



A Beauty is in the Eye of the Beholder: The Analysis of Indonesian Agricultural Startups Development Strategy

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Abstract. The abundant agricultural resources and the vast market does not make agricultural startups develop more massively than nonagricultural startups. At the same time, the role of agricultural's startups as an enabler of agricultural's technology (agri-tech) is crucial to improve food accessibility and even encourage the welfare of food producers to be better. This research aims to analyze the development strategy of Indonesian agricultural startups. The method used to answer these questions is a qualitative and quantitative approach which is carried out through discussions/interviews with agricultural startup stakeholders and analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT). The analysis results show that the right strategy to develop agricultural startups in Indonesia is an aggressive strategy to build a business. The design is applied to focus on horizontal integration in each part on the upstream, agricultural, downstream, and supporting sides. Various efforts and policies are still needed to achieve this strategy and reduce the risk of agricultural's startup businesses through: (1) creating and developing digital infrastructure and digital talent, (2) cooperating between the government and the private sector to introduce agricultural Internet of Things (IoT), (3) developing the commodity futures markets and warehouse receipt systems to facilitate business transactions, (4) increasing the massive role of incubators and accelerators in agricultural startups, and (5) increasing the availability and accessibility of integrated data as a basis for government and business decision-making.

Keywords: Agriculture · Food · Startup · Strategy · Technology

1 Background

Agricultural startups gained momentum again during the Corona Virus Disease 2019 (Covid-19) pandemic. Its existence has been boosted along with using of information technology through digital platforms. The limited food accessibility experienced by consumers and the accumulation of food availability faced by producers also find the

most rational solution (Muhanda, 2020; McKinsey, 2012). Coupled with the endowment factor of Indonesia, which has significant natural resources, varied geographical conditions, the dominance of the millennial generation and increased opportunities to become digital talent (Supriyadi, 2017), internet penetration is getting higher, and the increase in population is driving growth in daily needs. Today, it is inevitable that many parties have high hopes for the role of the agricultural startup as a business with bright prospects in the future. However, agricultural startups appear to be less developed than non-agricultural startups. That condition can be seen in the share of agricultural startups, which only reached 2.13% of Indonesia's total number of startups.

In the macro constellation, agricultural startups that use digital platforms are part of the digital economy. The Indonesian government has targeted the economic sector's contribution to USD315.5 billion by 2030 (Kristianus, 2022). Therefore, encouraging agricultural startup development is relevant to maintaining and achieving this economic potential. Moreover, agricultural startups have characteristics or specific businesses supported by the potential of local resources so that the outcome will strengthen the domestic supply chain and reduce dependence on imports of food or other agricultural commodities. Not to mention, the linkage of agricultural startups with government sectors/fields and programs is also high, for example, concerning manufacturing sector products which are required to be more market-oriented (Paralta et al., 2020); the involvement of more business actors in the trade, transportation, and logistics sectors; accelerating the level of digital and financial/financial literacy of business actors, encouraging government programs related to cashless transactions, and so on. Even the market coverage of business actors, including Micro, Small, and Medium Enterprises, will be stimulated to expand to exports and imports, which have the potential to contribute to the country's foreign exchange.

The agricultural startup's development is still dominated by the business fields of on-demand services, financial technology (fintech), and e-commerce which mainly target the downstream side of agricultural startups. The three business fields emerged as a response to market needs and the agricultural sector condition, where (a) agricultural businesses were still considered high risk because they were related to climate change and challenging to control (Srinigrum, 2017), (b) the unique characteristics of agricultural products (perishable, bulky, and voluminous) that affect material handling and distribution systems, (c) constraints in agricultural technology and innovation adoption (see examples in Assegaf, 2017; Burhansyah, 2014), and (d) The success of non-agricultural startups (such as Tokopedia, Bukalapak, Traveloka, and Gojek) is used as a role model compared to the success stories of other agricultural startups (Tarigan & Maulida, 2020). These various factors make agricultural startup business fields on the downstream side have more measurable risks than the upstream side, which still leaves big challenges. These challenges are related to managing climate/weather change when conducting a series of agricultural businesses and the unavailability of adequate agricultural information technology infrastructure. However, the upstream side of the agricultural startup business is slowly starting to appear. All parties, including the government, need to support these positive developments. However, unfortunately, the central government's priority of agricultural startup development is not always in line with development priorities at the regional level in the era of regional autonomy.

