

Information System Strategic Planning at Institut Agama Islam Negeri Ternate

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Abstract - Institut Agama Islam Ternate (IAIN) is one of the universities that run business processes in terms of educational services. IAIN Ternate has implemented information systems and information technology (IS/IT) to support its business processes. However, the implementation of IS/IT has not been equipped with strategic planning, so all forms of procurement, development, and maintenance of IS/IT are only available upon request and are not yet aligned with the organization's strategic plan. This research was conducted to design organizational needs into an IS/IT strategic plan at IAIN Ternate using the Ward and Peppard Framework. This research was conducted using interviews and focus group discussions (FGD) with the leaders and staff of the units at IAIN Ternate. The tools used for the analysis of the organization's internal environment are SWOT and value chain; for the analysis of the organization's external environment, PESTLE and McFarlan Grid are used to map the application portfolio. Based on the results of the study, IAIN Ternate has utilized IS and IT. To achieve the vision, mission, and objectives of IAIN Ternate, it is recommended that IS/IT become a priority for development. The IT Strategic Plan consists of an IS strategy, an IT strategy, and an IS/IT management strategy.

Keywords: Information system strategic planning, ward and peppard, IS strategy, IT strategy

I. INTRODUCTION

The development of information systems and information technology (IS/IT) has now become a basic need for every organization. Through information technology (IT), organizations can gain a strategic advantage in managing the organization. To achieve this gain, strategic planning in the field of information technology is needed. IS/IT strategic planning is used to formulate and measure the extent to which the goals and objectives of an organization are met and determine strategies that can increase the advantages of information systems and information technology in supporting business strategies [1]. Technically, organizations encourage us to make changes by combining inputs to

produce outputs when there is a change in IS or IT in the organization [2]. The strategic step needed is a strategic plan for developing IS/IT that is in accordance with the needs of the organization as stated in the IT Strategic Plan document [3]. The IT strategic plan is expected to help plan organizational activities based on the potential of human resources [4].

Every institution of higher education in Indonesia is obliged to carry out the Tri Dharma of Higher Education. In realizing the Tri Dharma, universities must make IS/IT plans to support the process of aligning the organization's business strategy and IS/IT strategies [5]. IAIN Ternate has used IS and IT to support organizational performance. The Information Technology and Data Center of IAIN Ternate stated that the application of IS/IT at IAIN Ternate was still lacking in supporting the business processes of IAIN Ternate. This is because there is no work plan for IS/IT implementation [6], which contains a portfolio of applications, strategic information systems, IT infrastructure, and IS/IT management.

Based on the current conditions, the author expects to develop a plan for IS and IT needs to help accelerate digital transformation at IAIN Ternate. IS and IT strategic planning will be made based on the Ward and Peppard framework, which not only focuses on IS and IT but also pays attention to aspects that affect the internal and external environments of the organization. Also, the framework ensures that the resulting IS and IT strategic plans can be evaluated [7].

A study conducted by Ward (2012) in an article entitled "Information Systems Strategy: Quo Vadis?" argues that the development of information systems strategies in organizations is influenced by the economic situation and the development of the IT industry [8]. Digital strategic planning in organizations is made to help plan strategic orientation in achieving business goals [9]. IS/IT strategic planning using the Ward and Peppard method produces recommendations for future application portfolios to management that can assist in

making decisions regarding IS/IT investments, implementation, and management policies [10].

Porter introduced the Value Chain Model to analyze the internal parts of the organization and show the advantages and disadvantages of an organization. This model focuses on providing added value to goods and services as well as minimizing costs and time without sacrificing quality [11]. a more diverse approach with PESTEL analysis (political, economic, social, technological, environmental, and legal) to understand the strategic orientation and provide an overview of environmental factors that need to be considered in decision-making [12]. The results of the analysis of the internal and external environment include strengths, weaknesses, opportunities, and threats to the organization. Analysis of the IS and IT environment used McFarlan's Grid model in mapping IS and IT applications, which resulted in an overview of the contribution of an application to the organization and the direction of IS and IT development in the future [13].

