Strategy Planning for Rice Seed Producer’s Information System Using Anita Cassidy Method

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Abstract

Strategic planning of information systems on seed producers is an action that needs to be taken in order to maintain and make the business grow faster. However, such information system usually been created through the system development life cycle (SDLC) or other methods that appropriate for business. This study used Anita Cassidy method for strategic planning of rice seed producer’s information systems in XYZ Ltd., as case study. The following stages has been done, i.e. visioning, analysis, direction, and recommendations. The final results of the stages carried out recommend business applications that can be implemented, namely: Rice seed certification information systems, E-Commerce of Rice Seeds, Rice Type Determination Applications, Irrigation Control Applications, Paddy Pest Resolution Applications, Rice Growth Monitoring Applications, Personnel Information Systems, Payroll Information System, Procurement Information System, Financial Information System.

Keywords: Information Systems, Information Systems Strategic Planning, Anita Cassidy Method

1. Introduction

The industrial revolution 4.0 is an information advancement era which is marked by the development of Information Systems and Information Technology, especially the use of the internet for all fields, e.g. government, education, medical, agriculture, etc. (Sharma, Parhi, & Shishodia, 2021). The technologies can also be implemented in the rice seed producer in terms of producing certified rice seeds for sale to farmers, shops and the government.

XYZ Ltd. rice seed producer is a firm that manage certified rice seeds that lack of facilities and resources compared to other firms. This study aims at improving XYZ Ltd. as seed producer in order to survive and grow fast through the use of information systems. To ensure the information system implementation, it is necessary to make a strategy to get the right information system planning. This study chose Anita Cassidy method for strategic planning (Lestari, Mahardika, Sujana, Adinda, & Lie, 2019; Pradana, Dantes, & Candiasa, 2020).

The Anita Cassidy method is a method that can be used to plan an information system strategy, so that it can produce recommendations for the right application for XYZ Ltd. rice seed producer.

Previous research has been carried out at the Public Works and Spatial Planning (DISPUPR) Office in one of the provinces in Indonesia using the Anita Cassidy method and produced 17 information systems (Pradana et al., 2020). In addition, there is also research conducted in educational institutions using both the Ward and Peppard and the Anita Cassidy method for describing the Internal Business Environment Analysis, Several technology trends that can be utilized by these educational institutions, and gap analysis to get an overview of information technology (Lestari et al., 2019).
Other research related to the development of agricultural information systems has been carried out in China that reviewing and analyzing the development stages of China’s agricultural information dissemination system, by applying information technology as a substitute for traditional practices so that the dissemination of agricultural information to farmers and agricultural communities is better and increases productivity and sustainability. Economic, social and environmental (Zhang, Wang, & Duan, 2016).

To create a pattern of information systems and technology that is in line with the existing process needs, of course, it is necessary to plan an appropriate information system strategy so that it can assist all stakeholders in carrying out activities at XYZ Ltd. rice seed producer.

There are several theoretical studies used to complete this research. We define some important terms in this study. Agriculture is the most comprehensive word used to denote the many ways in which plants and pets sustain global human populations by providing food and other products. Agriculture comes from the Latin ager (field) and colo (cultivate) which signifies, when combined, agriculture: field or tillage. But the word came to encapsulate a very wide spectrum of activities that are an integral part of agriculture and have descriptive terms of their own, such as cultivation, domestication, horticulture, arboriculture, and vegeculture, as well as forms of livestock management such as mixed crops (Harris & Fuller, 2014). Another term is information systems (IS). IS involves various information technologies (IT) such as computers, software, databases, communication systems, internet, mobile devices and many more, to perform specific tasks, interact with and inform various actors in various social organizations. Hence, the general interest for the IS field is all aspects of the development, deployment, implementation, use and impact of IS in organizations and society (Boell & Cecez-Kecmanovic, 2015). Information system is a combination of the word system and information. The system is a collection or set of elements, components or variables that are organized, interact with each other, depend on each other, and are integrated (Pradana et al., 2020). This means that in the system a process will be carried out by sub-processes or system components based on predetermined input to produce an output that has been predetermined. Finally, the important term is e-agriculture. E-Agriculture is an increasing area to improve existing agriculture and food security through an enhanced process of access to knowledge and shifting to using information and communication technology.