Apart from the macro level, the development of agricultural startups can be investigated at the micro level. The failure story of agricultural startups will present various factors. In general, these failures were caused by a lack of funds/capital, no clear market due to immature planning, lack of innovation and only being a follower, knowledge/skills, and so on (Mendes, 2022; Winosa, 2019; Wahyudi, 2020). This factor is common in all startups, including agricultural startups. According to the Ministry of Communication and Information (Kominfo), many agricultural and non-agricultural startups have failed compared to successful ones, with an average startup success rate of only 5% of the total startups (Yadika, 2020). Meanwhile, according to failory.com. (2020); although this is not the case in Indonesia when compared between sectors, startups in the agricultural sector have a startup failure rate of 49% or the fourth highest after the information, construction, and manufacturing sectors.

Based on that background, it is interesting to know the factors that influence the agricultural startups development and analyze the strategy for developing agricultural startups in Indonesia. The findings and analysis of this research are essential to assist policymakers in formulating appropriate programs and policies for growing agricultural startups while supporting Indonesia's vision as The Digital Energy of Asia. In addition, it is vital that similar empirical studies, especially in the agricultural sector, have not been widely carried out.

2 Method

A qualitative approach is used to answer the research objectives with an analytical method of Strengths, Weaknesses, Opportunities, and Threats (SWOT). The analysis helps identify the factors that influence the development of agricultural startups while also helping determine the appropriate choice of agricultural startup development strategies in Indonesia. In addition to the SWOT analysis, discussions were also held with selected resource persons to assess and deepen the internal and external factors required in the SWOT analysis.

2.1 Data Types and Sources

The analysis method needs primary and secondary data. Primary data was obtained through (a) discussions and interviews with experts, including the Ministry of Communication and Information (Kominfo) as a policy maker and the Information Technology Creative Industry Society (MIKTI) as representatives of business actors, and (b) distributing questionnaires to several agricultural startups engaged in e-commerce, fintech, and IoT with a limited range of products in food and services of the agricultural sector. Secondary data is needed to determine internal and external factors during pre-research and to support data and information analysis. How to get it by browsing online and offline news, information, documents, research reports, journals, and other articles/libraries related to the research theme. In general, the secondary data used in the research came from Statistics Indonesia (BPS), the Tourism and Creative Economy Agency, Kominfo, the Ministry of Agriculture, and MIKTI.

2.2 Selection of Locations, Key Experts, and Respondents

The research location is determined by the population distribution of agricultural startups in Indonesia. The database is sourced from startup directory information compiled by MIKTI and information from the internet. Furthermore, the research location was carried out by purposive sampling, namely by selecting the Provinces of DKI Jakarta and West Java. The main reasons for choosing the two provinces are (a) they have around 85% of the total agricultural startups in Indonesia, (b) the most significant number of internet users are 16.7% (APJII, 2018), (c) there is a complete ecosystem supporting startup development, and (d) high agricultural production.

The key experts are divided into two parts: the key expert at the centre located in the DKI Jakarta area (pre- research) and the research area. Key experts in the DKI Jakarta area include MIKTI and Kominfo. Both key experts would explain the perspective of the digital economy and the regulator/facilitator. Their views help confirm the internal and external factors of agricultural startup development. Meanwhile, key experts in the research field include academics, local government, agricultural startups, and incubators/accelerators. They are considered capable and representative in helping to obtain data and information and elaborating on research issues.

