

# Information System Strategic Planning using Ward and Peppard Method at Universitas Islam Negeri Sunan Ampel Surabaya

Pipit Merit Biyanti<sup>1</sup> and Nita Yalina<sup>1</sup>

<sup>1, 2</sup> Universitas Islam Negeri Sunan Ampel, Jl. A. Yani 117, Surabaya, Indonesia

**Keyword:** Information System Strategic Planning, Ward and Peppard

**Abstract:** Information Technology has been used in Universitas Islam Negeri Sunan Ampel Surabaya (UINSA) to improve its competitive advantage. However, the use of information system and its component has not been not optimized and needs to be reviewed since it is not fully integrated. The impact of these issues was inefficiency and ambiguity in business processed. Therefore, this research will elaborate and review the existing information technology in order to make information system a strategic planning. The method of this research was the one that Ward and Peppard proposed. There are few steps started from analyzing the existing business process and analyzing the current information system and technology, both internally and externally. Analyzing process used some tools, such as SWOT and Value Chain analysis, for internal analysis. PEST and Porter's Five Force were for external analysis. McFarlan's Strategic Grid was also used to analyze the internal IS/IT proposed. The result of these processes is application portfolio. There are 22 applications that were proposed. Ten of them are the current IS that need to be improved. Four of them have been developed and can be used effectively. The proposed system had been mapped in order to sustain its business strategic plan.

## 1. INTRODUCTION

At the moment, in this globalization era, Information System (IS) and Information Technology (IT) have an important role in the organization to support its business processes. Both IS and IT also can be used to support decision-making processes and to gain competitive advantage (Balgis, 2017). IS/IT implementation in an organization may increase efficiency in almost every aspect, resource, business process, market, and management. The development of information technology in all aspects encourages universities to take strategic steps in order to sustain its competitive advantage (Aswati, Mulyani, Siagian, & Syah, 2015)

Universitas Islam Negeri (UIN) Sunan Ampel Surabaya is one of public universities in Indonesia and the only Islamic public university in Surabaya. It was initiated in 1965 and is located in A. Yani 117 Surabaya. There are some businesses, one of them is Pusat Teknologi Informasi dan Pangkalan Data (PUSTIPD). PUSTIPD has an important role to manage affairs regarding IS/IT. It tries to improve and continues improvement both in infrastructure and information system application development.

In 2018, PUSTIPD evaluated their IS/IT by distributing questionnaire among its users in UINSA. The users consisted of students, lecturer, and

employees. The result was 93% from 301 respondent (81 employees, 76 lecturers and 144 students) said that they had used IS/IT at UINSA quite well. However, there were some respondents that showed dissatisfaction and said that these IS should be integrated and improved. Some of them also said that there should not be only web-based application but also mobile application. In today's digital era, mobile application technology is growing very rapidly. The rapid growth of mobile technology requires education to implement this technology in carrying out business processes (Bachtiar & Hasanah, 2017)

Based on the result, it can be concluded that in order to improve competitiveness, information system strategic planning should be formulated. If the strategic planning is formulated, it will be easy for an organization to map the application development phase and to make sure that IS/IT Strategies align with organization vision.

Ward and Peppard's method was used in this research since it differentiates IS and IT definition so it will be easy to understand. In this method, every phase does not have to be executed consecutively. Researcher can choose the most appropriate step first (Afriyano, Darwiyanto, & Wisudhiawan, 2016).

There are three major phases in Ward and Peppard method. The first one is the input phase, the second one is process phase, and the last one is the output phase. The input phase includes internal and

external business environment analysis, internal and external IS/IT environment analysis. In order to define the output phase, there are some tools that can be used, such as SWOT analysis, Value Chain Analysis, *Porter's Five Force* analysis and PEST analysis and *McFarlan's Portfolio*. The output phase includes IS strategy, IT Strategy, and IS/IT management.

Therefore, to minimize the problem that currently is faced by UINSA, it will be needed to formulate Strategic Information System Planning. Hence, the solution to overcome the problem can be found and mapped so that it can be easily implemented.