II. METHOD

In this study, the author used the Ward and Peppard framework. Ward and Peppard's method was used to plan information systems strategically. Information systems strategic planning was chosen to help organizations identify and align organizational strategies with IS/IT strategies in achieving the organization's vision, mission, and goals [14]. The alignment of IS/IT strategy with business strategy, as well as the pursuit of new opportunities through the use of cutting-edge technology, are all aspects of IS/IT strategic planning, which also encompasses a variety of tools, methodologies, and frameworks [15]. Fig. 1 depicts the Ward and Peppard's suggested planning structure for the IS strategy.

In order to learn about the business processes taking place at IAIN Ternate, the authors of this study conducted interviews with the management and made direct observations of those activities. Before conducting interviews, the authors first prepared interview materials related to IS strategic planning at IAIN Ternate. Interviews were conducted to obtain more detailed information. Observations were also made to determine the environmental conditions of the organization.

Based on this framework, the first thing to do in this research was to identify the vision, mission, goals, and policy directions of IAIN Ternate to find out the organizational situation at the time the research was conducted. Then an internal analysis and an external analysis related to the organization's business and IS/IT were carried out.

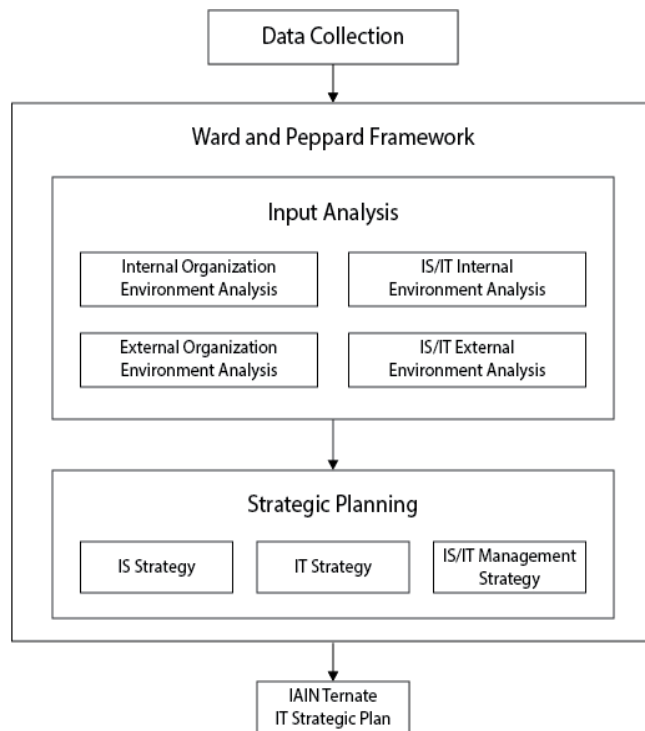


Fig. 1 Framework ward and peppard

Both internal and external business were the subjects of the analysis. For an internal corporate examination of strengths, weaknesses, opportunities, and threats, a SWOT analysis was used. The business plan was then determined using the SWOT matrix. PESTLE analysis was used to do an external business analysis. New opportunities or risks are the outcomes of this analysis. An internal analysis of IS and IT reveals that the present IS and IT have been mapped out in accordance with their intended function. external examination of IS and IT to determine current trends.

To ascertain the required IS and IT Management Strategy, IT Business Strategy, and IS Business Strategy, the IS and IT Strategy is prepared. The data and information requirements as well as the information system applications for IAIN Ternate will be recommended by the information systems business strategy. For IAIN Ternate, the Information Technology Strategy will suggest new infrastructure requirements in the form of hardware, network, and application software requirements. HR needs and HR development needs will be suggested by the IS and IT Management Strategy.

The creation of a reliable information system portfolio was the goal of the application portfolio preparation. A Focus Group Discussion should be held to review the findings of the IS/IT strategic planning analysis that was conducted in order to validate the analysis's findings from the earlier stage. Then, a

compilation of the present and upcoming IS portfolios is done. The formulation of a strategy in the form of an IT Strategic Plan is the final step in this research project. It is based on the findings of the analysis done with the outputs of IS Strategy, IT Strategy, and IS/IT Management.

III. RESULT AND DISCUSSION

According to the information technology strategic planning method by Ward and Peppard, the following are the stages of preparing the information system strategic planning at the State Islamic Institute of Ternate.