The selection of respondents using a non-probability sampling technique and determined by purposive sampling. Therefore, the sample size is no more important than the criteria set according to the purpose of this research. Thus, the number of respondents is not based on specific calculations but on the agricultural startup's characteristics that research objectives needed. The criteria for agricultural startups as respondents are (1) startups engaged in agriculture related to e-commerce, both on the upstream and downstream sides, (2) startups engaged in agriculture related to fintech, both financing and capital, (3) startups engaged in agriculture/food, and/or (4) those agricultural startups have existed for at least three years. The number of respondents is 13 people who come from startups (e-commerce and fintech), communities, incubator, accelerator, academics, and local government.

Although the number of respondents is not based on specific calculations, based on data from MIKTI & Teknopreneur Indonesia (2018), the total number of startups in agriculture, both e-commerce, fintech, and other businesses, as many as 14 startups are in the Jakarta area, and nine plus startups are in West Java region. Plus, here refers to agricultural startup data that has not been included in the MIKTI & Teknopreneur Indonesia database. The number is not much and can be obtained by searching independently on the internet or websites.

2.3 Analysis Method

The analytical method used in this research is the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis, which Albert S. Humphrey introduced, and has been used by many researchers (see Aghasafari, 2020; Namugenyi et al., 2017; Habimana et al., 2018; and others). SWOT analysis is a strategic planning/management tool that is useful in evaluating the strengths, weaknesses, opportunities, and threats of a business/project, both ongoing and in planning. The four components are grouped into external and internal factors. Internal factors include strengths and weaknesses, and external ones

consist of opportunities and threats. Therefore, the SWOT analysis is also called an internal-external analysis (Gurel & Tat, 2017).

Using a SWOT analysis begins with determining an agricultural startup's strategic internal and external factors based on data and information collected during pre-field research. After the SWOT indicator is selected, the next step is determining the weight, rating, and score, carried out by experts. The weight is based on the importance indicator on a scale of 0.0 to 1.0 (0.0 = not important to 1.0 = very important), with the total weight of the indicators of strength and weakness equal 1.0. The same applies to the weighting of the opportunity and threat indicators. As for determining the rating of the strength and weakness indicators, numbers are 1 to 4 (1 = strongly disagree to 4 = strongly agree). For a negative factor, if the weakness or threat is enormous, the value is 1, while if the weakness or threat is minimal, the value is 4. The score is obtained by multiplying the weight by the rating. The score of internal factors is getting closer to 1, and the more internal weaknesses are compared to its strengths. If it the closer to 4, then the more strengths than weaknesses. Likewise, with the total score of external factors, the closer to 1, the more threats than opportunities. If the total score is close to 4, there are more opportunities than threats. The combination of the two is entered into the Internal-External Matrix to determine the competitive strategy.

The next step is visualizing scores in a SWOT analysis diagram. This step is a way to formulate a strategy by determining the coordinates on the SWOT diagram. These coordinate points will fall in a particular quadrant to identify the appropriate strategy (Rangkuti, 2006). The next step is to construct a SWOT matrix. This matrix contains a description of the strategy based on the results of previous calculations, where the position of the agricultural startup development strategy and the combination of strategies will be known, either through Strength– Opportunity, Weakness-Opportunity, Strength-Threats, or Weaknesses–Threats.

3 Results and Discussion

3.1 Agricultural Startups in Indonesia

Indonesia's digital economy has accelerated amid the economic slowdown in the last five years. Digital transformation in the agricultural sector has stimulated the growth of agricultural startups. Based on the Indonesia Agritech Report 2020, there are four points the digital agricultural startups developing in Indonesia: (1) financing to help small farmers who have limited access to capital and financing, through online crowdfunding or peer-to- peer (P2P) lending platforms, (2) e-commerce, (3) counselling that provides education to farmers and fishermen about skills and knowledge to increase agricultural productivity, and (4) development of new digital technology to support production, for example, sensors, drones, Virtual Reality (VR), and Augmented Reality (AR).

The number of agricultural startups in Indonesia is less than non-agricultural startups. According to MIKTI, Indonesia has ± 25 agricultural startups from 1,220 startups in 2020 (2.13%). The development of agricultural startups still has great opportunities with the support of extensive natural resources on the supply side and increased consumption on the demand side. Potential startups face the challenges of limited business scale and

capital for small-scale agricultural startups and mismatches and limited human resources for medium and large-scale startups.

