support in the form of automation of a manual system is growing where much of the current business operations of the company is very dependent with it. Furthermore, in some circumstances, IS becomes an enabler that enables a company or organization to achieve its business strategy.

In fact, IS is able to refresh the market lethargy due to the tightening of business competition situation and become the driving force for the opening of new business opportunities and needs (IS driven business).

As an IS/IT solutions provider with extensive market penetration, one of the company now is aware of the importance of applying the right IS and aligned it to business strategy. One of the expected goals is to maintain and improve the stability of the company's business growth. With appropriate strategies and implementation of the right IS, various needs and conditions and some potential risks in the future can be predicted and anticipated as early as possible, so that it would not become a negative impact on the company's business operations.

Unfortunately, some existing applications are still considered fail to fulfill and support the company's business needs. As example, there are still long delay in decision making and giving solution to customer because of existing manual system with tight hierarchical approval model that could take a long time for completion. Therefore, a planning is needed to align IS strategies with the company's business activities and strategies by adjusting the company's vision and mission.

As a company with core business in providing IS / IT product and service solution, sales are the most important factor in daily activities. The sales team are key assets of the company, because the achievement level of income and profit is strongly influenced by the aggressiveness and successfulness of sales team in generating revenue. The aggressiveness of sales team impacts on the intensity of meeting among other team to be very low. This leads to a lack of knowledge sharing among sales teams, both in technical and non-technical skills or in case of events (case studies) experienced by certain sales team. If the model of knowledge sharing among sales teams can be facilitated well, it will have a positive impact in internal company's operational activities. These positive impacts includes saving on external training costs, minimizing duplication of errors or failure in providing solutions to customers, and also spreading the success story among sales team and/or sales person. From several explanations mentioned above, it can be seen that the company needs several systems that can be facilitated by the implementation of some certain application. Nevertheless, it must be carefully planned through the information system strategic planning, especially in case of readiness of human resources to adapt to the new system or business processes to be fully prepared so that the information system can be used optimally.

II. LITERATURE REVIEW

Strategic planning of information systems is one effective way to know the needs of IS in the future; while the existing applications are still mapped as a baseline. The methods used usually are Zachman Method [1], Tozer [2], Cullen and Cecere [3], and also Ward and Peppard [4].

Pambayun, et. al [5] using the Zachman Method that applied to a transport company; Fadhillah and Waterkamp [6], Widodo and Suharjo [7], as well as Mumtahana et al. [8] using it in a higher educational institution, while Surendro [9] leverages Enterprise Architecture inside Zachman Framework to make strategic planning of information system. Furthermore, Tozer Method was chosen by Wijaya and Aliyanto [10] to conduct strategic information system design in universities, while Cullen and Cecere Methodology is used by Hardjo and Suharjo in a manufacturing company [11].

The Ward and Peppard method was chosen by many researchers as a guide to make strategic planning of information systems in their respective objects. Anggelina and Harisno [12] as well as Maulana and Sensuse [13] apply it in government organizations. Furthermore, implementation at educational institution are conducted by Syafitri [14], Pipin et. al. [15], Fattah and Asni [16], as well as Maryani and Darudiato [17]; while Holik [18] and Hannesto [19] are applying it in private companies. Specifically, the steps of Ward and Peppard Method are explained in detail by Wedhasmara [20].

III. METHODS

3.1. Research Framework

In this study, frameworks used are based on the method pursued by Ward and Peppard [4], that can be sorted as follows.

a. Internal business analysis

The analysis of the internal business is conducted with studying and understanding of the company's vision and mission. Based on the information from the Strategic Planning documents and then internal analysis are made using Value Chain Analysis to map the various main and supporting business processes. Additionally, SWOT analysis is also conducted to find out how the company's internal understanding to the various advantages and disadvantages that it have.

b. External business analysis

The External Business Environment Analysis was conducted using two analyzes. The first is using SWOT analysis to find out various factors that affect the opportunities and threats / obstacles in running the organization's activities. Furthermore, an analysis of the company's activity trends is performed by benchmarking against trends and best practices against other companies that have similar business.

