Developments of Information Technology and Digital Startup Sector of Agriculture in Indonesia

D S Soegoto¹ M Faridh²*
¹Departemen Magister Manajemen, Universitas Komputer Indonesia, Indonesia
²Departemen Sistem Informasi, Universitas Komputer Indonesia, Indonesia

Email: *faridhhh08@email.unikom.ac.id

Abstract. This research is intended to find out how fast the development of information technology in agriculture and plantations, so that it can help the problems being faced by farmers and plantation owners, especially startup companies engaged in these fields. The research method used in this study was descriptive. The results of this research are to find out whether the presence of technology and information and startup companies, farmers and gardeners can solve the problems they face, it is necessary to know that the agriculture and plantation sector is a very abundant source of food in Indonesia. With the existence of information technology and startup companies that handle these problems, food self-sufficiency can be implemented well in Indonesia to meet the food needs of all Indonesian people.

1. Introduction
The development of information technology is so fast in recent years, several technologies can help the development and advance the field of agriculture. One of them is a startup company that specializes in agriculture. They create innovations that can help farmers to sell their crops or market their agricultural sector. The high-tech nature of traditional Precision Agriculture (PA) technology developed in developed countries creates a real challenge for engineers to find Precision Agricultural technology suitable for developing countries. Two Precision Agricultural technologies are expected to be able to balance a country’s specific socioeconomic needs that are suitable for developing countries, namely soft and hard Precision Agriculture. Soft Precision Agriculture depends mainly on visual observations of and management decisions plants and soil based on experience and intuition, not on statistical and scientific analysis. Hard Precision Agriculture uses all modern technology such as GPS, RS, and VRT. Single-Precision Agricultural technology, Precision Agricultural technology package (for users to choose one or a combination) and Integrated Precision Agricultural technology are elements that have been identified as part of the adoption strategy of Precision Agriculture in developing countries [1].

However, advances in information technology are now very easy and can help farmers to meet their needs. There is nothing that farmers need to fear because they have to wait a long time to get information related to agriculture, with existing information technology, farmers are expected to not miss information about agriculture. Problems such as erratic weather, the availability of production facilities, to the marketing of agricultural products which have been problematic farmers have begun to be overcome by the existence of agricultural applications. This change has been done a lot by the private sector and practitioners who care about the empowerment of farmers. This is also much encouraging because the extension activities in Indonesia carried out by the government so far are still conventional
and require field meetings. Farmers are considered as people who are not literate in information technology can make the government less ready to use information technology for extension needs in the agricultural sector [2]. The right decision in agriculture is on land preparation, planting, weeding, irrigation, harvesting, storage, and timely marketing is always the main concern of stakeholders in agriculture. There is a way to speed up farmers in rural areas to get information, exchange information, and manipulate information, namely with the help of information and communication technology in the form of smartphones[3]. This is very useful because at this time many farmers are using smartphones to communicate and find information about agriculture. Many IoT developments have also penetrated agriculture, but not all farmers understand and are aware of it. Almost every physical thing in this world can also be a computer connected to the Internet can be called the brain of the IoT (Internet of Things)[4]. Agricultural information also referred to as e-agriculture is a field that combines advances in agricultural information, development, and entrepreneurship to provide technology-enhanced services, dissemination, and delivery of information through information and communication technology (ICT) and the Internet[5]. IoT technology in terms of modern agricultural products mainly consists of soilless culture and culture solution control technology, artificial photosynthesis technology, development of environmental control technology (carbon dioxide density, humidity, wind pressure, and speed), intelligent irrigation technology [6]. The success of the Green Revolution in Asia shows the results of giving rural communities access to science and technology can provide energy to expand agriculture. Therefore, farmers need information about new technologies, early warning systems for pests and drought, market prices, capital for farming, and competitors[7]. Besides, the internet increases many opportunities for the community. To get information related to production from markets in the nearest city they need the internet[8]. One of the uses of Information and Communication Technology (ICT) is the possibility of decreasing consumer prices, supporting the increase in farmers’ yields, contributing to the development of smarter, more efficient and sustainable agriculture[9]. This can be minimized by developing and asking local governments to provide good information exchange services so that the efficiency of transactions between farmers in rural areas and markets can be seen. The existence of the internet can make it easier to access the information needed quickly, easily, and cheaply and can help increase the effectiveness and productivity of an organization’s performance[10]. The budget for the education of underprivileged farmers is very necessary so that they can advance the agricultural sector that they run.