A. Data collection

Data was collected using observation and interview methods. Observations were made to identify the organization's business environment, vision, mission, goals, and policy direction of the organization. Interviews were conducted directly with organizational leaders. From the results of data collection by 14 divisions at IAIN Ternate, 96 services and 70 system/application requirements were identified.

B. Analysis of Internal Business Environment

The tool used to analyze the business processes of IAIN Ternate is the value chain, while to identify the strengths, weaknesses, opportunities, and threats of IAIN Ternate, a SWOT analysis is used. The results of data collection are then described in the form of analysis as follows:

1) *SWOT Analysis*: Based on the results of the SWOT analysis that has been carried out, several strategies can be identified that can be applied to IAIN Ternate. The strategies that can be applied are presented in Table I.

2) *Value Chain Analysis* is a technique for examining an organization's internal processes, with an emphasis on the system, how inputs are transformed into outputs, and how these processes are then split into primary and secondary activities [16]. Fig. 2 displays the value chain analysis's subsequent findings.

TABLE I
SWOT MATRIX

Strategy SO	Strategy WO
<ol style="list-style-type: none"> Utilizing the budget for IT infrastructure development. Developing HR through HR training in order to develop IT infrastructure that is still available. Cooperating (MoU) with other PTKINs to obtain the use of information systems and applications from other PTKINs. 	<ol style="list-style-type: none"> Procurement of infrastructure, information systems, or applications in accordance with the needs of IAIN Ternate. Adding human resources expertise in computer programmers or institutions placed at the Information Technology and Data Center through the formation of CPNS/PPPK/Honorary Personnel. A Letter of Assignment (ST)/Decree (SK) is held from the leadership regarding the management of Information Systems and applications that have been or will be held. The main database serves as the foundation for the growth of the information system, allowing for the integration of data produced by many applications. Obtaining a budget that is suitable for IT infrastructure.
Strategy ST	Strategy WT
<ol style="list-style-type: none"> To compete with other higher institutions, develop integrated information and social media systems and applications as well as a way to reach out to potential new students. Providing opportunities and including training related to the development of trends in IT infrastructure and information systems, so that existing human resources can apply trends in the business processes of IAIN Ternate Make a list of each unit's IT infrastructure and information system needs for development so that existing business processes can move better. 	<ol style="list-style-type: none"> Improving the development and procurement of IT infrastructure to improve business processes that are integrated with IT. Developing human resources and creating a safe and comfortable work environment to create quality human resources.

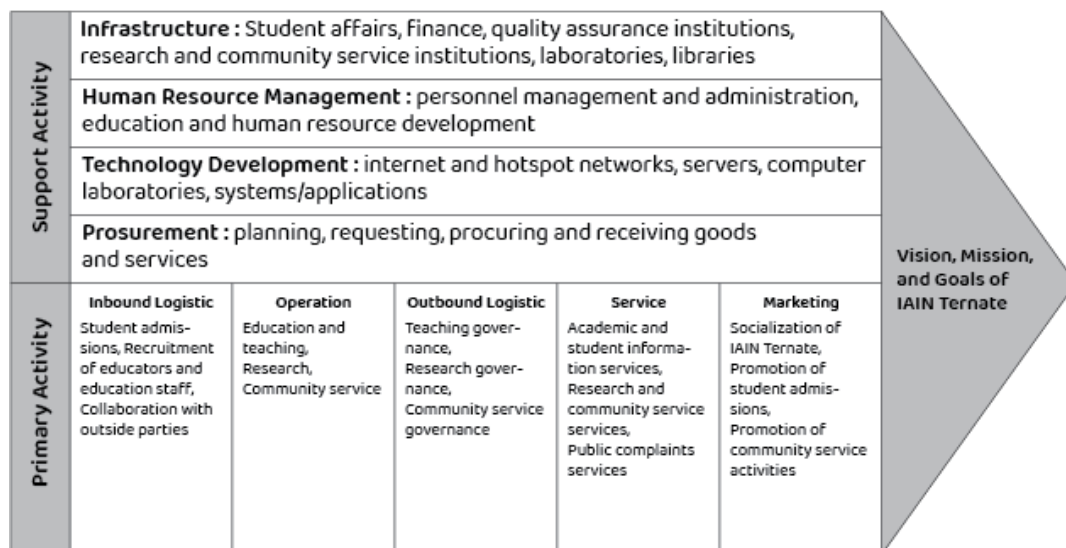


Fig. 2 Value chain analysis

C. Analysis of External Business Environment

To analyze external factors that affect the business processes of IAIN Ternate by collecting data and information related to the institute using PESTLE analysis which is then described as follows:

- 1) *Political aspects*: Political factors include the policies and regulations of the President of the Republic of Indonesia, the Minister of Religion of the Republic of Indonesia, and the Chancellor of IAIN Ternate.
- 2) *Economic aspects*: Economic factors include Non-Tax State Revenue and Pure Rupiah Revenue.
- 3) *Social aspects*: Social factors include students and lecturers with low information technology knowledge.
- 4) *Technological aspects*: Technological factors include academic information systems handled by outsiders and IT infrastructure that is not updated following global technological developments.
- 5) *Legal aspects*: Legal factors include the development of IT Infrastructure based on Presidential Regulation and the Regulation of the Minister of Religion on the Electronic-Based Government System.
- 6) *Environmental aspects*: Environmental factors include changes in natural conditions that result in unstable internet networks and frequent power outages in the Ternate area.

D. IS/IT Internal Analysis

Direct observation and interviews with relevant parties are used to analyze the internal IS/IT environment in order to determine the state of the infrastructure, system portfolio, and resources.

1) *Network infrastructure and server infrastructure* are both available IT infrastructure at IAIN Ternate. The infrastructure of the IAIN Ternate network is still in very poor condition. The Wi-Fi network hasn't yet gotten to every spot in the IAIN Ternate environment. The bandwidth and access speeds are still constrained. All IT applications and services have not been able to be supported due to the limited capacity of the IAIN Ternate server architecture. Even some servers weren't kept up with.

2) *Application Information System*; there are up to ten recorded application information systems at IAIN Ternate. As of right now, SIAKAD, SIM PMB, OJS, SLiMS, and the IAIN Ternate Website are the five active information systems that are in operation. Simple, PMB Enterprise, and SIAKAD Enterprise are functional but underutilized systems. The system is in an inactive condition, namely Online Absence and E-library.

3) *Human Resources* who have IS/IT competence at IAIN Ternate are 7 (seven) employees. 4 (four) of them are assigned to the Information Technology and Data Center. 3 (three) other people are assigned to other units with tasks and functions outside the IS/IT field.

E. Analysis External IS/IT

Several technological trends can be exploited by IAIN Ternate based on the findings of the literature review, including:

1) *Cloud computing* is a technology that has been used by organizations and society, either directly or indirectly. Users can exchange data from any location using cloud services and an internet connection.

2) *Learning Management System (LMS)*, which is frequently used by academic and governmental organizations to develop an extensive digital framework for the development, use, and assessment of learning systems [17]. The learning aspects of LMS, such as online instructor-student interaction and the sharing of more recent knowledge, set it apart from ICT-based learning technologies.

3) *VPS* has the freedom to determine what platform and operating system they want to use, so they can optimize online services. However, *VPS* does not

accommodate the need for private connections between servers. When the user needs a more optimal configuration for security, *VPS* cannot fulfill it.

F. Development of IS and IT Strategies

The IS portfolio that needs to be established, the necessary IT infrastructure, and the IS/IT management that needs to be taken into consideration can all be seen from the results of the business needs analysis.

1) *IS Strategy* : Strategy The IS Strategy is shown in Table II.