Strategy is the priority and overall direction taken by the organization to achieve organizational goals (Basri, 2004). IS/IT strategic planning must be based on internal and external business environments as well as internal and external IS / IT environments. The data then will be analyzed in the IS/IT strategy process so as to produce several SI business strategies, IS / IT management strategies, and IT strategies. The three results of the IS / IT strategy process are then analyzed to produce an application portfolio for the future. The portfolio will be used as a basis for developing information systems in organizations in the future (Peppard & Ward, 2016).

#### 1. Input

- a. *The Internal Business Environment*  
It describes all aspects of the current business strategy, goals, resources, processes and culture and business values of the organization.
- b. *The External Business Environment*  
It describes economic, political, social, technological, industrial, and competitive climate aspects of the company.
- c. *The Internal SI/IT Environment*  
It describes organizational IS/IT conditions from a business perspective at the present time, company experience in business, contribution to business, skills and technology infrastructure used, including portfolios of existing IS/IT, both that is under development and new planned.
- d. *The External SI/IT Environment*  
It describes technological developments and opportunities for their use and use of IS/IT by competitors, consumers and suppliers.

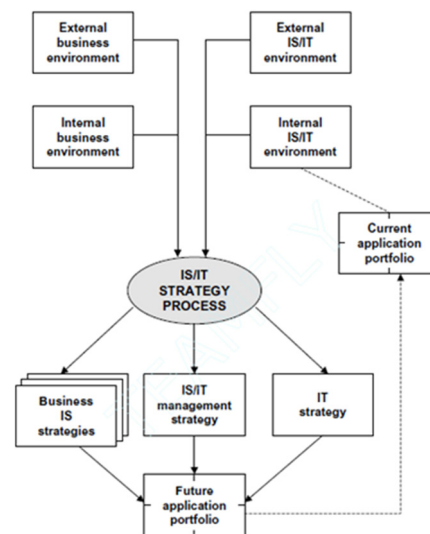


Figure 1: IS/IT Strategic Plan (Peppard & Ward, 2016)

#### 2. Output

##### a. *Business IS Strategy*

It describes how each business unit or function will utilize IS/IT to achieve its business goals.

##### b. *IT Strategy*

It describes policies and strategies used by IS/IT technology and human resource management.

##### c. *IS/IT Management Strategy*

It describes general elements that are applied through the organization as a whole to ensure consistent application of the required IS/IT policies.

## 2. METHODOLOGY

Figure 5 shows framework and methodology of this research. Data collection techniques are the most strategic step in research because the main purpose of research is to get data (Jogiyanto, 2009). In this research, data were collected by direct observation, interviews, and literature study.

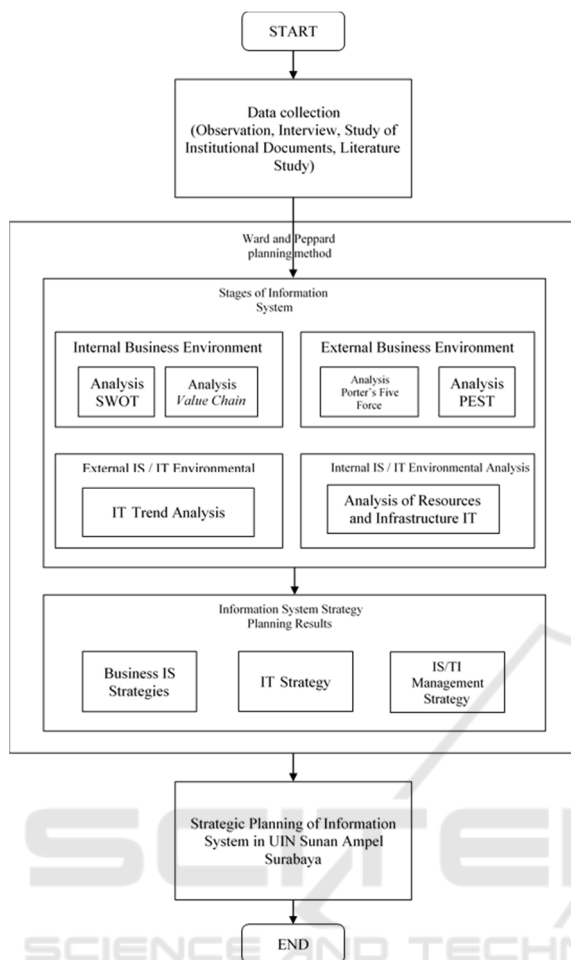


Figure 5: Framework and Methodology

## 2.1. Analysis

SWOT analysis and a Value Chain are carried out to get an overview of the internal conditions UINSA.