Based on the analysis of internal and external business, it is expected to deliver detailed organizational strategies that will be compared with the organizational strategies listed in the strategic documents as a comparison. This comparison can be done using Gap Analysis to know whether the recent condition of the company is far from its ideal operational.

c. Internal IS of Analysis

Internal IS Analysis is an analysis conducted to find out how far the IS existing portfolio capable in supporting the company to realize the vision and mission that it does. This analysis is done by studying existing documents and mapping existing IS application portfolios using Mc Farlan's Strategic Grid. This internal analysis is expected to provide a description of how far IS applications could support the company's business performance. Furthermore, the results of internal analysis will be maintained as a baseline in carrying out further development.

d. External IS Analysis

External IS Analysis is done by conducting literature review to find out the current development trend of IS. Based on existing trends, it is expected to know the current IS development strategy to support the company's business strategy in the future.

e. Future IS and business strategy

Based on the Gap Analysis of the company's business strategy that has been done internally and externally before, it can be determined the ideal IS business strategy to support the company's performance in the future.

The strategy created is based on functional and structural CSFs that are summarized and prioritized according to the company's future trends. This strategy is expected to provide direction for the development of next IS strategies in the future.

f. IS Strategy Planning

The next step is to design the IS strategy to support the company's performance in providing IS services to its employees and customers. This is done based on the Gap Analysis between the current IS condition as a baseline with the need of future IS services in accordance with the company's business strategy. This IS strategy will be shown inside application portfolio that based on Mc Farlan's Strategic Grid.

g. Road Map of IS Development

Furthermore, it is needed to make the milestone or stages of IS development that can be made in the form of road map of IS development. This road map will contain the stages of IS development in certain time duration.

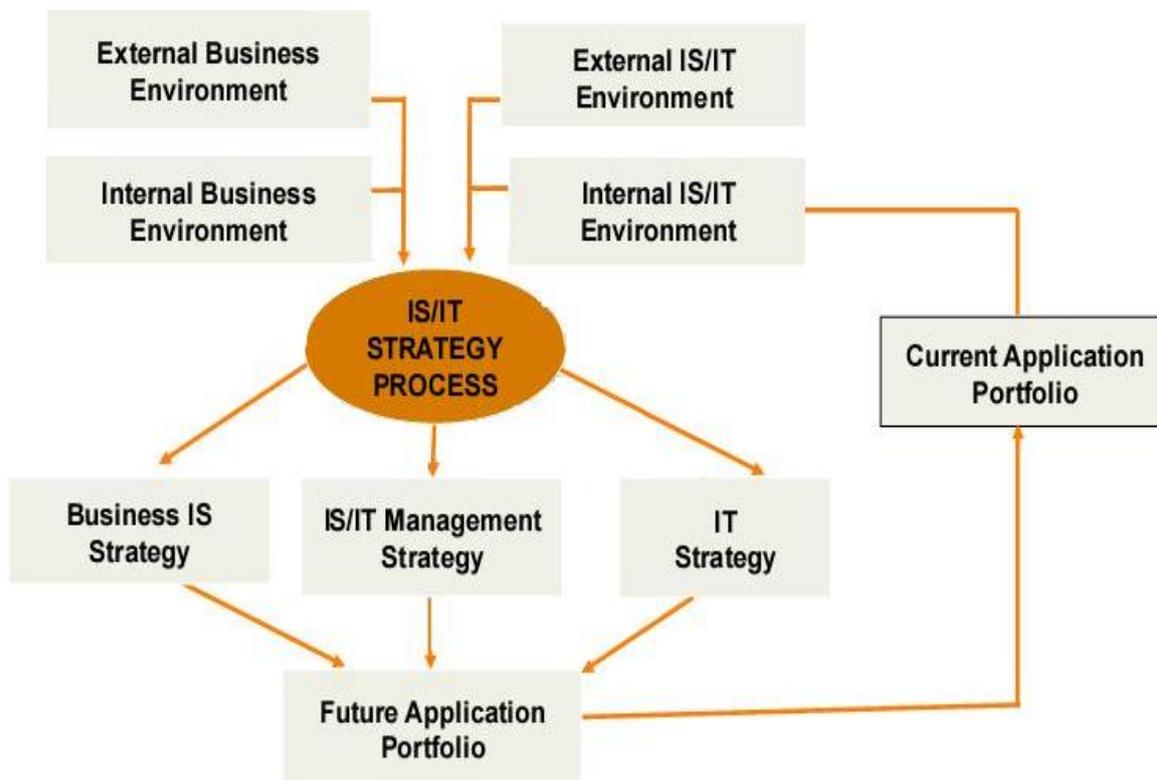


Figure 1. Ward and Peppard Method [4]

