Harvestnesia: Partnership-based start-up to advance agriculture in Indonesia

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Abstract. Indonesia is a country with great agricultural potential, natural potential geographical conditions in Indonesia making Indonesia an agrarian country. Nevertheless, the agricultural sector in Indonesia still faces many problems ranging from farmer regeneration, land-use change, modern agricultural technology, to fluctuating commodity prices. For this reason, an integrated model or system is needed which can overcome the problems of farmers from upstream to downstream. The model offered is Harvestnesia, a Start-up based on partnerships with farmers. Through this partnership, farmers will be given assistance to be able to improve the quality and quantity of production, besides this Start-up also helps in terms of integrated marketing and distribution, through this integrated system partners can find out the needs and demands of the market so that there is no surge in supply or demand so that price fluctuations can be suppressed. Through this model, it is expected to be able to restore the passion of agriculture in Indonesia specially to attract young people to work in agriculture.

1. Introduction

Indonesia is an agricultural country [1]. Indonesian people grow crops to live and also work. The majority of Indonesian people are very sensitive to agricultural lands [2]. In 2019, 25.19% of Indonesia's population would work in narrow agriculture and 2.14% in other agriculture. Based on its sub-sector, 12.64 million people are engaged in the food crop business, and 3.31 million in the horticulture business [3]. The agricultural sector has succeeded in increasing the growth rate of 2019 Gross Domestic Product (GDP) which reached 12.72 percent of Rp15,833.9 trillion of Indonesia's GDP, where agriculture became one of the main sectors that play a role in the Indonesian economy in the fourth quarter of 2019 [4].

Seeing the great potential of agriculture in Indonesia, the government through the Ministry of Agriculture wants to realize food sovereignty and farmers' welfare. Law Number 18 the Year 2012 concerning Food Security and Nutrition regulates food availability, food affordability, and food utilization, through self-sufficiency in rice, corn, soybeans, and increasing sugar and meat production, increasing production stability in the context of price stability. In fact, to develop agricultural Human Resources competencies [5], the Ministry of Agriculture increased budget allocations for vocational education and training to produce millennial farmers [6].
Although the agricultural sector has the potential and has the support of the government [7], in fact agriculture in Indonesia still faces several problems. At least, five agricultural problems in Indonesia pose challenges in the future, namely capital, land use change, modern agricultural technology, fertilizer, and marketing [8]. Besides, farmers in Indonesia currently 60 percent are at the age of 45 years and over, and only 14.8 percent of farmers at the age of 35 years [6,9]. Problems that include agriculture include: a) changes in economic structure; b) population growth; c) the flow of urbanization; d) consistency in the implementation of spatial plans; e) distribution of rice fields that are getting smaller. Field verification of the 20 regions and the data was agreed by the Ministry of Agrarian Affairs and Spatial Planning/National Land Agency together with the Central Statistics Agency (Badan Pusat Statistik, abbreviated BPS), the Geospatial Information Agency (Badan Informasi Geospasial, abbreviated BIG) and the Ministry of Agriculture that some regions are experiencing a decrease in the number of paddy fields compared to 2019 with 2018, such as South Kalimantan, North Sumatra, South Sumatra, North Kalimantan, Aceh, West Kalimantan, Jambi, and Riau. The decline occurred due to a lot of transfer of land functions for industrial areas, land management and infrastructure [10,11].

During this time, the fact is that the knowledge of the farming community in terms of education is still low, causing the agricultural sector to be easily defeated by other sectors, such as trade, services industry for better needs [10,12]. This is certainly a threat to the agricultural sector because the regeneration of farmers is one of the problems [13], despite having abundant natural resources, but if there is a human resource crisis agriculture certainly in Indonesia cannot be maximized.

The decline in the number of young farmers is due to the urbanization factor where young people prefer other sectors as their jobs, another reason young people do not choose the agricultural sector as work is agricultural land that is increasingly narrow and not economical to be used as a business [3]. So that the agricultural sector is seen as unable to meet their living needs [14]. In addition to land issues, price fluctuations in agricultural products also result in farmers and businesses reluctant to develop their businesses. The same thing is based on the autonomy aspect of some small farmers experiencing limited basic resources of farmers in trying to farmers, generally only control a small plot of land, as well as uncertainty in its management, even some scattered plots often experience infertility. Farmers often experience debt problems and are unreachable by credit institutions and production facilities even they face unstable markets and prices so there is not enough information and capital [15].