### 2.1.1 SWOT Analysis

Strength, Weakness, Opportunity, Threat (SWOT) analysis is the identification of various internal strategy factors (strengths and weaknesses) and external strategy factors (opportunities and threats) of the company to formulate a company's strategy by maximizing strengths and opportunities, but simultaneously minimize weaknesses and threats (Saragih & Harisno, 2014). SWOT analysis was generated from the SWOT analysis that was carried out by UIN Sunan Ampel Surabaya which was listed in the 2014-2019 strategic plan and several additional

analyses after observing, interviewing and studying documents as follows:

Table 1 SWOT Analysis

Strength	Weakness
a. Clear vision, mission and goals b. Offer various major c. Strategic location (located in the center of city, easily accessible by various transportation) d. In 2017, received the second world of webometrics in the Islamic public universities in Indonesia e. One of the oldest Islamic Public universities in Indonesia (5 <sup>th</sup> Rank)	a. Administrative systems, especially related to data and information are not integrated and well-organized. Information flows are often interrupted, for example about inflexible activities and budgeting plans b. Lecturer education background is still relatively not linear (for example tasawuf lecturers undertake the syariah master program), or the subject matter is not in align with competencies c. The number of doctoral lecturer is quite low (1: 4 146 doctors from the total 613 lecturers) d. Information Technology's is not maturely adopted, the use of advanced media in teaching and learning activities is still on initial stage e. Minimum facilities and infrastructure f. The number of new student registration in the last four years (2015-2017) is fluctuated. In 2015 it decreased 20% from the previous year and in 2016 increase 20% and then decrease 17% in 2017
Opportunity	Threat

a. Institution reformation, since 2015 UINSA became Public Service Organization (Badan Layanan Umum) which have flexibility on budget policies and performance.	a. The number of competitors grow up steadily every year both vocational studies and private universities.
b. Strategic Location, located in the center of city	b. Indonesian students have a high interest to study abroad.
c. The existence of cooperation with horizontal and vertical institutions, domestic and overseas, provides an opportunity for the development and empowerment in the form of study scholarships (domestic and foreign), research assistance, human resource development training, as well as the publication of lecturer scientific work	c. Our society have a pragmatic assumption, so they prefer to enter an institution that promise job opportunities without study for a long time.
d. The development of professional community groups who want to improve academic quality	d. Work competition is increasing tightly especially in the global era, they should compete with both domestic graduates and foreign workers.
e. High potential of foreign students. The number of new foreign students in the last three years (2015-2017) is	e. In order to achieve Word Class University, there are so many challenges. It needs support from management, lecturer and student. However, the support from management is hard to obtain.

fluctuated. In 2016, it decreased by 1% from the previous year and then increase by 20% in the next year	
f. Islamic integration's idea both on science and social studies would differentiate UINSA from other universities.	

After identifying SWOT, an analysis matrix is mapped in four categories as it is in Table 2.

### 2.1.2 Value Chain Analysis

Value Chain Analysis was used to map the entire work process that occurs in the organization into two categories of activities, namely the main activities and supporting activities (Wedhasmara, 2009). Interviews were made with particular people in every business unit in UINSA. Two categories of activity are described in Figure 6. The first category is the main activities and the second one is supporting activities. There are 5 main activities and 6 supporting activities.