3.2. Data Collection

This study uses two types of data as research materials, namely primary and secondary data. Primary data is data that obtained directly from the source. It can be taken from the documents company's strategic plan, vision, mission, corporate objectives and organizational structure, tasks and functions, as well as CSF (Critical Success Factors) of each section structurally and functionally, business documents, and also other documents and portfolio applications that already exists. Techniques that can be done to obtain primary data are as follows:

a. Interview

Interviews are conducted directly to various parties / sources related to data that become research objects.

b. Filling questionnaire

Respondents filling the questionnaire are those who have a close relationship with the data to be taken. They were asked to fill out questionnaires based on questions and answer choices that had been prepared. Questions

and answers are intended to know the description of situation and conditions that exist inside the company.

c. Direct observation

Observation is conducted by examining a scientific inquiry directly. This is done to determine the reality that exists directly, to know the portfolio of existing applications, and to check the data that has been taken from other methods to minimize the possibility of errors that occur.

IV. RESULT AND DISCUSSION

4.1. Internal Business Analysis

Internal analysis of company's business is done using Value Chain Method, to map the entire work process that occurs within the organization and grouped into two categories of activity: main and supporting activities. Referring to the organizational documents that mention the duties and functions of each work unit based on observations made on the work processes that occur in each working unit, the Value Chain Diagram can be seen in Figure 2.

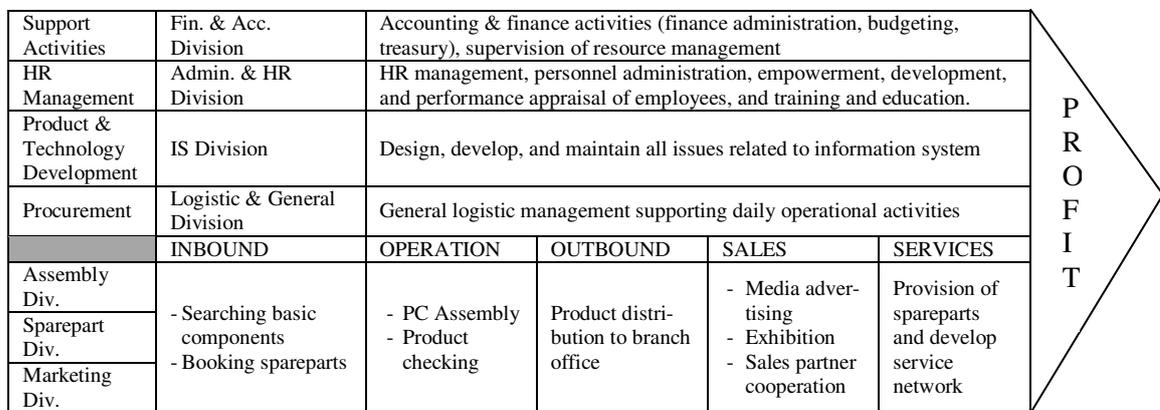


Figure 2. Company's Value Chain Diagram

Results of internal business analysis then can be mapped into analysis of Strength and Weakness as follows.

Strength:

- The company is pioneer of enterprise IS / IT service provider with corporate market segmentation so that it has a reputation as a provider of IS / IT product and services with many experiences that have been known by almost all companies in Indonesia, especially companies engaged in the field of IS / IT.
- Implementation of sales concepts that strive to provide the best for the customer based on a long-term and continuous relationship (customer intimacy).
- Treatment of quality of business processes with the standard of ISO 9001: 2000 by SGS.
- Competitive price due to minimum inventory cost.