3.2 Internal and External Strategic Factors Analysis for Agricultural Startup Development

Internal and external strategic factor analysis is an analysis for identifying the right strategy for agricultural startup development. All factors have been mapped based on data and information during the pre-research and validated by agricultural startup stakeholders. Analysis of internal strategic factors is carried out to determine how agricultural startups' internal conditions affect their development, both in terms of the strengths and weaknesses of startups (Table 1). Digitalization creates efficiency in business operating costs, and consumer demand is served quickly are the two strengths of the most prominent internal startup factors. Advances in technology have had a positive impact on Indonesian agriculture. Several startups have emerged to help farmers get market certainty and good profits. Agricultural startups that present technology, including IoT, have great potential to solve various problems in the Indonesian agriculture sector, starting from the supply, management, and use of production factors on the farm, post harvesting, and distribution to retail.

The lowest score in internal strategic factors is human resources, usually filled by millennials with high passion. High passion still needs to be complemented with skills, experience, and infrastructure support. So many extraordinary ideas to develop agricultural startups are initiated by millennials but hampered by infrastructure. For example, Habibi Garden uses IoT to ensure efficient production through gadgets and apps. According to Talaviya et al. (2020), artificial intelligence in agriculture would save excess water and pesticides, maintain soil fertility, help efficiently use the workforce, elevate productivity, and improve quality. The limitations of the startup development ecosystem on-farm technology in certain areas are that startups need government support in developing a more massive network infrastructure. In addition, Science Techno Park IPB said that millennials could become a force with a top priority in developing agricultural startups. The note targets factors that often cause startup failures, which include: (1) less solid teamwork, (2) complacent with the income that has been obtained in the early stages of the business, (3) unable to compete with similar products on a large scale, (4) not focused on its primary business, and (5) unwilling to take business risks.

The main weakness factor in the development of agricultural startups is the incompatibility of the digital talent capabilities of HR with the startup needs. The unattractiveness of the farming profession also impacts agricultural startup development. Agriculture still relies on hereditary farmer systems. The farming profession has not become an attractive profession for millennials. The qualified human resources needed to advance agriculture is reluctant to participate. Currently, agricultural startups are dominated by the millennial generation interested and intrigued by agriculture, not because of a scientific basis. Meanwhile, the need for human resources for agriculture is essential. For example, human resources experts in soil and plant management (agronomists) would significantly improve crop yield quality to meet growing market demands.

Then, the external environment analysis can be seen from the opportunities and threats (Table 2). The main factor that becomes an opportunity in developing agricultural

Table 1. Internal Strategic Factors for Agricultural Startup Development

		Strategic Factors	Rating	Score
Strengthen	1.	Digitization creates efficiency in business operational costs	3.77	0.35
	2.	There are abundant quantities and types of agricultural products	3.31	0.25
	3.	Demands from consumers can be met quickly due to shorter distribution channels	3.31	0.35
	4.	Human resources are millennials with a high passion for digitalization	3.46	0.09
	5.	Startups have a relatively broader market coverage	3.77	0.25
	6.	Startups have a good reputation because they aim to improve the welfare of farmers/producers/local	3.15	0.25
	7.	Startups do not require a store location or a strategic offline place to do business	3.08	0.15
Weakness	8.	Less innovative so that their business tends to become a follower.	2.54	0.23
	9.	Lack of funds/business capital	1.85	0.18
	10.	The selling price is relatively higher than in other markets (modern/traditional)	2.62	0.13
	11.	Digital talent (H.R.) is less supportive or unsuitable for startup needs	2.85	0.27
	12.	Startups have limited storage/warehouse/cold storage	1.77	0.09
	13.	Startups have difficulty meeting the demand level because producers/ farmers are skeptical/reluctant to use new technologies/innovations	2.23	0.15
	14.	Startup businesses are limited to urban areas/big cities	2.92	0.14
		Total		2.90

Source: Primary data, 2020 (Processed)

startups is a very large domestic (buyer) market potential. The emergence of a new economy, called the Stay at Home Economy, is one of the influential factors. This new form of economy emerged due to changes in consumer behaviour. Since the pandemic, the government has issued a policy limiting mobilization to crowded places, including traditional markets, and even the most significant marketing places for agribusiness products have been closed. Closing the market causes producers to lose their place to market their products. On the other hand, people are also starting to experience changes in shopping patterns that are beginning to shop online. It can disrupt business orders.