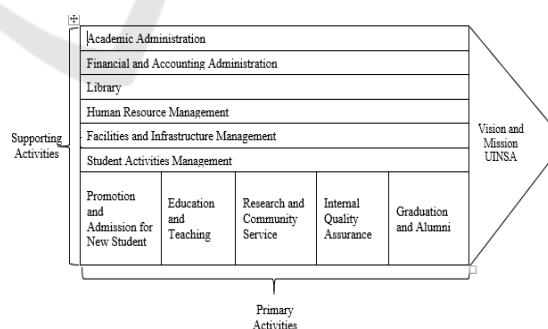


Figure 6: Value Chain Analysis

Strategy	IS/IT Resource	IS Strategy
<b>Strategy SO</b> 1. Expand market share and increase promotion and cooperation with overseas schools (to increase register foreign student) 2. Improve the quality of academic quality to produce quality graduates	1. An information system that can provide information, promotion, and easy registration application. 2. An information system that can support foreign student to register online. 3. Information systems that can support academic quality improvement	1. Website UINSA 2. IS for New Student Registration 3. IS for International Online 4. Registration 5. IS for Quality Assurance
<b>Strategy ST</b> 1. Improving the quality of infrastructure and facilities to support academic activities 2. Evaluating the curriculum that has been implemented that align with market needs	1. An information system that can manage infrastructure and facilities easier. 2. An information system that is capable of supervising academic quality	1. IS for Assets and BMN 2. IS for Quality Assurance
<b>Strategy WO</b> 1. Improving the quality of human resources (lecturers) 2. Expand the network of cooperation with parties that can improve competitiveness	1. An information system that can manage personnel data 2. An information system that can manage the data of cooperation and the potential of the organization's experts	1. IS for Employment Management 2. IS for Cooperation 3. IS for Potential and Experts
<b>Strategy WT</b> 1. Improving the quality of facilities and infrastructure to improve the quality of learning to produce qualified graduates 2. Utilizing the potential of human resources optimally 3. Increasing the effectiveness of business processes and supported by systems and information technology adoption	1. An information system that can manage infrastructure and facilities well 2. An information system that can manage staffing An integrated information system	1. IS for Assets and BMN 2. IS for Employment Management 3. Integrated System

Based on Figure 6, Table 4 was formulated. It described IS/IT needs and strategy to support every single activity.

Table 4 Value Chain Analysis

Internal Quality Assurance		
Including all activities that coordinate, control, audit, monitor, assess, and develop the quality of organizing academic activities	An information system that can manage internal quality assurance	IS for Quality Assurance
Graduation and Alumni		
Including all activities that manage graduation and alumni empowerment that provide guidance to	Information system that can manage alumni	IS for Graduation Online IS for Alumni

students who will graduate		and Tracer Study
Support Activities		
Activity	IS/IT Resource	IS Strategy
Management of Academic Administration		
All activities that manage student academic administration (KRS, KHS, scheduling lectures, assessment attendance and others)	An information system that can help students' academic administration processes	IS for Academic
Management of Financial and Accounting Administration		
All activities that manage financial expenses and income such as receipt of payments from	An information system that can manage financial	IS for Finance and Planning



students, the purpose is to facilitate the reporting and monitoring of financial institutions	transactions and planning	
Management Library		
All activities that manage library collection administration (books, papers, journals, theses, magazines, research, book lending process)	An information systems that manage library administration, book collections and borrowing processes	IS for Library or <i>E-Library</i>
Management Human Resource		
All activities that manage various staffing data from promotion, employee transfer to employee, to support the making of various reports	An information system that can manage personnel administration	IS for Employment Management
Management of Facilities and Infrastructure		
All activities that manage facilities and infrastructure owned by the institution from building data management.	An information system that can manage infrastructure	IS for Assets and BMN
Management of Student Activities		
The activity that manage student administration and student talent development through Student Activity Unit	An information system that can manage student activities	IS for Student

## 2.2 Analysis of The External Business Environment

### 2.2.1 Porter's Five Force Analysis

This analysis is used to find out the advantages of current and future competition positions (Porter, 1980). Based on observation and interviews, *Porter's five force* is formulated as in Figure 7. In order to formulate a good strategy, we should know with whom we compete. Figure 7 describes that there are 4 subjects that we should know. They are Supplier, New Entrants, Buyers, and Substitute.