Weakness:

- Lack of knowledge sharing among sales teams, both in technical and non technical issues and skills or in case events (case studies) experienced by the certain sales team.
- High turn over (in and out employees) on marketing and sales teams.
- Less education on the retail segment, thus creating a reluctance on customers to make purchases.

4.2. External Business Analysis

In general, the professional and expert in the IT service provider industry, especially the experienced sales persons, usually has previous experiences in the company where they work before, as an individually or as a sales team. This makes the level of competition getting higher. In addition, the competition is increasingly enlivened with the level of movement (turn over) employees (sales person / team). This makes customer acquisition is a

much harder job than before.

This condition make the company should has a high level of competitiveness. Companies that have high competitiveness will survive, and vice versa. Companies that are able to survive and capable in generating high sales growth will be noticed by IT product manufacturers / principals that in turn have a high bargaining power to keep providing the best solutions to customers at very competitive prices.

Otherwise, external business analysis is done using Porter's Five Forces Model to find out the external situation of business as well as identifying the existence of a competition in the business process undertaken by the company to win the competition. This model is mainly used to analyze the micro environment of an organization such as level of competition and how big its potential benefits. With Porter's Five Forces Model, the position of the organization in the competition map will be determined, so it can be formulated the important strategies. The Five Forces Model can be seen in Figure 3.

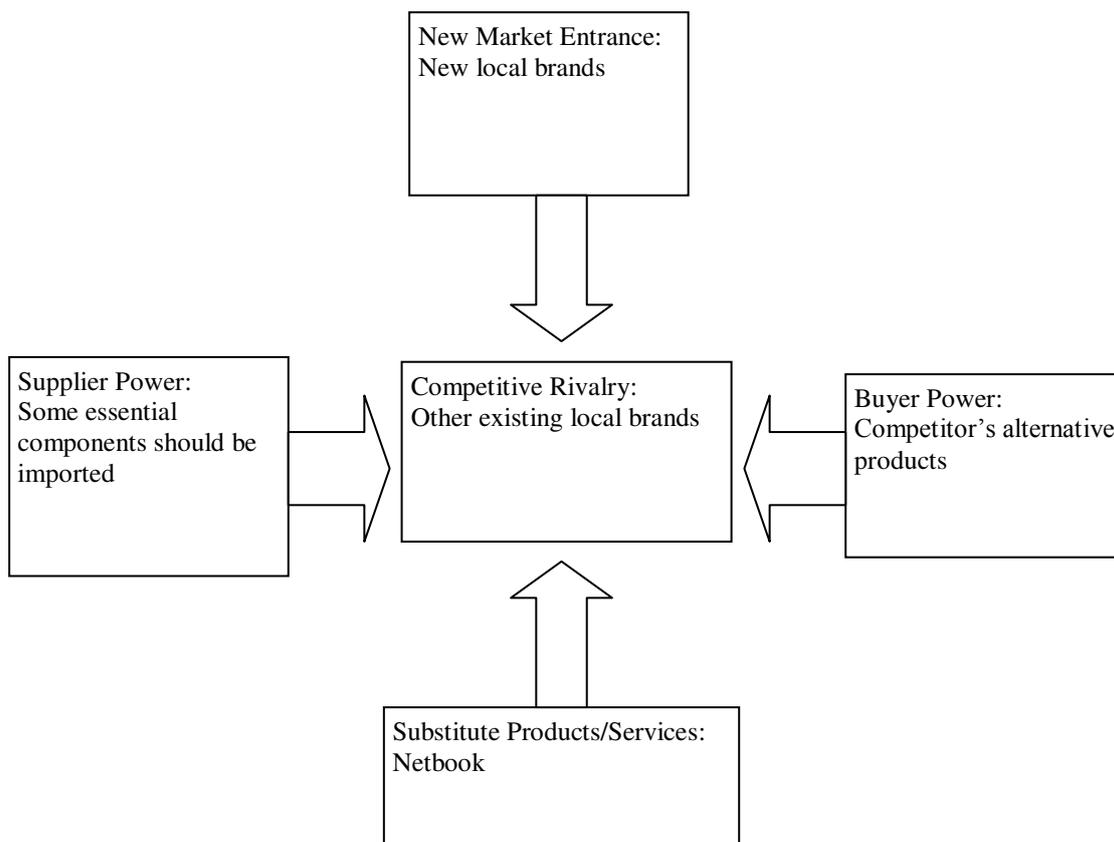


Figure 3. Company's *Five Forces* Model

Based on the results of the previous analysis, then the proposed strategies to reduce the pressure of each aspect of the Five Forces model can be seen in Table 1.