Another factor that becomes an opportunity with the lowest ranking in opportunity factor is that startup businesses can develop at the local, national, and international levels.

Table 2. External Strategic Factors for Agricultural Startup Development

		Strategic Factors	Rating	Score
Opportunity	1.	Consumption of staple foods tends to increase, especially during a pandemic	3.23	0.33
	2.	There is a great desire from investors to invest in startups	2.62	0.15
	3.	The potential of the domestic (buyer) market is enormous	3.46	0.36
	4.	Changes in consumer preferences, especially healthy lifestyles, including picking local food	3.46	0.23
	5.	Business opportunities can develop not only at the local and national level but also internationally	3.23	0.12
	6.	Government support for startup development, both ease of licensing and capital/financing	2.92	0.25
	7.	There is a growing existence of startup incubators and accelerators from the government and private	3.08	0.15
Threat	8.	The available internet network is uneven/less supportive	1.62	0.14
	9.	Startups compete with agricultural companies that already have partnerships and loyal customers	1.92	0.15
	10.	The decline in people's income due to the pandemic as indicated by the decline in national growth	1.69	0.15
	11.	The development of technology and information is changing too fast	2.08	0.08
	12.	Lack of interest in banks to finance or provide capital for agricultural startups	1.69	0.10
	13.	Public concerns about the security of consumer data and secure payment systems	2.00	0.15
	14.	There is the imposition of tax (VAT) for digital service products	2.31	0.16
		Total		2.53

Source: Primary data, 2020 (Processed)

Technology and digital media make it possible for startups to reach the international level, although currently, it is still at the national level.

The main factor on the threat side comes from the imposition of taxes (VAT) for digital service products. The amount of startup tax paid by startup actors refers to the self-assessment system. Startups are taxed on operating results. However, the government will not impose taxes if the startup's business results do not meet the target.

The factor with the lowest threat score is related to the dynamic development of technology and information, with a score of 0.08. Most farmers are not digitally literate

in marketing their agricultural products and do not understand the benefits of using technology as a supporting tool. If it is currently hampered by existing technology, more efforts will undoubtedly be needed when technology changes.

3.3 Agricultural Startup Development Strategy

3.3.1 Position of Agricultural Startup Development Strategy

Based on the analysis, a strategy can be chosen to develop Indonesian agricultural startups. The alternative strategy is based on the score between the strength factor of 1.69, the weakness factor of 1.19, the opportunity factor of 1.59, and the threat factor of 0.93, shown in the diagram. Then we find the coordinates of the values on the x and y axes. Coordinates values on the x-axis (0.52) come from the difference between the scores of strengths and weaknesses. Coordinates values on the y-axis (0.64) come from the differences between the scores of opportunities and threats. In Fig. 1, the recommendation for the right strategy to support the agricultural startups development is an aggressive strategy (quadrant 1). It means that agricultural startups are in their momentum, so expanding, growing, and achieving maximum progress is possible.

The internal and external factors scores are further mapped into the internal-external matrix (IE) to ensure a more specific strategy (Fig. 2). The IE matrix functions to position startups into a matrix consisting of 9 cells provided that the dimensions on the X-axis are internal factors and the Y-axis are external factors. Based on the IE matrix, agricultural startups are in a growth position (cell V). Therefore, the recommended strategy is a concentration strategy in the form of horizontal integration.