New Entrants to UINSA is other higher education institutions that can emerge anytime. As Substitute, there are some organizations, such as vocational academy, course institute, Certification Agency, etc. As a supplier, there are human resources, such as lecturer and staff.

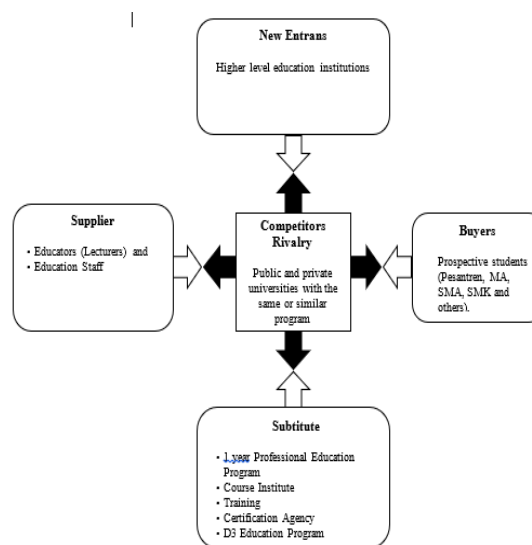


Figure 7 Porter's Five Force

### 2.2.2 PEST Analysis

External factors, such as political factor, economical factor, social factor, and technology, have an impact to internal organization environment. Table 5 describes the PEST analysis of UINSA.

Table 5 PEST Analysis

PEST Factor	IS/IT Resource	IS Strategy
<b>Politic</b> 1. Regulation of the Republic of Indonesia Number 12 of 2012 about Higher Education 2. Republic of Indonesia Permendikbud Number 50 of 2014 about the Quality Assurance System for Higher Education 3. Government Regulation of the Republic of Indonesia Number 4 of 2014 about the Implementation of Higher Education and Higher Education Management	1. An information system that can supervise academic quality based on standard 2. An information system that can assist students' academic administration processes	1. IS for Quality Assurance 2. IS Academic
<b>Economy</b>		

Unstable economic conditions could decline market share in education, our society requires higher education with low tuition fees, easy to reach locations and offer scholarships	An information system that can provide information about UINSA profiles and scholarships	1. Website UINSA 2. IS Scholarships
Social The social, cultural and religious diversity in Indonesia greatly influences the character and behavior of students at UINSA	An information system that displays the socio-cultural diversity that exists in UINSA through student activities	1. Website UINSA 2. IS Student affairs
Technology The development of information technology and systems has an impact on the integration of all business processes in universities	An information system that can be used to support business processes so that they are more effective and efficient	IS Integrated Data Warehouse

### 2.3 IS/IT Internal Environment Analysis

IS/IT internal environment analysis was needed to evaluate current IS/IT resources in UINSA and to identify IS Application Portfolio. IS portfolio was made using McFarlan Strategic Grid which is mapped into 4 quadrants: strategic, high potential, key operational and support. IS/IT Internal Environment Analysis can be seen in Table 6.

Table 6. Current IS/IT

Hardware	The hardware consists of servers, access points, routers, switches, firewalls, wireless, storage, UPS (Uninterruptible Power Supply) and printers. The server has 20 servers. RAM server is an average of 8GB and some are 16GB. However, stability and availability of system did not manage systematically especially on the peak time
Software	The operating system used by client / PC is Microsoft, namely Microsoft Windows 7 and Windows XP. While the

	programming software used in developing information systems is PHP and MySQL. However, there are still some software that have not used official licenses, so there are still a lot of pirated software used in office operations. This is because there is no policy regarding the standardization of the software used.
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McFarlan's application portfolio is used to assess the overall IS/IT contribution and its effect on business success (Peppard & Ward, 2016). Using *McFarlan Strategic*, there are 2 applications on the strategic grid, 6 applications on key operational, and 3 applications on support. From this point of view, there is no application on high potential grid.

