

## **Towards Smart Coffee Industry: Designing IS/IT Portfolio for Sustainable Coffee Cooperative in Indonesia**

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### **ABSTRACT**

The existence of the coffee industry in Indonesia has a strategic role and potential in evolving people's welfare as well as Indonesia's economic growth. However, the global industry trend is transformed a lot. One of the interesting trends in the emerging of the smart industry: digital industry concept which relevant to the technology era today. The smart industry offers various advantages. The industries which do not implement the concept will be difficult to compete with others. The technological problem even becomes one of the top barriers to the development of Small Medium Enterprises (SMEs) in Indonesia. Therefore, local coffee smallholders in Indonesia are expected to adapt to the smart industry concept. When an organization comes to implementing a smart industry, they need a systematic IS/IT strategy so that the investment becomes effective and the target of the organization will be realized. The study case of this research is Koperasi Gunung Tilu. This study aims to design a systematic IS/IT implementation strategy towards smart industry realization of coffee smallholder. The analysis and method used is the Ward & Peppard framework which consists of internal and external phases in business and IS/IT area. The output of this research is the design of business and IS/IT strategies.

**Keywords:** IS/IT Portfolio, Enterprise Architecture, Coffee Smallholder, Coffee Industry

## **1. INTRODUCTION**

The coffee industry is the third largest contributor to the foreign exchange for Indonesia. With a total plantation area of 1,227,787 ha (Directorate General of Estate Crops, 2017), the level of coffee production in Indonesia exceeded 11,491,000 tons in the 2016-2017 period while at the same time occupying the position of the world's fourth-largest coffee producer and exporter (ICO, 2018). Based on the status of the company, the Indonesian coffee industry is divided into 3 categories, namely smallholder, government, and private (Directorate General of Estate Crops, 2017). Smallholders are plantations owned by households and are not legal entities. Smallholder farmers are the largest contributor with a percentage of the land area of 96.19% of all types of coffee producers, both private and government (Directorate General of Estate Crops, 2017). With this

strategic role and potential, Indonesia's coffee smallholders are expected to continue to grow amid global competition.

The global industry trend has evolved, those organizations around the world are slowly adopting the concept of smart industry, a concept that is a breakthrough for every industry to be able to compete amid rapid technological developments (Prasetyo and Sutopo, 2018). The smart industry can be interpreted as the concept of optimizing the digital role of industrial activities that are well integrated with the production process (Huizinga et al., 2015; Mariana et al., 2017) as well as information management (Lee et al., 2014). Among the benefits of smart industry for organizations is that product development can be faster, save resources (Lasi et al., 2014), improve productivity, increase the need for skilled labor, increase investment (Rübmann et al., 2015), make optimal decision making, process engineering, and business becomes dynamic and able to create new business models and new ways of making value-added (Kagermann et al., 2013). However, in Indonesia, technological problems are included in the 5 main problems that hinder the development of Small Medium Enterprises (SMEs) (Irfayanti and Aziz, 2012). Therefore, to be able to develop and remain competitive, the Indonesian coffee industry should apply the concept of the smart industry.

As previously explained, the concept of smart industry has a focus on optimizing the role of Information Systems/Information Technology (IS/IT), therefore the implementation of smart industry requires a systematic implementation strategy of IS/IT to be a satisfying solution in building the target of an organization (Irfanto and Andry, 2017). The application of IS/IT that is not planned carefully results in an organization not having a priority scale of a development project which results in decreasing organizational productivity (Nastiti et al., 2015; Ward and Peppard, 2002). In designing an IS/IT strategy, the organization needs to pay attention to business alignment and IS/IT, where it is very prone to cause problems. The issues of IT-business alignment is one of the top IT management issues and concerns from year to year (Proença and Borbinha, 2017; Kappelman et al., 2014). Without aligning IT-businesses, organizations cannot create a sustainable competitive advantage as a manifestation of the benefits of IS/IT investments (Luftman, 2003). Therefore organizations that want to adopt the smart industry concept need to pay attention to the strategy of IS/IT synchronization with organizational needs, so that the application of smart industries to be built can simultaneously reduce the gap between the business and the IS/IT organization.