Table 1. Proposed Five Forces' Aspect – Strategy Matrix

Aspect	Strategy
Reduce supplier's bargaining Power	<ul style="list-style-type: none"> • Partnering • Supply Chain Management • Supply Chain Training • Increase dependence
Reduce customer's / buyer's bargaining power	<ul style="list-style-type: none"> • Partnering • Supply Chain Management • Loyalty Improvement • Increasing incentives and added value to customers • Intermediary decreasing
Reduce threat of entry by new Competitor	<ul style="list-style-type: none"> • Increasing efficiency scale of minimum operation • Improving brand image (making loyalty becoming barrier) • Intellectual property protection • Developing partnership and alliance with business partners
Reduce pressure from substitute product	<ul style="list-style-type: none"> • Increasing switching cost • Alliance • Accentuate the difference
Reduce intensity of rivalry among existing competitors	<ul style="list-style-type: none"> • Product differentiation • Focus to different segment markets

From of external business analysis, the strategy then mapped into the following Opportunity and Threat analysis:

Opportunity:

- The growing needs for IS / IT solutions in Indonesia, especially in the corporate segment.
- High economic growth leads to an increase in the income per capita of the community, thus increasing its purchasing power.

Threat:

- Cheap products from P. R. of China has resulted in fewer buyers, especially for price sensitive segments.
- Competitors bring out better and more reliable products.

Based on the analysis of internal and external business, it can be seen that to increase market share of company's product especially hardware, it needs business strategy changing, such as:

- a. Entering the retail market segment
- b. Enhance brand education in retail customers
- c. Strengthen cooperation with financial institutions and banks to add alternative purchase schemes.
- d. Continue synergies with corporate customers who have access to the retail market
- e. Stick handle corporate segment.
- f. Strive to reduce loss opportunities in many ways, such as: making special cooperation with strategic companies, and creating online payment

4.3. IS Analysis

Furthermore, existing applications are currently mapped by McFarlan Strategic Grid that map IS applications based on their contribution to the organization. It is done on four quadrants (strategic, high potential, key operation, and support). From the mapping, It can be obtained the contribution of an IS application to the organization and development in the future. The fourth quadrant of Mc Farlan's Strategic for existing IS can be seen in Table 2.

Table 2. *McFarlan's Grid* of Existing IS

Strategic	High Potential
- Knowledge Manajemen - Goldmine	N / A
- HRIS (<i>Human Resource Information System</i>) - Administration Automation	- Email System - Company's website
Key Operational	Support

Additionally, in terms of current trends, the company already has various advantages for implementing various applications that most competitors not yet doing the same things. Nevertheless, there are some things that make the sales support system needs to be improved

a. Hardware Trend

Currently, RAID (Redundant Array of Independent Disk) is the right technology for data storage media. With RAID technology, data transfer can be done very quickly and has a small data loss risk. Then, for remote storage techniques, the SAN (Storage Area Network) and NAS (Network Attached Storage) can be used.

b. Software Trend

The latest technology currently being developed is SOA (Service-Oriented Architecture) technology or SaaS (Software as a Service). Software functions are provided in the form of services. Thus, the application can be made in a modular models that enable to implement integration optimally.

c. Operating System Trend

The current trend of O/S leads to Linux with Ubuntu distros as an open source based O/S. In Ubuntu, the interface has been improved to make it easier for users to use the operating system.

d. Databases Trend

Currently, RDBMS (Relational Database Management System) is a database technology that is still commonly used in almost all organizations. In RDBMS, data is stored by managing relationships (interconnections) between data. RDBMS is also a database management system that have open standard. The other side of the commonly used database technology is the distributed database system that will ultimately increase availability and performance. To extract more value from existing data, the current emerging technology is Data Mining technology otherwise known as Business Intelligence. By implementing Business Intelligence, an organization can develop more accurate and important decisions that help to achieve organizational goals easier.

e. Network and Infrastructure.