Table 7. Current IS Portfolio

Strategic	High Potential
Website UINSA	Online submission system
Key Operational	Support
IS for Academic IS for Employment Management E-Performance E-Office IS for Research and Community Service IS for Finance and Planning IS for Library or E-Library	Digital Library E-Journal IS Public facilities

### 2.4 External IS/IT Environment Analysis

Information technology (IT) support can facilitate accurate, reliable, fast, and economical decision-making mechanisms (Maulana & Sensuse, 2011). This analysis was made to determine the rapid development of information technology followed by an increase in the needs of UINSA. Information technology trends that can be utilized by UINSA can be seen in Table 8.

Table 8. Information Technology Trend

Google Cloud Platform	A cloud computing service product that has been provided by Google. The goal is to create a cloud computing / internet-based computing project so that it can be utilized on a global scale. Google App Engine, Google Compute Engine, Google Cloud Storage dan Google BigQuery (Hakim, 2016).
Big Data Technology	The process of managing, storing and analyzing data is very large and complex and has a high diversity of data sources. To make previously unstructured data

	into structured data and mutual integration (Maryanto, 2017)
WEB Technology	Can be accessed anywhere and on any computer or through various other media. No need to install any program because the only program needed is the browser
Mobile Application	Work becomes easier and more practical in use. Currently mobile application users are increasing so that it requires UINSA to follow the technology trend so that it can compete with other universities.
Smart Card Technology	Smart Card is a small computer because it is equipped with a chip that contains a processor, RAM and ROM, and even a very high security operating system (Kadir, 2003)

### 3. RESULT AND DISCUSSION

#### 3.1. Information System Strategic Planning

In IS/IT strategic planning, there are several characteristics including the existence of the main tasks, namely, strategic or competitive advantages and linkages with business strategies, the main objectives of pursuing opportunities and integrating IS and business strategies, the direction of senior executives and management and users. The main approach is user innovation and a combination of bottom up development and top down analysis (Pant & Hsu, 1995).

In the analysis session, there were some tools which were used to determine the application portfolio that could support UINSA to attain their competitive advantage. In addition, validating the result verification from the stakeholders is quite important. Therefore, some interviews have been done to validate the result. From these interviews, IS Business strategy, IT Strategy, and IS/IT management strategy will be discussed below.

##### 3.1.1. IS Business Strategy

The information system has three activities in producing information which is needed by the organization to make decisions, control operations, analyze problems, and create new products or services (Laudon & Laudon, 2003). From several analyses conducted, there are 22 information system applications needed in UINSA. Ten of them are already used but still need some improvements so that they can be used optimally to meet the business needs of universities. Four of them can continue to be used

because they are still considered to be useful and fit to the future strategy and the other 8 are new applications (New System) needed by UINSA to carry out activities so that the work becomes more effective and efficient.

These applications include the UINSA Website, SI new student registration, international online registration system, academic information system, financial and planning information system, online lecture or E-Learning, quality assurance information system, human resources information system, E-performance, E-office, research and community service information system, infrastructure and asset information system, public facilities information system, relationship information system, experts and potential information system, tracer study information system, online graduation information system, scholarship information system, student affair information system, e-library, e-journal, and digital library.

##### 3.1.2. IT Strategy

IT Strategy includes technology investment, service plans and strategies for acquisition and management of technology, supplier relationship and specialist resources (Peppard & Ward, 2016). To formulate IT strategy, interview with IT steering committee was held. There are some conclusions which are:

- Ease of access to information; Maintaining the ease of access to information for the entire academic community by implementing an integrated login (single sign-on). Cooperating with third parties, such as Google, Moodle, etc., might be included
- IS/IT Standardization; Standardizing the hardware and software system of IS/IT from information system applications to facilitate maintenance. License and legal aspect should be considered.
- Access Point (AP) Distribution; Distribution of the access point is intended to allow the internet network to be used to the maximum extent possible by the user to perform all activities. In UINSA, there are some buildings that do not have AP and are totally disconnected from internet.
- Bandwidth Management; It is the process of monitoring the communications (traffic, packets) on a network in order to prevent network congestion and network poor performance.
- RAM Server Escalation; RAM memory is added to the server that is used for all IT services. It is expected to minimize the number of users who



cannot access some services in particular peak time.

