

Shortening the Local Food Supply Chain Management in Indonesia Based on IoT (Internet of Thing)

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ABSTRACT

Local food development in Indonesia often experiences barriers including the limited scale of exploitation and the extent of sporadic distribution chains that make it difficult to develop. Indonesia is known to have enormous resources related to local food resources. Small-scale concessions that are incorporated in the concept of forming farmer groups and farmer group combinations have been developed in Indonesia for a long time. Supporting the concept of development in the form of nucleus-plasma also seeks to bridge to achieve optimal production capacity and added value. However, along with the acceleration of the development of technological mastery and implementation of system-based performance becomes a strategic step orientation to help provide solutions in the field. The purpose of this paper is to review the performance of local food development at the field level and provide alternative solutions to accelerate IoT-based performance. Based on the review results, the association-based development opportunities at the field level will reach far more distribution networks based on the availability of raw materials, opportunities for business continuity, and shortening marketing networks in the field. Technology development and technical solutions will be able to develop even more by sharing knowledge at the association level. Technical contribution in the field using IOT-based supporting systems is expected to shorten the chain and optimize performance steps in the field.

Keywords- shortening, chain, SCM, IoT Introduction

I. INTRODUCTION

Indonesia has the potential for abundant local food resources. Some of these potentials include cassava, sweet potatoes, sago, corn, sorghum, porang and other local foodstuffs. In the process of developing local foodstuffs often experience constraints in large-scale business related to the existence of product continuity constraints during the production period as well as large-scale business as well as agro-industry activities. To anticipate this, it can be done by optimizing the effectiveness of supply chains based on SCM (Supply Chain Management).

Runtuwene [1] states that the supply chain is the activity of procuring materials and services, converting it into semi-finished goods and final products, as well as shipping to consumers with the aim of maximizing value to customers. Continued Marimin and Nurul [2] stated that the supply chain management of agricultural products is different from the management of the supply chain of manufacturing products because: perishable agricultural products, the planting process, the yields have the shape and form varying sizes,

and agricultural products are cage making it difficult to handle.

Local food development in Indonesia often experiences barriers including the limited scale of exploitation and the extent of sporadic distribution chains that make it difficult to develop. Indonesia is known to have enormous resources related to local food resources. Some processed local food products can be in the form of fresh food for example cassava stick [3], simple intermediate processing or further processing results. One of the prospective local food development opportunities is local flour [4]. Further processing of local flour in the form of intermediate products can also be developed into various gluten free products both as staple food [5-9] or snack food [10-14]. These various products can be further processed not only to increase added value, but also to increase competitiveness and increase the potential for wheat imports in Indonesia.

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nucleus-plasma also seeks to bridge to achieve optimal production capacity and added value. However, along with the acceleration of the development of technological mastery and implementation of system-based performance becomes an strategic step orientation to help provide solutions in the field.

The purpose of this paper is to review the performance of local food development at the field level and provide alternative solutions to accelerate IoT-based performance. Based on the review results, the association-based development opportunities at the field level will reach far more distribution networks based on the availability of raw materials, opportunities for business continuity, and shortening marketing networks in the field.

II. INDONESIA LOCAL FOOD

Local food is food that is produced and developed according to the potential and resources of the region and local culture [15]. Husain [16] states, local food is locally produced food (a certain region / region) for economic and / or consumption purposes. Local food has advantages in terms of quality, quantity and also serves to preserve biodiversity and ecosystem sustainability [17].

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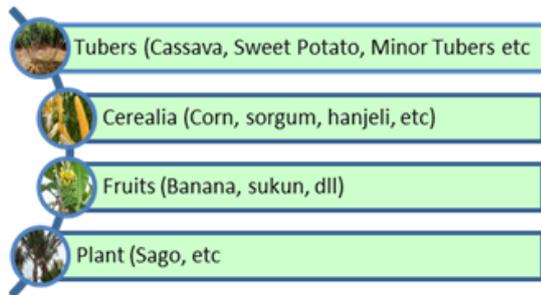


Fig 1. Potential Local Food Sources of Carbohydrates

Indonesia has the potential to develop the potential of these local food sources into various processed products. Some processed local food products can be in the form of fresh food for example cassava stick [3], simple intermediate processing or further processing results. One of the prospective local food development opportunities is local flour [4]. Further processing of local flour in the form of intermediate products can also be developed into various gluten free products [5-14]. These various products can be further processed not only to increase added value, but also to increase competitiveness and increase the potential for wheat imports in Indonesia. Processing of flour into finished products in the form of food and food based on local commodities can also be processed into various snacks or snacks.

Some of the potential for local food development has begun to be initiated by the existence of commodity-based associations both registered and expertise-based. Like MSI (Indonesian Cassava Society), MASSI (Indonesian Sago Community) and ASPEPORIN (Indonesian People Empowerment Care). The institution is quite intensive to capture knowledge and experience as well as information technology, supply and alternative markets. The existence of the association will more intensively support the government's performance in order to develop local food potential in Indonesia.