Infrastructure technology that is currently being discussed is cloud computing technology. With the cloud computing, the service providers can provide services as easy as which can be obtained from the Data Center. Thus an organization does not have to confusing about investing in and managing Data Center and its infrastructure, because the needs of network, server, hard disk space, bandwidth, and so on have been provided by cloud computing service providers.

Futhermore, IT solutions and services providers should implement good CRM (customer relationship management) applications. It is very important because it will have a role as a tool to connect with customers to understand what they want and what they need. By implementing CRM optimally, customers will have more concern to the products and services, so that they will be more open in giving information about the need for IT solutions or complaints to the services that have been received. This information and complaints can be transformed into opportunities to give other products or services. CRM application that has direct contact facilities with customers is needed by the company in order to capture business opportunities from existing customers to avoid customer switching to competitors.

4.4. IS Strategy Planning

The compilation of IS / IT strategy is done by using Balance Scorecard combined with SWOT analysis. The results of the Balance Scorecard analysis are mapped with the Critical Success Factor Model to determine what activities to perform and what information to use. The role of CSF in strategic planning is as a liaison between business strategy and IS strategy, focusing the strategic planning process of the IS on a strategic area, and prioritizing the IS application proposal. From the result of Balance Score Card analysis which has been combined

with Critical Success Factor, the proposed IS solution can be seen in Table 3.

From the proposed IS solution, the Gap Analysis is done to determine which system is proposed to be built and need to be updated. Based on the results of Gap Analysis, it can be seen that to support its business strategy, the company needs several applications that can be mapped using McFarlan Grid as seen in Table 4.

Table 3. Proposed IS Solution on BSC – CSF Matrix

No.	Strategy	Achievement Goals (CSF)	IS Solution
Financial Perspective			
1.	Multiply income by increase sales	<ol style="list-style-type: none"> Extend promotion to improve customer awareness Improvement of assembly cost efficiency to achieve competitive price Market development 	<ol style="list-style-type: none"> Providing customer database Providing product sales database and competitor's Providing databases of behavior, shopping pattern and preference of consumers Product ordering feature Application for assembly plan and material stock management Online application for ordering to supplier Online application for assembly controlling
2.	Enhance collaboration to multiply sales	<ol style="list-style-type: none"> Expand cooperation with other supplier and business partner Expand assembly cooperation 	<ol style="list-style-type: none"> Online facility to integrate supply chain management Online sales transaction monitoring features
3.	Decrease non strategic cost	<ol style="list-style-type: none"> Internal cost efficiency Increase outsourcing 	<ol style="list-style-type: none"> Application to simplify approval and authorisation of purchasing Vendor selecting application
4.	Increase sales by market and consumer acquisition	<ol style="list-style-type: none"> New market expansion Product development for new consumer Product revitalisation Enhance promotion 	<ol style="list-style-type: none"> Online application for product marketing Online application of CRM
Customer Perspective			
5.	Improve image and brand awareness by giving new service experience	<ol style="list-style-type: none"> Decrease complaints Increase consumers' satisfy Improve after sales services 	<ol style="list-style-type: none"> Online helpdesk Spare part and service ordering features Online community for customer
Internal Business Process Perspective			
6.	Improve product quality in getting high competitive products	<ol style="list-style-type: none"> Improve product quality in customer Acceptable and competitive product price 	<ol style="list-style-type: none"> Features of cost and account receivable monitoring Online application for assembly monitoring Online Application for controlling product quality
Learning and Growth Perspective			
7.	Improve HR quality	<ol style="list-style-type: none"> Increase employee's prosperity Career clarity and certainty Improve work motivation 	<ol style="list-style-type: none"> Online payroll and performance assessment Feature of training and career for employee

Table 4. Proposed of Application in McFarlan's Grid

Strategic	High Potential
<ul style="list-style-type: none"> - Knowledge Management - Goldmine - SCM (Supply Chain Management) 	<ul style="list-style-type: none"> Company Portal: - Online Customize System (OAS) - E-Payment
Administration Automation: <ul style="list-style-type: none"> - Online Approval System (OAS) - Sales Administration System (SAS) 	<ul style="list-style-type: none"> Email System HRIS (<i>Human Resource Information System</i>)
Key Operational	Support

Table 5 shows the achievement targets of the proposed IS implementation.