### 3.1.3. IS/IT Management Strategy

IS/IT management strategy includes policies and governance mechanism to enable the formulation and successful implementation of the strategy and to ensure that it delivers the maximum available business benefits at acceptable level of cost and risk (Peppard & Ward, 2016). UINSA should consider some legal products that support the strategy which includes:

- Standardization of IS/IT policies both in hardware and software systems
- Policies from each unit/section/faculty to use the IS application that has been developed, encouraged by the provision of punishment and awards.
- Centralized management system. In order to enable integrated system, Centralized system is appropriate since it will be easy to coordinate and make a policy.
- The development of information systems can use the insourcing system that utilizes the workforce.

### 3.2. IS Future Portfolio

IS Future application portfolio generated from SWOT Analysis, and Value Chain Analysis can be seen in Table 9 using *McFarlan's Strategic Grid*.

Table 9. Future IS Portfolio

Strategic	High Potential
* Website UINSA () IS for online submission system	+ Online submission system for International student
Key Operational	Support
* IS for Academic * IS for Employee Management * E- Performance * E-Office * IS for Research and Community Service * IS for Finance and Planning () IS for Library or E-Library + E-Learning	() Digital Library () E-Journal * IS Public facilities + IS for Quality Assurance + IS for Assets and BMN + IS for Alumni and Tracer Study + IS for Potential and Experts + IS for Cooperation + IS Scholarship + IS Student + IS for Graduation Online

Note \* : *Upgrade System*

() : *Continue System*

+ : *New System*

- : *Retire System*

### 3.3. IS Strategic Implementation Planning

Implementation plan for information system development planning within 5 years can be seen in Table 10. The priority of the information system that must be developed refers to *McFarlan's Strategic Grid* analysis and aligns with the UINSA strategic plan from 2014 to 2019.

Table 10. Information System Strategic Implementation Plan

The strategic plan	Application Name	Recomm	Year				
			1	2	3	4	5
Promotion of UIN Sunan Ampel Surabaya through social media	Website UINSA	U	x				
Recruitment of prospective students	IS for New Student Registration	N	x				
Education and teaching programs	IS for Academic (SIKAD)	U	x				
	E-Learning	U	x				
	IS for Graduation Online			x			
Research-based community service and development of community service models	IS for Research and Community Service	U		x			
Academic quality assurance	IS for Quality Assurance	N		x			
University administration management skills and worksheet document management	IS for Employment Management	U			x		
	E-Performance	U			x		
	E-Office	U			x		
Strengthening the management cycle (external)	IS for Finance and Planning	U			x		

internal performance and financial supervision)							
Encourage student activities in talent, interests and profession	IS Student	N				x	
Providing scholarships for outstanding students	IS Scholarship	N				x	
Mapping community needs for alumni	IS for Alumni and Tracer Study	N				x	
Increasing relation and partnership with potential organization	IS for Cooperation	N					x
	IS for Potential and Experts	N					x
Increase facilities and infrastructure to support academic activities and public facilities	IS for Assets and	N					x
Provision of supporting facilities for non-academic activities (room)	IS Public facilities	U					x

#### 4. CONCLUSION

Information system strategic planning aims to produce an IS/IT strategic plan framework that can be used in UINSA. The proposed IS/IT strategic planning framework can discover the important factors needed in developing an information system that aligns with the vision of UINSA. These important factors can be seen from the results of SWOT analysis, Value Chain, Porter's Five Force, PEST and internal IS/IT analysis.

On the other hand, formulation process of information system strategic planning should consider the organization's strategic plan in order to make sure that the IS/IT development aligns with and supports organization to accomplish their vision and mission. There are several applications that should be developed at least in 5 years in order to gain a competitive advantage. However, IS/IT strategic planning should be reproduced to sustain competitive advantage and adapt to external changes and challenge.

For the future research, risk management, human resource, and financial planning can make the recommendation more detailed and comprehensive. Other methods can also be used, such as critical success factor or balanced scorecard, or both. It can enrich the recommendation from another perspective.

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