The price fluctuation itself is caused by an imbalance in the amount of demand and the amount of supply, this imbalance is due to several factors, namely: first, vegetable production is still concentrated in certain regions, such as national onion production 90 percent is still produced in 6 provinces and 82 percent chili production produced by 7 provinces. Such a production system will certainly cause problems in price stability because if there are production anomalies (e.g. crop failure due to pests or production spikes due to climate influences). Second, the production system which is concentrated in certain regions is exacerbated by the production pattern that is not synchronous between the producing regions. Each vegetable producing region generally has a relatively similar monthly production pattern so that total vegetable production tends to be concentrated in certain months. Third, the demand for vegetable commodities is very volatile towards the freshness of the product. Whereas vegetable commodities are generally relatively easier to rot so that farmers and traders are unable to hold back their sales for too long to regulate the volume of supply. Fourth, to be able to adjust the volume of supply by consumer needs, we need storage facilities that can maintain the freshness of the product efficiently. However, the availability of storage facilities is generally relatively limited due to the need for sizable investments while simple storage technologies that can be applied by farmers are very limited [15].

Based on this background, this paper offers a model as an effort to solve problems in the agricultural sector from upstream to downstream. The paper aims to introduce the model to overcome challenges in the agricultural sector starting from the decline in the interest of young people working in the agricultural sector, commodity price fluctuations, implementation of agricultural technology, capital to marketing.
2. Methods
The design of this model uses research and development methods [16], where modeling is done based on the results of an analysis of existing research. This model works based on the distribution and marketing business system through the website by partnering with farmers designed this model can be seen in Figure 1.

Figure 1. Harvestnesia model.

Figure 1 explains that farmers who become partners will be assisted in marketing and distributing their agricultural products where the model made will be integrated between the regional to be able to maximize the distribution to be able to obtain food needs data of each regional. Besides, farmers who become partners will get coaching and mentoring through mentors that come from agriculture graduates so that partners can implement the latest agricultural science and technology. Not only coaching, but partners who have been able to improve the quality and quantity of production can also apply for the capital loan where the return through the installment of each harvest. Partners will also get information about the revenue gained as long as partners and commodity recommendations what markets are needed so that partners no longer choose an intuiting type of commodity but based on market demand.

Coaching partners not only to apply agricultural science and technology, but directs the orientation of farmers to conduct sustainable agriculture and seeks products produced the demands of national and international market, as well as create integrated agriculture to improve agricultural methods and provide new knowledge for vegetable farmers, reduce the cost of fertilizer, better crop protection (for example, through the use of only tested pesticide sprayers and safe organizing of storage for pesticides), and has introduced a new concept of crop protection (for example, using preventive measures and encouraging predatory insects) and improving hygiene standards in harvesting and storage [17]. This model partnership system can be seen in Figure 2.
In Figure 2, it is explained that the process of farmers becoming partners is to register by agreeing with the cooperation agreement. Farmers who have officially become partners will get the Empowerment program, as long as receiving a partner Empowerment program will be monitored whether the quantity and quality of agricultural production are increased. If the partner is already able to improve the quality and quantity of its production, then the partner will be given development capital assistance. All the results of the partner's production will be sold through Harvestnesia, then from the sale of the partner will obtain a report of income and sales as long as they become partners so that the partners can know the development of its agricultural business. Other than that, partners will get recommendations on agricultural commodities that are in need of the market.

The model designed is in the form of an e-commerce website. From a service perspective, e-commerce is a tool that meets the desires of companies, consumers, and management in cutting service costs when improving the quality of goods and speed of service. From an online perspective, e-commerce is related to the selling capacity of products and information on the Internet and other online services [18]. Partners do not need to input in selling their products because all commodity products from partners will be inputted by the admin, this is to maintain market price stability and farmers can focus on commodity production, to determine the price of the product is determined by the quality of the product because the product being marketed will have grade or level from 1 to 5 stars. Determination of product quality based on the type of variety, farming system, and product conditions, besides that every product displayed on the website will be given a complete description, starting from the variety,
planter system, location of planting, and harvest date. This information is a form of transparency towards consumers, so consumers know the products to be purchased clearly.