Table 5. Expectation of Achievement Goals of New IS Implementation

No.	Target	Strategy	Achievement Goal (CSF)
1.	Improvement of information system values	Increase information system usage	1. Improvement of information systems implementation that needed to support business activities 2. Increasing the benefit value in information systems usage 3. Increase efficiency in work
2.	Improvement of infrastruktur values	Increase existing infrastructure utilities	1. Increasing of infrastructure utilities 2. Development adaptive infrastructure
3.	Improvement of HR quality	Improvement employee expertise	1. Improvement internal and external training 2. Recruit additional expertise when lacking of internal expertise
4.	Increase role of IS in supporting business strategy	Increasing IS implementation in supporting business strategy	1. Improve IS role in supporting company's strategy 2. Improve IS usefulness

Furthermore, in implementing the development of IS, it required some IS policy that generally could be listed as follows:

- a. Data security and confidentiality
Maintain the security and confidentiality of all data, including internal company data, customer data, and other data relating to business processes.
- b. Open System Application
Using application with the Open System principle to facilitate the development of the next stage.
- c. Paperless and printable system
Documenting all forms of business processes in paperless, but also can be manifested in hard copies for documentation of ISO system audits.

4.5. Preparation of IS Development Road Map

The development and implementation of this IS Strategic Plan can be carried out gradually within 4 (four) years, with the following phases:

- a. Conditioning and campaign
This phase will take 2 (two) months as the preparation stage for the employees to adjust to the new IT Policy and as a foundation for the implementation of whole IS Strategic Plan
- b. Development and stabilization of administration automation system
It is a development of existing administrative systems, that the development and implementation is expected to take 3 (three) months until Go Live stage.
- c. Development and consolidation of SCM (Supply Chain Management)
Conducting virtual integration with major suppliers, both domestic and foreign suppliers, that is estimated to take a maximum of 12 (twelve) months.
- d. Development of corporate portal
Conducting the development and implementation of corporate portals, as well as integration with existing systems. This phase of acceleration is expected to take 7 (seven) months until Go Live (ready for operation).

Table 6. Proposed IS Development Milestones

Information Systems	Year			
	Year 1	Year 2	Year 3	Year 4
SCM (Supply Chain Management)	√	√	√	√
Online Customize System (OCS)	√	√	√	√
Online Approval System (OAS)		√	√	
E-Payment			√	√
Sales Administration System (SAS)	√	√		

V. CONCLUSION

This research performs strategic planning of information system using Ward and Peppard Method. Based on the results of the study, it is known that the method can be applied in strategic planning information systems in private companies, especially in IS / IT products and services providers. From the study, it is known that to actualize the strategic plan into real, smoothly and capable in supporting business activities, it will take about four years to achieve an optimal positive impact; and it should be accompanied by support and consistency from all stakeholders in the company, includes both employees and management.