Information system strategic planning will produce the main and supporting resources to achieve the organization’s business goals. Information system strategy plan can add value to the organization, improve information system asset management, improve communication between businesses and information systems departments, align information systems with business, provide business opportunities and increase value to the business and plan information flow and processes. Plans that have been made can also result in the appropriate allocation of resources and reduce system life cycle costs. Thus, in planning an information system strategy, the organization must think about what it wants to achieve from the planning (Cassidy, 1998).

This study proposed how to provide a platform where agricultural market players can share market information by combining a strategic planning method, Anita Cassidy, with the software development (UML-based). With the proposed platform, real-time market information can be accessed for market participants (Thankachan & Kirubakaran, 2014).

The rest of the paper is organized as follows. After describing the method, the strategic planning is implemented. The recommendations are presented in the result, both for IT infrastructure and seed information system.

2. Research Methods

According to Anita Cassidy, the information system strategy planning process has four phases, as follows (Cassidy, 1998). (1) Visioning Phase. This phase focuses on the organization's business processes by conducting interviews with the organization and assessing external and internal factors of the company as well as analyzing the strengths and weaknesses of the existing business processes in the organization. (2) Analysis Phase. The analysis phase documents the information system environment that exists in the organization regarding what applications have been running and how it impacts the organization. The organization will understand how threats and business opportunities highlight the strengths and weaknesses of the system. (3) Direction Phase. This phase determines the direction of the organization's business by choosing an information system that can help the organization run its business processes in a sustainable direction. It also determines the desired IS service architecture, which
includes the people and processes required in the information system and prioritize various information system projects. (4) Recommendation Phase. This phase documents a detailed roadmap outlining the project for the next several years related to the development of an information system that is an organization's priority.

Figure 1 shows the methodology for strategic planning of seed producer's information systems. (1) Data collection was carried out as material for further research to be carried out at XYZ seed producers related to information system strategic planning. In collecting data, several activities were carried out. First, a literature study was done to obtain relevant theories taken from journals and books related to the research title. Second, the interview was done in addition to the literature study to officers in XYZ Ltd. seed producer. This interview aims to obtain data and an overview regarding the main business processes carried out by the XYZ seed producers. Therefore, they can photograph the existing problems. In addition, observations were carried out with the aim of analyzing the activities or actions of each stakeholder in carrying out business processes in the XYZ seed producers. (2) Phase visioning analyses internal condition of the company, both from the vision, mission and objectives of the organization. (3) Phase Analysis is necessary to understand the condition of the existing system in the company by photographing the business processes used in carrying out its business processes. (4) Phase Direction was conducted to improve and suggest the form of a system that is needed by the XYZ seed producers. (5) Recommendation phase recommends the work roadmap in the development of the proposed system.

The information system is designed using the PHP programming language, MySQL database, and additional Xampp applications. As well as the products produced from this research in the form of information systems that have functions such as: weekly or monthly reports, seed stock charts and information on distribution of seed stocks. The method used in this research is the RUP (Rational Unified Process) approach.

![Research Methodology of Anita Cassidy Strategic Planning](image)

Figure 1. Research Methodology of Anita Cassidy Strategic Planning

After strategic planning, the information system is designed as part of recommendation using the PHP programming language, MySQL database, and additional XAMPP applications. The information systems have many candidate functions such as: weekly or monthly reports, seed stock charts and information on distribution of seed stocks. The method used in this research is the Rational Unified Process (RUP) approach as shown in Figure 2. Some UML diagrams were employed to describe the system.
There are four phases in RUP, i.e. inception, elaboration, construction, and transition. Inception finds the required business processes (business modeling) and defining the requirements for the system to be created (requirements). Elaboration phase focuses on planning the system architecture. This stage can also detect whether the desired system architecture can be made or not as well as the risks that may occur from the architecture created. Construction phase focuses on the development of system components and features. This stage implements and tests the system. Transition phase deploys or installs the system so that it can be understood by the user. Activities at this stage are: user training, maintenance and testing of the system whether it meets user expectations.

3. Results and Discussion
After data collection, the Anita Cassidy Method was implemented from visioning phase to recommendation phase as follows.

Visioning Phase
Internal conditions Analysis in this study used Value Chain analysis which contains the main activities and supporting activities. The main activity involves several business processes, namely applying for seed certification, promoting seeds, selling seeds, reporting seed stocks, determining types of seed crops, managing irrigation, checking pests, checking plant growth, heating seeds and packing seeds.