III. SCM (SUPPLY CHAIN MANAGEMENT)

SCM or supply chain management in local food development must be supported by a decision-making technique that accommodates the customer side and product supply. Supply Chain Management as an approach used to achieve efficient integration of suppliers, manufacturers, distributors, retailers and customers. Goods can be produced in the right amount, at the right time, and at the right place in order to achieve a minimum overall cost of the system and also reach the desired service level [18]. Marimin and Nurul [2] stated that the supply chain is the physical network, namely companies involved in supplying raw materials, producing goods, and sending them to end users. SCM is defined as the integration of a business process from end users to initial suppliers to provide products, services, and information that provide added value to customers and other related parties [19].

Local food is the raw material in agro-industry that supports the optimization of the products being marketed. Perisable or perishable factors are important factors that must be considered in the management of agro-industries that process local food. The added value of processes and products becomes a reference in implementing SCM's role in optimizing agro-industry activities. At the agro-industry level, supply chain management pays attention to supply, supply and distribution transportation as a strategy to reduce the risk of damage or a decrease in total product quality [20].

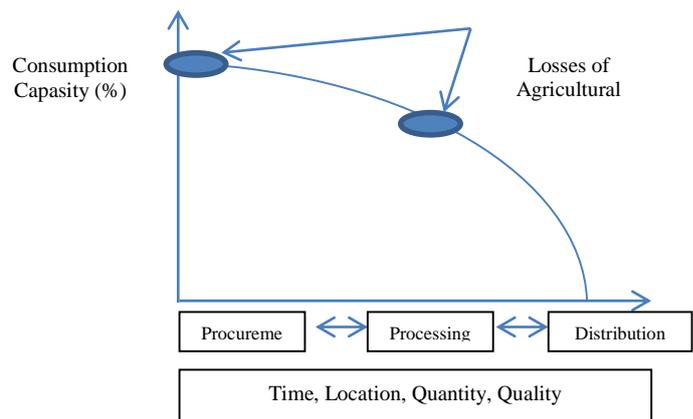


Fig 2. Process Loss of Fresh Agricultural Products Throughout SCM [21]

One of the considerations to reduce the risk of damage to local food products and optimization of value added products, network shortening and communication efficiency are important alternative choices before making chain selection decisions. Likewise in local food products that are easily damaged, where supply chains from supply, primary

to tertiary processing and marketing must be clearly identified at the beginning, so that continuity assurance from upstream to downstream can be guaranteed, in order to increase the added value of processes and products.

In implementing the method must use several methods of approach. According to Kusnandar et al. [22], there are three stages of the value co-creation design process, namely; (1) user-centered design; the first stage is trying to understand the needs and desires of the supply chain actors, (2) co-design; the next stage is to involve researchers and participants to collaborate to design an ideal model, and (3) participatory design; the third stage is the final stage in designing the model. The design process is based on the results of joint discussions between researchers and participants. The successful implementation of the model is closely related to the support provided by all stakeholders involved in the chain.

IV. IoT CONCEPT

One application to handle supply chain performance is through the use of internet and computer-based information technology. This technology has changed the way humans do many jobs ranging from communicating, transacting, producing, innovating and traveling [23]. Some research activities that have begun to integrate the IOT system to support the SCM as shown in the Table below.

TABLE 1. RESULTS OF IOT SUPPORT ACTIVITIES FOR SCM AGRICULTURAL PRODUCTS

Implementation	Sources
IOT Support for Agricultural Supply Chains	[24]
The Role of Logistics 4.0 for the Rice Supply Chain	[23]
Sago Local Food Supply Chain Management in Maluku	[25]
IOT support for SCM for agricultural product development	[26]

Zezulka et al. [27] uses Industry terminology 4.0 in three interrelated factors, namely: (i) digitalization and simple technical integration - economic relations with complex technical - complex economic networks, (ii) digitization of product and service offerings, and (iii) new market model. The most widely used technologies are the Internet of Things (IoT), the Internet of Service (IoS), and the Internet of People (IoP) which rely on Physical-Cyber-Systems [23].

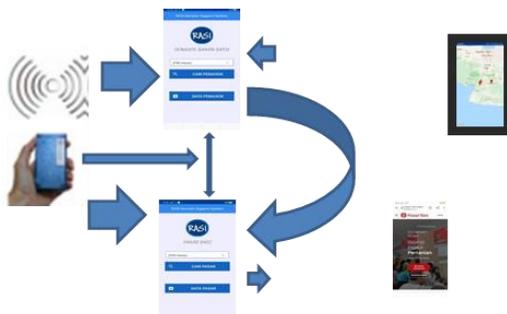


Figure 3. The Role of IoT Support for Supply Chain Performance Optimization

Support for the role of IOT can be illustrated in the chart above, where there is a database interconnect link connected to the G Map for the supply of raw materials, in accordance with market demand based on online marketing systems. This is of course also supported by the synergy of information from the association related to the availability and distribution of the raw material supply chain, so as to guarantee the continuity of production so that the precision optimization of value added processes and products can be maintained.

V. CONCLUSION

The association-based development opportunities at the field level will reach far more distribution networks based on the availability of raw materials, opportunities for business continuity, and shortening marketing networks in the field. Technology development and technical solutions will be able to develop even more by sharing knowledge at the association level. Technical contribution in the field using IOT-based supporting systems is expected to shorten the chain and optimize performance steps in the field.

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