TABLE II
NEEDED PORTFOLIO APPLICATION

No	SI Need	Plan
1	Website	Helping speed up the distribution of information as well as documentation and information archives
2	E-Repository	Assistance in the search for research data;
3	E-Library	Helping lecturers get promoted
4	Library Management System	Assistance in accessing digital books through smartphones and computers. Helping operators manage library membership and control the circulation of books in the library
5	Employees' IS	Supporting the management of personnel data by the personnel department Assisting the personnel department with data recapitulation in the absence of data and performance allowance calculations Aiding in the monthly reporting of performance for both employees and lecturers.
6	E-Office	Assisting various parties in managing letters. The creation, distribution, and filing of letters are done online.
7	Electronic Public Complaints	Helping the academic community and the public to make online complaints. Assisting the campus in managing complaints
8	Infrastructure IS	Helping BMN managers control state property in each unit
9	Scholarship Module	Helping the campus to recap the scholarship recipient data and report it
10	MoU Module	Helping monitor data and cooperation progress
11	Planning Module	System integrated with the system belonging to the ministry of finance
12	Finance Module	Helping the academic community to know the types of transactions from institutions that enter their accounts
13	Official Work Trip Module	Helping the finance department calculate the realization of the official travel budget
14	Accreditation IS	Facilitating assessors in conducting assessments. Easy for lecturers to make performance reports. Easy for LPM staff to conduct audits/surveys.
15	Field Work Module	Automation of Field Work (KKN) registration at LPPM
16	CBT Application	Foreign Language & BTA proficiency tests are more efficient
17	Internal Complaint System	The academic community can make complaints online and upload supporting evidence
18	Help desk System	The academic community can seek assistance for system and IT issues they are experiencing.
19	Single Sign On	One account integrated with other systems

2) *IT Strategy*: *IT Strategy* recommendations on IT strategies to support the needs of the IS strategy. It is advised to give the IT infrastructure portfolio the following general description:

- To keep the local servers that are currently running functional, physical server maintenance is done by purchasing supporting equipment.
- To meet network requirements throughout the university area, network expansion infrastructure must be provided.
- Renting a cloud server allows you to communicate data via a cloud computing platform over the internet, use it as a database backup, and store organizational data. Cloud servers are designed to handle an increase in IT service workload and can be accessed at any time without interruption.
- subscription to the Microsoft License by working with Microsoft Indonesia to offer official licenses for the whole IAIN Ternate academic community in an effort to boost academic engagement there. *IS/IT Management*

3) *Strategy: IS/IT management and organization IAIN Ternate is getting ready for the future by taking numerous factors into account*, namely:

- The IAIN Ternate Strategic Plan provides as a template for developing IS/IT strategies that are in line with the organization's vision, mission, objectives, and policy objectives.
- The Information Technology and Data Center, which is the center for managing all human resources and infrastructure related to IS/IT, is the specific unit for managing IS/IT and is listed as such in the regulation of the minister of religion number 41 of 2022 concerning changes in the organization and work procedures of IAIN Ternate.
- To establish an IS/IT architecture design that is current with both present and future trends, the information system architecture and IT infrastructure design will be modified.

4) *Recommendations for IS/IT management strategies*: to provide suggestions in the form of policies in the implementation of IS/IT strategies. The strategy recommendations are as follows:

- The strategy for developing systems/applications, IT infrastructure and IS/IT services by creating an IT Strategic Plan or IT Master Plan is the basis for the IS/IT

management unit of IAIN Ternate in determining investment and implementation of IS/IT and the direction of IS/IT development.

- Carry out standardization of IS/IT which becomes the agreed standard and becomes the commitment of all parties involved and will become a reference for the implementation of the development and procurement of IS/IT.
- Conduct Clearance for IS/IT procurement where the development of information and communication technology (ICT) systems and devices at Ministries/Institutions in 2021 onward is required to obtain Clearance from the Ministry of Communication and Informatics. The aim is to ensure the feasibility of spending on ICT devices, applications, and ICT systems and to procure new servers and data centers to support national digitalization.
- Conduct periodic Monitoring and Evaluation of IS/IT against the achievement of standards and conduct analysis and evaluation of the implementation of IS/IT standards to improve the quality of IS/IT.
- Perform IS/IT maintenance. Design a maintenance system to assist in managing maintenance activities and improve the quality of IS/IT maintenance.
- Upgrading the internet network is always needed to meet the needs of academic services and keep abreast of technological developments.
- The need for IT human resources based on Job Analysis and Workload Analysis for Certain Functional Positions for Computer Staff, the need for IT staff at IAIN Ternate with job descriptions based on the regulation of the Minister of Empowerment of State Apparatuses for Bureaucratic Reform Number 32 of 2020, the need for IT staff is shown in Table III.