To realize the smart industry the involvement of academics was needed in the form of research and development (Kagermann et al., 2013). Therefore, in this study, the development of the implementation of smart industry will be built through the perspective of aligning IT-business as well as being a reference for the research on the smart industry development in the coffee industry. Therefore the research used an object which consists of several studies of cooperation cases throughout Indonesia. The method used to design general IS/IT in the Indonesia coffee cooperative is the "Ward & Peppard" framework. The tools were developed by Ward and Peppard in 2002. In the study of literature, this method is often implemented in educational institutions, finance, and government bureaucracy.

Among the strengths of the "Ward & Peppard" framework is the classification between IS and IT to facilitate the IS/IT strategy to be easy understood (Fariani, 2014), the

existence of external analysis that can consider outside organizational factors that affect the organization's business processes, and steps taken do not have to be sequential so that you can prioritize which steps are most likely to be done (Afriyano et al., 2016). This framework is divided into two stages, namely the input and output stages. The input stage includes internal business analysis, external business analysis, internal IS/IT and external IS/IT. The output stage consists of designing an IS/IT management strategy and designing a business information system and IT strategy that will generate a portfolio of an information systems that will be needed to support the organization's business processes (Ward and Peppard, 2002). The output of this study is a portfolio of IS/IT strategy as the recommendation for the actual implementation of the smart industry in line with the objectives of the coffee cooperative business.

## 2. LITERATURE REVIEW

IS/IT strategy is an important part to achieve organizational goals and as a guideline in the preparation of strategies for business units. The combination of organizational IS and IT development can be one of the strategies in improving organizational competitiveness. Information System (IS) strategy planning is a set of long-term goals that describe the purpose of the system and information technology architecture to achieve company goals (Turban et al., 2003). According to Wijaya (2006), Information Technology (IT) System is known as strategic weapons because they can be used to implement strategies that can provide a competitive advantage. In order to achieve what has been planned and desired, effective and efficient SI/IT design is needed. A comprehensive plan is needed and in accordance with the specifications needed by the organization to be built on the IS/IT. Therefore, it is very necessary to design information system strategic planning in the Gunung Tilu Cooperative as the object of this research.

The methodology used in designing information systems' strategic plans is Ward and Peppard. The advantages of the Ward and Peppard method itself are compared to other methods, namely:

1. There is an external business analysis that can consider external factors that affect the company's business processes
2. The separation between the definition of IS and IT makes it easier for the IS/IT strategy to be understood.
3. The steps taken do not have to be sequential, the analyst can choose which steps are first possible to do

After conducting the IS/IT strategic planning, a portfolio document from the IS/IT strategy design will be obtained as a reference for future implementation in the context of Gunung Tilu Cooperative, and as the recommendation for the actual implementation of the smart industry in line with the objectives of the coffee cooperative business. The Ward and Peppard version of the methodological approach starts from an analysis of the business environment and IS/IT those are rated less effective, then an analysis of the external business condition, so that it can increase the competitive advantage of the organization. The analysis of the utilization of IS/IT has been maximized, then compared it with the other implementations of IS/IT used outside. Because, sometimes

the usability of IS/IT for organizations is because more focused on technology, not based on business needs.

Following are the steps of Ward and Peppard methodology (Ward and Peppard, 2002):

- 1) The input stage consists of:
  - a. Analysis of the internal business environment, which covers aspects of current business strategy, goals, resources, processes, and cultural values of the organization's business.
  - b. Analysis of the external business environment, which includes economic, industrial, and competitive climate aspects of the company.
  - c. Environmental analysis of internal SI/IT, which covers the condition of the IS/IT organization from the current business perspective, the maturity, how to contribute to the business, human resource skills, resources, and technological infrastructure, including how ISSP documents from SI/IT available.
  - d. Environmental analysis of external IS/IT, which covers technology trends and their utilization opportunities, as well as the use of IS/IT by competitors, customers, and suppliers.
- 2) While the output stages are part of the process to produce an IS/IT strategic planning document whose contents consist of:
  - a. IS business strategy, which includes how each business unit/function will utilize IS/IT to achieve its business objectives, ISSP document applications, and information architecture descriptions.
  - b. IT strategy, which includes policies and strategies for managing IS/IT technology and human resources.
  - c. IS/IT management strategy, which includes general elements that are applied through the organization, to ensure consistency in the implementation of the required IS/IT policies.