According to Kudelko (2015), there are two main perspectives in the application of this strategy, namely: (1) external applications, which use mergers or acquisitions or takeovers of other companies in the same industry and at production stages which are also almost similar and (2) internal refers to its resources by increasing the company’s market share, growing economies of scale, and offering product diversification. The strategy is to expand the activities of startup companies by increasing the range of products offered to consumers or end users. The goal is to drive the company’s growth (Perez-Lara et al., 2020).

The number of agricultural startups in Indonesia has only reached small and not yet focused on solving classic agricultural problems, such as innovating in irrigation, seed

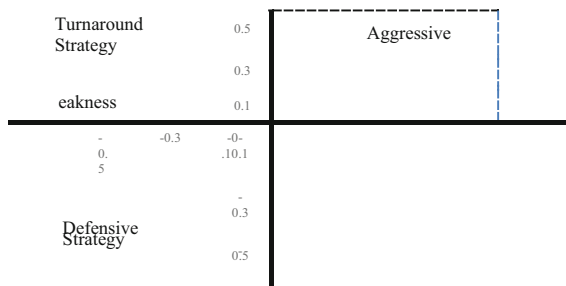


Fig. 1. Position of Agricultural Startup Development Strategy. Source: Primary data, 2020 (Processed).

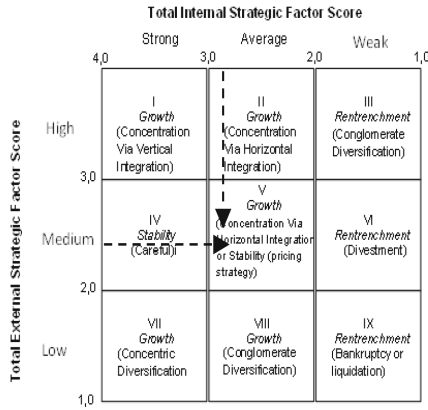


Fig. 2. Internal-External Matrix. Source: Primary data, 2020 (Processed).

technology, and other cultivation technologies. For example, Tech in Asia summarized that most agricultural startups only offer (a) marketing services with the idea of reducing or eliminating the role of middlemen and (b) funding, both peer-to-peer and crowdfunding. Unlike in Israel, agricultural startups come with essential solutions to the agricultural sector, such as irrigation systems, technology to grow meat in laboratories, pollination technology, and others. Likewise, in India, several startups focus on the upstream sector. For example, Impeccable Innovations produce nano nutrients to increase the efficiency of the photosynthesis process to boost rice and wheat production (Tarigan & Maulida, 2019).

Therefore, policymakers and each startup actor must see this horizontal integration as a grand strategy. For policymakers to see the agricultural startup development as promising revenue and market share and simultaneously providing solutions for the agriculture and food sectors, various incentives can be applied to support horizontal integration. For example, facilitating cooperation between the state-owned enterprises (SOEs) or the regional-owned enterprises (ROEs) with several agricultural startups through social and commercial projects to distribute food aid, support the food distribution system, develop the local food industry, and so on. According to Pauschinger & Klauser (2021), public-private relationships between the expertise and authority arising thereof are essential for understanding how digital technologies are introduced into agriculture.

So far, the number of agricultural startups exposed is relatively small and still concentrated in the Java region (MIKTI & Teknopreneur Indonesia, 2018). The number of agricultural startups that are not recorded may still be many on a small scale, using simple technology, and scattered sporadically in various parts of Indonesia. In general, the field of business that agricultural startups are engaged in is e-commerce. Therefore, policymakers can present regulations that encourage these startups to work together to improve operational efficiency and increase market share, for example, through rules on capital assistance or financing that require a combination of several agricultural startups with the same business field to access them.

The strategy through horizontal integration on the business side of agricultural startups will depend on the needs of each startup. The strategy is planned and focused on

competitors increasing “control” over consumers by competing or collaborating. Meanwhile, collaboration occurs between startups in the same production or line of business and between startups and companies (large-scale). The possibility is substantial because companies are increasingly concerned with the existence of startups that have more flexibility in innovating. According to research by Thomson Reuters in 2018, a collaboration between startups and companies can be in the form of (1) procurement of hackathons, (2) creation of incubators or accelerators, and (3) service support. In addition to these forms, collaboration can take the form of direct investment in startups, including conducting mergers or acquisitions (M&A). On the other hand, many partnerships have been carried out, including in Indonesia, for example, PT. Pos Indonesia-Tokopedia, Blue Bird-Traveloka, Djarum-Cermati, and so on.