G. *Future Application Portfolio*

The results of mapping the needs of IS/IT get an overview of the contribution of IS/IT to the organization and future development. Several systems and applications need to be developed and then mapped into the *McFarlan grid*, which maps IS/IT applications based on their contribution to the organization. In the application portfolio, an application can be categorized as strategic, high potential, key operational, or support [18].

TABLE III
IT HR REQUIREMENT

No	Position	Duty	Needs (People)
1	Intermediate Computing Officer	Create and oversee plans for all information technology-related tasks.	1
2	The Senior Expert Computer Officer	Develop plans and analyze all forms of information technology activities	7
3	The Junior Expert Computer Officer	Perform all forms of information technology activities and document them	15
4	Website Manager	Manage websites in each work unit (assuming there are 19 study programs in 4 faculties, 3 postgraduate study programs, 2 institutions, 4 Technical service units, and 3 sections in the Biro)	31

From the results of mapping the IS/IT application, an overview of an IS/IT application's contribution to the organization and development of IS/IT in the future is obtained. This is done by having the head of the Information Technology and Data Center complete a questionnaire based on current needs and taking information system needs into consideration. The future formulation results can be seen in Table IV.

H. IS/IT Strategic Plan Roadmap

The McFarlan Grid is used to create the IS/IT Strategic Plan Roadmap. System development in the Strategic quadrant is given priority, followed by system development in the Key Operational quadrant that is tied to systems in the Strategic quadrant, and then Support and High Potential. The IS/IT strategic planning roadmap at IAIN Ternate can be seen year by year within the next five years taking into account the priority needs of the Institut is shown in Table V.

TABLE IV
MCFARLAN GRID

Strategies	High Potential
Student Admissions IS*	Data Warehouse
Tracer Study*	Career Center
Open Journal System*	
Employees IS	
Online Attendance Application	
Performance Report Module	
Accreditation IS	
Finance Module	
Information Website	
E-Repository	
Key Operational	Support
Academic Information System*	MoU Module
Community Service Program	Planning Module
Module*	CBT Application
Library Management System	Internal
E-Library	Complaint System
E-Office	
Electronic Public Complaint	
Infrastructure IS	
Scholarship Module	
Official Work Trip Module	
IT Helpdesk Application	
Single Sign On (SSO)	

*On

TABLE V
IS/IT STRATEGIC PLAN ROADMAP

No	IS/IT	2023	2024	2025	2026	2027
1	Employee IS	■				
2	Online Attendance Application	■				
3	Performance Report Module	■				
4	Accreditation IS	■				
5	Finance Module	■				
6	Information Website	■				
7	E-Repository	■				
8	Library Management System		■			
9	E-Library		■			
10	E-Office		■			
11	Electronic Public Complaint		■			
12	Infrastructure IS		■			
13	Scholarship Module		■			
14	Official Work Trip Module			■		
15	Planning Module			■		
16	CBT Application			■		
17	Single Sign On (SSO)				■	
18	IT Helpdesk Application				■	
19	MoU Module					■
20	Internal Complaint System					■
21	IT Master Plan	■				
22	Connection Infrastructure Expansion	■	■	■	■	■
23	Microsoft License	■	■	■	■	■
24	Local Server Maintenance	■	■			
25	Cloud Server		■	■	■	
26	IS/IT Training and Seminar	■	■	■	■	
27	Data Warehouse				■	■
28	Career Center					■

IV. CONCLUSION

The development of the IT Strategic Plan using the Ward and Peppard framework produces a strategic framework that can be used to align with the strategic plan of IAIN Ternate. The IS/IT strategy plan for IAIN Ternate is in the form of a proposed IS strategy, IT strategy, and IS/IT management that need to be considered for implementation in the IAIN Ternate environment. The portfolio of future IS/IT needs are mapped onto the McFarlan strategic grid. 16 types of IS/IT are planned to be created or developed and several other types of IS/IT only need to be updated according to the needs of the organization. Then, the new IS/IT and which needs to be updated made a proposed IS/IT Implementation Roadmap with 5 stages. IAIN Ternate can develop strategic planning of information systems and information technology in accordance with technological developments, government policies, and institutional leaders. The combination or addition of

other methods in future research can be carried out and consider the financial aspects in the preparation of information technology strategic plans.

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