The tools used to support IS/IT strategic planning in this research methodology are PEST, SWOT, CSFs, Value Chains, and McFarlan's Strategic Grid analysis. PEST analysis is an approach that focuses on the external environment of the business based on Political, Economic, Social and Technology factors (Gupta, 2013). SWOT stands for Strength, Weakness, Opportunity, Weakness (Srivastava et al., 2005) emphasize that SWOT analysis can provide a framework for analyzing situations and developing appropriate strategies and tactics as a basis for assessing core capabilities and competencies as well as evidence, key change, success and also provide stimulus to participate in groups experience.

CSF is a series of policies of an organization that influence the success or failure of the organization (Tozer, 1986). In line with the definition of Zawawi et al (2011) states that CSF is a method that measures the performance of a company in achieving its targets. Value chain analysis according to Porter (1980) is used as an analytical method used to understand the competitive advantage, where companies can increase value-added and decrease costs, so they can make businesses more competitive. Mc Farlan's strategic grid is used to map SI application requirements based on the priority scale of contributions to the organization. Mapping uses four quadrants: strategic, high potential, key operation support (Ward and Griffiths, 1996).

### 3. METHOD

This research uses a qualitative study approach. This design consists of the process of collecting primary and secondary data through observation and interview. Observations are conducted from January to March 2019. Primary data was obtained from respondents who were the chairman of the Gunung Tilu Cooperative and Murbeng Cooperative in Bandung Regency, and the Sarasate Cooperative in Takengon, Central Aceh. Secondary sources refer to the previous relevant studies of Manggarai Cooperative in East Nusa Tenggara and Rejo Tani Cooperative in East Java (Permatasari et al, 2018; Sarirahayu and Aprianingsih, 2018; Pratiwi and Ita, 2015; Fernando et al., 2016; Raharja et al., 2020). The method used is Ward and Peppard with some analysis techniques which are PEST, Value Chain, SWOT, CSF and McFarlan, also analysis of internal and external business environments, and analysis of internal and external IS/IT environments. There are issues to produce IS strategy, new information system portfolio design, IT and management strategy for IS/IT for Gunung Tilu Cooperative and the design phases that will be carried out to analyze the strategic issues are as follows:

- 1) Interview and Observation Stage: aim to identify the organization's environment in order to find primary and secondary data that are useful as preliminary data before conducting the analysis.
- 2) Organization Environmental Analysis Stage: started with analyzing internal and external business environments using organization functionality, Value Chain, PEST, internal and external IS/IT environments analysis using McFarlan Strategic Grid to identify available IS/IT, and the needs of IS/IT based on current technology development.
- 3) Analysis Process Stage: using data generated from environmental analysis, SWOT analysis techniques, CSF Analysis, and McFarlan Strategic Grid.
- 4) Stage of strategy formulation: the result of the analysis process will be arranged in a portfolio for the application. In information system strategy, management strategy formulation of IS/IT and arranging roadmap in IS/IT field is done to support the performance of Gunung Tilu Cooperative.

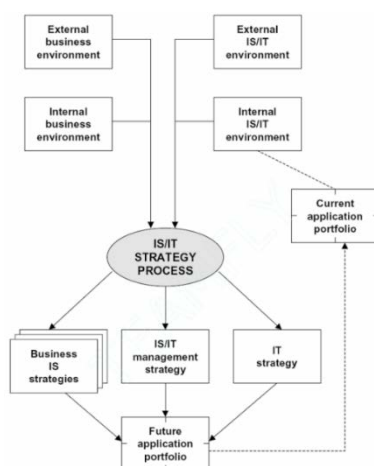


figure 1. Ward and Peppard Framework

## 4. FINDINGS AND ARGUMENT

### 1. External Environment Analisis

#### a. Political Factors:

The Indonesia Government regulates the operation of cooperatives. Cooperative law number 25 of 1992 determines several principles, capital, business processes and organizational structures that must exist in the Cooperative. This encourages Gunung Tilu Cooperative to have accountable and transparent documentation and organizational bureaucracy. The other law is number 19 of 2013 in regulating the agricultural cooperatives in the term of importing, counseling and empowering land. So, Gunung Tilu Cooperative must pay attention to business processes and have accountable documentation.

#### b. Economic Factors:

The trend of world coffee consumption and fluctuations in foreign currencies greatly influence the selling price of coffee. The economic level of coffee farmers is relatively low. Therefore, they need money to meet their daily needs while coffee harvesting only occurs on an average of 2 years. This has resulted in the potential of *ijon* practices or purchasing the commodity from farmers long before the harvesting period and causing the low agricultural price.