REFERENCES

- [1] J. A. Zachman, "A Framework for Information Systems Architecture", *IBM Systems Journal*, vol. 26. No. 3, pp. 276 – 292, Feb. 1987.
- [2] E. E. Tozer, *Strategic SI/IT Planning: Professional Edition*, Betterworth-Heinemann, Boston, 1996.
- [3] A. Cullen and M. Cecere, "The IT Strategic Plan Step-by-Step", CIO Roadmap, 2007.
- [4] J. Ward, and J. Peppard, *Strategic Planning for Information Systems*, Third Edition, John Wiley & Sons, New Jersey, 2002.
- [5] C. W. Pambayun, E. Darwiyanto, and G. A. A. Wisudiawan, "Perencanaan Strategis Sistem Informasi pada PT. Primajasa Menggunakan Zachman Framework", *e-Proceeding of Engineering*, vol. 2, no. 2, pp. 6538 – 6549, Aug. 2015.
- [6] Y. Fadhillah and J. Waterkamp, "Analisa dan Perancangan Strategis Sistem dan Teknologi Informasi Menggunakan Balance Scorecard pada Institut Bisnis dan Informatika Kwik Kian Gie", *Journal of Information System*, vol. 12, no. 1, pp. 15 – 29, Apr. 2016.
- [7] B. Widodo and Suharjo, "Pengembangan Blueprint IT dengan Zachman Framework di STP Trisakti", *Journal of Information System*, vol. 13, no. 1, pp. 49 – 66, Apr. 2017.
- [8] H. A. Mumtahana, W. W. Winarno, and A. Sunyoto, "Perancangan Master Plan Sistem Informasi Akademik STT Dharma Iswara Madiun", *Khazanah Informatika*, vol. 2, no. 2, pp. 72 – 84, Dec. 2016.
- [9] K. Surendro, "Pemanfaatan Enterprise Architecture Planning untuk Perencanaan Strategis Sistem Informasi", *Jurnal Informatika*, vol. 8. No. 1, pp. 1 – 9, Mei 2007.
- [10] A. Wijaya and A. Aliyanto, "Penerapan Metodologi Tozer dalam Perencanaan Strategis SI/TI pada Sekolah Tinggi Teknik Musi", *Journal of Information System*, vol. 9, no. 2, pp. 95 – 100, Oct. 2013.
- [11] L. Hardjo and Suharjo, "Development of Information Technology Strategic Planning for Manufacturing Industry (Case Study: PT. MCM)", *International Journal of Communication & Information Technology*, vol. 7, no. 2, pp. 49 – 52, Oct. 2013.
- [12] Angelina and Harisno, "Developing Information Strategic Planning in the Directorate General of Animal Husbandry and Health, Ministry of Agriculture", *Procedia Engineering*, vo. 50, pp. 29 – 37, 2012.
- [13] M. Maulana and D. I. Sensuse, "Perancangan Strategis Sistem Informasi: Studi Kasus Direktorat Jenderal Penyelenggaraan Haji dan Umrah Departemen Agama RI", *Journal of Information Systems*, vol. 7, no. 1, pp. 1 – 12, April 2011.
- [14] W. Syafitri, "Perencanaan Strategis Sistem Informasi / Teknologi Informasi Universitas Lancang Kuning Menggunakan Metode Ward and Peppard", *Jurnal Teknologi dan Komunikasi Digital Zone*, vol. 7, no. 1, pp. 31 – 43, Feb. 2016.
- [15] P. Widyarningsih, Mustafid, and A. F. Rochim, "Perencanaan Strategis Sistem Informasi pada Institusi Pendidikan Tinggi Menggunakan Analisis Critical Success Factors", *Jurnal Sistem Informasi Bisnis*, vol. 1, no. 2, pp. 87 – 93, 2011.
- [16] A. Fattah and A. Asni, "IS / IT Strategic Planning pada Universitas Balikpapan", *Jurnal Teknologi Terpadu*, vol. 3, no. 1, pp. 55 – 62, April 2015.
- [17] Maryani and S. Darudiato, "Perancangan Rencana Strategis Sistem Informasi dan Teknologi Informasi (SI / TI) : Studi Kasus STMIK XYZ", *CommIT Journal*, vol. 4, no. 2, pp. 77 – 85, May 2010.
- [18] M. A. Holik, "Strategy System and Information Technology Planning In PT. Trikarsa Sempurna Sistemindo", *ComTech Journal*, vol. 6, no. 3, pp. 402 – 413, Sept. 2015.
- [19] R. Hannesto, "Perancangan Strategis Sistem Informasi pada PT. Indah Kiat Pulp & Paper Tbk", *ComTech Journal*, vol. 5, no. 2, pp. 905 – 916, Dec. 2014.
- [20] A. Wedhasmara, "Langkah – Langkah Perencanaan Strategis Sistem Informasi dengan Menggunakan Metode Ward and Peppard", *Journal of Information System*, vol. 1, no. 1, pp. 14 – 22, April 2009.