This model will also collaborate with restaurants, hotels, retail, catering, and also agencies that require agricultural products as raw materials. There are also steps in the implementation and application of this model:

2.1. Implementation
At this stage of implementation, the concept of design, website development, testing, and improvement are carried out. The explanation of the stages is as follows:

2.2. Concept design
At this stage, a work concept design model and workflow are carried out, so that it can be used as a basis in making websites and service systems. It also analyzes the hosting requirements for the website that was designed.

2.3. Website design
At this stage, programming is done to build a system on the website, besides that a database is built as a data storage medium for customers, partners, and products. Then, the interface is made so that the website has an attractive appearance and is easy to use.

2.4. Testing
At this stage, a system test is performed to determine the shortcomings of the system that has been built. Testing is carried out in stages by testing every feature in the model.

2.5. Improvement
After testing, the next step is to improve the system, improvements are made by referring to the results of the trial, by correcting the errors that occur during the trial.

2.6. Execution
In the process of applying the model, it starts with the introduction of services to partners and consumers while also cooperating with the Government, especially the Agriculture Service, because the services of the model are also in line with government objectives related to the provisions of Article 3 of Law Number 41 the Year 2009 concerning Protection of Sustainable Agricultural Land Article 2 Law Number 19 the Year 2013 concerning the protection and empowerment of farmers. Besides, an investor search is also conducted to support and expand service coverage. Furthermore, the design is also carried out in the form of a platform to further facilitate services, and also the addition of new features.

3. Results and discussion
The integrated marketing model is an effort to overcome one of the agricultural problems, namely distribution. One of the problems of food distribution in Indonesia is inter-island connectivity which results in unequal demand and supply [19]. Each region has different types and soil fertility, so that vegetable crops cannot be the same in each region. With an integrated system between islands, the problem of equilibrium needs and food supply is more easily overcome, this model allows integrated data through demand data available on the website so that the data can be processed for forecasting of inter-island food needs.

However, an integrated system alone is not enough because in meeting the food needs must be adjusted to the supply, the problem that often occurs is that the commodities planted by farmers are still concentrated in certain regions and are not synchronous with the food needs on the market [15]. For this reason, this model provides a partnership system through which the commodity engineering partnership system planted by farmers can be carried out.
Partnership with farmers is also an effort to form independent farmers because through partnership farmers get standards that must be met through counseling and coaching [20]. Bleine revealed in 2005 that "The individual extension methods are connected with extension methods, and are most effective for activities undertaken by or within the full control of the individual farmer or household" [21]. With a partnership system, the projection of sustainable agriculture is more easily achieved, because partners will be encouraged to be able to apply agricultural science and technology with mentors who have been prepared to be able to increase production and income, where one of the benchmarks of sustainable agriculture is to increase production per unit area agriculture used, and increased farmers’ income [22].

This model will also absorb more labor in agriculture because it will open up employment opportunities for agricultural graduates as mentors. Besides, integrated sales of food price fluctuations can also be controlled, because pricing is done centrally and transparently so that both farmers and consumers can see prices in real-time.

4. Conclusion
Harvestnesia became the first agricultural sector to advance farmers’ welfare and food security based on online by implementing digitalization of online platforms to be directed offline, throughout both international and national markets. Harvestnesia can be a solution in the effort to advance Indonesian agriculture because the model created allows the supervision of the agricultural process from farmers to agricultural products to consumers. Harvestnesia also enables the realization of sustainable agriculture through a partnership system that provides assistance and counseling to partners, where the realization of sustainable agriculture and better agricultural products will open market opportunities not only nationally, but also internationally. Food security, which is the target of the government, can certainly be realized because Harvestnesia promotes the distribution of distribution systems and also the transparency of the process through digitization. Harvestnesia certainly cannot be a complete solution. The role of the government becomes important as a regulator of policies and regulations. For this reason, the collaboration between the government and Harvestnesia is needed in an effort to realize Indonesian agriculture in order to become better.

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