#### c. Social Factors

The coffee industry should have a good relationship among themselves because of the need for imports which required certain conditions, as well as from the marketing side where they generally use certain coffee workshops or events to market and sell their products. On the other hand, the participation of the international community through certification is very influential in guaranteeing the welfare of farmers, including guarantees of buyers. Like UTZ and Fair Trade, those cooperatives that want and have contracts for these organizations have to meet the requirements and have special responsibilities that must be fulfilled.

#### d. Technological Factors

As explained in the introduction, the role of ICT in the industrial world has developed rapidly. Therefore, adequate infrastructure is needed by a cooperative. The agricultural industry needs basic information technology such input device, output device, compatible processor and other. For being advanced in agricultural industry they should add the agricultural information technologies such as Decision Support Systems (DSS) and Geographic Information System (GIS) in order to gain more advantages. In the other side to accommodate the retail demand, the cooperative can implement a few

kinds of digital payment, including Go-Pay in order to penetrate the other market segmentation.

## 2. Internal Environment Analysis

Analysis of strength and weaknesses conducted in order to analyze and determine the existing internal condition. The strength of the Cooperatives are:

- a. The bean coffee characteristic of each region is unique and have a strategic value proposition
- b. The organization is agile, the cooperative not owned by any individual, it owned by all of the members. So, basically the decision made by the members itself (including the chief and its managers), but chief and managers have a strategic role to listen and accommodate the members' minds as well to lead the discussion.

For their weakness consist of:

- a. Bad accountability, there is a lack of documentation activity in their business processes which are basically needed such in secretary, finance and production business process.
- b. The finance system does not transparent, the finance accountability is less informative, started from the uncertainty of the data collection until the financial report that announced irregularly.
- c. Lack of managerial documentation, the documentation still paper-based, not organized well and not centralized.
- d. Low of education in business view, the cooperative has less knowledge in lot of business insight especially in marketing, business strategy and finance management.

## 3. SWOT analysis

- Strengthen the branding and marketing especially in preparation for competitions and events. (*Strength-Opportunity*)
- Hold research and development efforts. (*Strength-Treat*)
- Join the international coffee certifications. (*Weakness-Opportunity*)
- Implement IS that is integrated mainly in the business process of production, secretary, and finance. (*Weakness-Opportunity*)
- Two collaborate with organizations or institutions that are experts in the field of agriculture and meteorology (*Weakness-Treat*)
- Increase transparency of data both internally and externally. (*Weakness-Treat*)

#### 4. IS/IT Strategy

The result of IS/IT strategy can be seen at table 1.

Table 1. IS/IT Strategy of Indonesia Coffee Cooperative

Strategic Theme	CSF	IS Need	McFarlan
Build cooperative credibility	Certified by various national and international standards	- IS Audit and Certification	-Strategic
Increase the member income	The members have qualified in their knowledge and skill	- IS Human Resource	-Support
Increase the loyalty and trust of members	Availability of asset and finance information	- IS Finance - IS Asset Management - IS Production	-Key Operational -Key Operational -Key Operational
Increase service quality	Accessible service and information	- Multi payment purchase system - Official website	-Support -High Potential

#### 5. CONCLUSION

The design of the IS/IT strategy for Cooperative in Indonesia is important to increase competitiveness in the sector. One of the relevant frameworks used for designing IS/IT strategy is Ward and Peppard. This study uses five coffee cooperatives as the object of study which is a collection of smallholder coffee in Indonesia that has a problem that makes them less competitive in the market. The results of this study are the IS/IT strategy design that starts from the identification of the external and internal business environment of the organization. After identifying the design requirements, a formulation is conducted to define and determine the strategy. Next is defining CSF, determining IS/IT needs and prioritizing categories for IS/IT implementation, and finally designing an action plan for implementing the cooperative IS/IT strategy.

So far, the Ward and Peppard framework has been used in certain types of industries, like finance, government, education and MSME industries. By using this method in a koperasi kopi as the case, this research provides a new perspective of SI / IT models design in the agricultural cooperatives industry especially in Indonesia. The problem that is almost always present in every cooperative is the problem of low transparency, accountability, documentation that will have an impact on the level of trust of members. This problem can be accommodated through the procurement of Information Systems and Information Technology in the financial, storage, sales, and reporting business



processes. The IS / IT will directly integrate the business processes and simplify certain activities in it. With this, cooperatives can have good data storage, real-time, transparent and can be accounted for.

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