Application for certification in this process is carried out by registering seeds to be certified so that they produce certified rice seeds that can be sold and bought to the community, stalls or certain government agencies that collaborate with the government to distribute certified rice seeds to farmers. Promotion of seeds is part of the main activity where the promotion of seeds is carried out to get consumers in Indonesia. The promotion is done through the internet. Sales of certified rice seeds are carried out based on requests ordered by customers, both customers from individuals, shops, and agencies. Reporting on seed stocks must be updated in period for reporting to the government. To determine the type of planting, in this activity, an analysis of appropriate seeds types based on the market for a certain season should be done in accordance with environmental or weather conditions in the current. Irrigation Regulations are made to control the discharge of water needed by plants. Enough water should flow to agricultural land. Pest inspection is carried out to maintain plant health from various diseases or pests that attack plants. An examination of plant growth power is carried out to see whether the plant's development meets the current condition. Heating the harvesting seeds, of course, must be in a regular temperature to maintain the quality of the seeds. Therefore, they have enough quality for maximum result. Seed packaging is carried out when the seeds are ready for sale and meet government standards.

The next internal condition analysis is the supporting activities. These activities support the main activities which contain several processes, i.e. human resource management, payroll management, procurement of operational tools and financial reporting. Human Resource (HR) management in this process are carried out to obtain complete HR data and profiles, then improve the quality of HR by including them in training activities to increase HR capacity to support their work. Payroll management is carried out to manage the calculation of HR performance in the form of a salary. The salary contains fixed salaries, health insurance and overtime pay. The procurement of operational equipment is carried out to meet the monthly operational needs of the producers to support the main and supporting business process
activities. Financial Reporting has a financial scope involving the division that manages finances of the daily activities as well as managing financial data related to cash out and cash in.

External condition analysis aims to analyze how external factors can affect the seed production process at XYZ Ltd. seed producer. This analysis conditions consist of political, economic, social and technological perspective. Politics, in this case the government policies, relate to the provision of national seeds, government policies on increasing productivity, as well as rice production, agricultural products produced must meet the requirements for quantity, quality and continuity. Therefore, they are competitive, safe for consumption, and affordable prices. Producing a good quality of rice for farmers is a must, because it can increase quality of life of the farmers as well. Social awareness of farmers regarding the use of certified rice seeds has to be increased. Internet media should be used by farmers via the smartphones.

The SWOT analysis was conducted to see the strengths, weaknesses, opportunities, and threats that could affect the existing business processes of XYZ Ltd. seed producer. First, the strengths of the XYZ Ltd. are having employees who are resilient at work, selling rice seeds between provinces, having extensive agricultural land, having adequate advice and infrastructure, and having a strategic location close to agricultural land. Second, weaknesses in XYZ Ltd. are very limited IT skill, still using manual systems, no written guidelines for running business processes, and do not use internet. Third, opportunities found in this organization are the increasing need for rice, agricultural technology that has begun to develop and is needed by farmers, and internet coverage has entered the farmers or the wider community. Finally, threats for XYZ Ltd. are the existence of larger seed producers, the emergence of new seed producers, and not all farmers have already used certified rice seeds

Analysis Phase

The current system analysis was carried out to better understand the existing business processes of XYZ seed producers. This was done in order to capture the advantages and disadvantages of the running system. Human Resource Management is carried out starting from employee recruitment, administrative management to employee dismissal management. Salary management must be done by XYZ Ltd. seed producer to ensure the proper calculation based on attendance, benefits, health Social Security Administering Bodies (BPJS), basic salary, and overtime.

Operational Equipment procurement is carried out to meet the monthly operational needs of the XYZ seed producers. Financial Reporting involves the finance department where in its daily activities the financial department manages financial data relating to cash out and cash in, then payables and receivables of seed producers XYZ. Seed certification activities are carried out to produce certified rice seeds that can be sold and bought from stores or certain government offices that collaborate with the government in certified rice seeds distribution to the farmers. Sales of certified rice seeds are carried out based on customer requests (individuals, shops, or agencies). Seed stock is reported periodically in every ten days, quarterly, and annually. In this case, the warehouse part is responsible for reporting the seed stock.