The purpose of this study is to find out how rapidly the development of information and communication technology exists in agriculture, especially in Indonesia. The method used in this research was the descriptive method and discourse analysis.

2. Method
This research used descriptive methods and discourse analysis. The study explained the development of information and communication technology (ICT) and startups engaged in agriculture in Indonesia. Data collection techniques in this research used a method to obtain secondary data, in the form of written material from previous research, books, journals, and various information obtained from the internet. Analysis conducted by researchers points to references or literature that were relevant to the object of the study.

3. Results and Discussion
The development of information and communication technology (ICT) and startups has been very advanced and progress is so rapid. Many people today are aware of this progress and are starting to use it slowly. This can open opportunities for young people or people who want to enter the business world, which is involved in the world of business in agriculture. It can be seen that the use of the internet in Indonesia has increased so much each year. There are two types of technology used in the field of technology, e-Agriculture, m-Agriculture, and teleAgriculture. E-Agriculture is an agricultural service that is implemented using information and communication technology, needed by computers and the
internet to access this service. Whereas m-Agriculture is part of e-Agriculture that delivers services using smartphones or other cellular-based technologies, services that refer to agriculture provided with agronomic participation through electronic communication are referred to as tele-Agriculture [11]. Following is an example of m-Agriculture to deal with the problems faced by farmers in Indonesia made into several startups engaged in agriculture.

### 3.1 Eragano
Eragano is a startup that provides solutions in the agricultural sector. Starting from the sale of agricultural equipment, fertilizers, crops, how to manage rice fields effectively and efficiently, as well as providing capital loans to farmers (see Figure 1).

![Figure 1. Eragano](image)

### 3.2 iGrow
iGrow is a platform that allows us to invest in agriculture and monitor them online. This platform can connect three important parties in the agriculture industry, namely, investors, farmers, and consumers (see Figure 2).
3.3 Habibi Garden
Habibi Garden is a startup that can provide real-time data about soil conditions on a farm and plantation. With this data, farmers and garden owners can increase their effectiveness in providing nutrition to their land (see Figure 3).
3.4 8Villages

8Villages is one company that makes an application called FARMERS. With this application, farmers can exchange information with experts in agriculture, as well as asking about various issues related to the growth of plants. Farmers can also send photos of the condition of the crops, agricultural experts can respond to any complaints of farmers with accurate and better. This application can also serve as a forum for exchanging information on the agricultural farmers. By doing so, farmers can earn a decent selling price, than if they sell to distributors (see Figure 4).
Figure 4. FARMERS application of 8Villages

3.5 Sayurbox
Sayurbox is an application for people who want to eat organic vegetables and pesticides free of fresh and freshly harvested. Our system must order vegetables first, then the introduction of Sayurbox will send vegetables that have just been harvested and have been ordered according to the specified time (see Figure 5).

Figure 5. Website Sayurbox
4. Conclusion

The advanced agriculture sector is very dependent on human resources and natural resources if human resources are trained and follow the flow of information and communication technology development, the agricultural sector experienced rapid progress also because the sales process through online marketplaces or e-commerce is a very promising big profit. Vice versa, if human resources still use a very old-fashioned and traditional way of thinking, they can be lose imported material from abroad because the people needing cheap food prices as well as they are also looking for quality. Therefore, training and counseling about technological developments need to be provided to farmers.

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