Direction Phase

To complete the process of determining the application in relation to business functions, candidate applications were prepared. Table 1 shows the candidate applications for the XYZ Ltd. seed producer.

| Application                  | Description                                                                 |
|------------------------------|-----------------------------------------------------------------------------|
| Rice Seed Certified Information System | This application can manage the process of submitting rice seed certification to the government and facilitate the process of reporting seed stocks. |
| Rice Seed E-Commerce         | Rice seed E-Commerce application is made to cover the promotional process and the sale of certified rice seeds. |
| Application of rice types determination | This application can determine what type of rice seeds should be planted by seed producers, so they can survive in current weather conditions until harvest period. This application can determine the type of rice seed by analyzing previous experiences related to location, land, weather and type of rice seed factors. |
| Irrigation Control Application | The irrigation control application is used to regulate water conditions in the rice fields by making irrigation valves that can be opened automatically by looking at the water conditions in the agricultural land. In addition, it can also be controlled remotely with internet support to make it easier for employees to control irrigation valves. |
| Rice pest settlement application | This application plays a role in overcoming pest attacks on rice by analyzing the increasing need for rice, agricultural technology that has begun to develop and is needed by farmers, and internet coverage has entered the farmers or the wider community. Finally, threats for XYZ Ltd. are the existence of larger seed producers, the emergence of new seed producers, and not all farmers have already used certified rice seeds
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| Application                        | Description                                                                 |
|------------------------------------|-----------------------------------------------------------------------------|
| Rice growth monitoring system      | This application is made to monitor the growth conditions of the rice fields, starting from the planting period, the flowering period to the harvest period. |
| Personnel Information System       | This application is for managing human resources related to the completeness of HR administration data, and to improve the quality of HR. |
| Payroll Information System         | This application is for managing payroll, starting from fixed salary, performance appraisal, benefits and insurance. |
| Procurement Information System     | This application is to manage the process of operational equipment procurement. Operational equipment procurement is carried out to meet the monthly operational needs of the producers. |
| Financial Information System       | This application provides facilities for managing Financial Statements, relating to cash out and cash in. |

Recommendation Phase

This stage is to produce recommendations that need to be carried out by XYZ Ltd. seed producer. It starts from network planning, organizational structure and information system development plan roadmap.

Figure 3 shows the network recommendation for XYZ Ltd. seed producer.

![Figure 3. Network Recommendation](image_url)

Figure 4 shows the organization structure for IT Division. By the proposed IT division, it can strengthen the management of information systems in the future, both from maintenance of systems that have been developed and for developments to newer systems. This recommendation follows the software engineering standard (Pressman, 2001; Sommerville, 2007).

![Figure 4. The recommendation of IT Division Structure](image_url)
In accordance with the application candidates described previously, a roadmap for the development of producer applications was created. In application development, it takes 2 years of work, which is divided into several workflows. First, it takes six months to work on the rice seed certification information system with several working modules, then the E-Commerce work on rice seeds, the rice type determination application, the irrigation control application, the rice pest resolution application, and the rice growth monitoring information system for the planned work. fifteen months, then for applications to support personnel information systems, payroll information systems, procurement information systems, and financial information systems, it is planned for twenty-four months.

This study has implemented one of the recommended system, namely rice seed test result certification system. Figure 5 shows the use case diagram for the proposed system of lab test rice seed certification. This model follows the UML standard diagram (Ambler, 2005; Arlow & Neustadt, 2004; Chonoles & Schardt, 2003; Fowler, 2004; Larman, 2005; Pilone & Pitman, 2005).

![Use Case diagram of the recommendation system](image)

The use case for the recommendation system of rice seed certification are secure login, variety management, commodity management, producer management, test result management, stock management, stock detail information, and supply information management. Actors for the information system are administrator, producer, and consumer.

Figure 6 shows the main function of the proposed system, i.e. test result user interface. Aside the test result, other functional requirements are login, variety management, etc. following the use case diagram and the non-functional requirements: user credential, web-based language, system framework, and libraries to ensure the user friendly and security.

![Test Result User Interface](image)

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4. Conclusion

Information system strategic planning has been carried out for XYZ Ltd. seed producers following the Anita Cassidy method. Application candidates that can support rice seed production in XYZ seed producers are produced, namely the information system for rice seed certification, E-Commerce of Rice Seeds, Application of Determination of Rice Types, Application of Irrigation Control, Application of Rice Pests, Application of Monitoring of Rice Growth, Personnel Information Systems, Payroll Information Systems, Procurement Information Systems, and Financial Information Systems. One of the recommended systems has been implemented successfully, i.e. rice seed test result information system. Other recommended system can be implemented as the future research.

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