3.3.2 Combination of Agricultural Startup Development Strategies

The combination of agricultural startup development strategies is analyzed using the SWOT Matrix. Table 3 describes the recommended strategy to support agricultural startup development in Indonesia.

(1) S-O Strategy

- (a) Encouraging startup business expansion through horizontal integration is primarily supported by internal strengths and opportunity factors from external startups. The expansion of the agricultural business is manifested in the form of horizontal integration, both externally through collaboration with the government, private companies, or other startups, as well as internally with the startup’s efforts to optimize production or marketing stages to increase market share. The technical strategies that can be chosen are very diverse and situational, requiring their own managerial “art.”

For example, related to investors, investment funds are needed for initial operations to build prototypes and improve products. The incubator and accelerator roles are vital at this stage. The integration and coordination strategies of the incubator management would increase mutual dependencies and improve relationships to secure resources, such as universities, business centres, and public research organizations (Hernandez & Carra, 2016). After that, usually, the startup will gather a mass user base before the service is ready to be monetized and then develop a business plan that matches the characteristics of the service. At this stage, startups usually start to attract more investors for round A (first round) investments until the next round.

- (b) Develop innovations, both market and product, to capture changing consumer preferences and habits. In general, many agricultural startups move downstream with an online marketplace. The innovations are very diverse in terms of product and market coverage.

When millennials blend with the existence of digital technology, that is an excellent opportunity to introduce agri-tech and product innovation, for example, by using IoT in agricultural cultivation through drones, automation of irrigation,

Table 3. SWOT Matrix: Recommended Strategy Options for Agricultural Startup Development in Indonesia

EFASWIFAS	Strength:				Weakness:			
	Cost efficiency	Abundant products	Distribution	Digital HR	Market coverage	Business reputation	Marketplace	
Opportunity:	S-O Strategy				W-O Strategy			
Consumption trend Big investors desire Market potential Preference change High business opportunity Government support Incubators and accelerators	<ol style="list-style-type: none"> 1. Encouraging startup business expansion through horizontal integration 2. Develop innovations, both market and product, to capture changing consumer preferences and habits 3. Cooperate intensively with the government (and the private sector) for business scaling up and promotion 				<ol style="list-style-type: none"> 1. Improving education and training to produce digital human resources with the number and quality according to startup needs 2. Contemplation and internal consolidation of startup founders and teamwork towards startup passions and missions 3. Evaluate startup business processes by paying attention to high-risk business nodes 			
Threat:	S-T Strategy				W-T Strategy			
Lack of digital infrastructure Business competition Revenue drop Technology changes too fast Banking reluctance Consumer data security concerns Tax (VAT) on digital products	<ol style="list-style-type: none"> 1. Overcoming the limitations of digital infrastructure with technological innovation (local network) 2. Cooperation in expanding and developing product distribution systems 3. Intense promotion of competitive products, both above the line and below the line 4. Improvement of the digital system used and complying with regulations related to consumer data security 				<ol style="list-style-type: none"> 1. Develop ideas out of the box with a mature, comprehensive, and solid business plan to produce competitive products 2. Improving the competence of digital human resources so that they are with a good business portfolio responsive to support business competition, including managing 3. Big Data for market intelligence Accessing capital from banks and/or non-banks, including foreign investors with a good business portfolio 			

Source: Primary data, 2020 (Processed).

and so on. According to Nuryakin¹, in addition to attracting millennials, agricultural startups also have a favourable rate of return.

Market innovation also refers to mapping consumer needs and the condition of their production supply locations. According to Peralta et al. (2020), the startup

¹ The results of the FGD with Mr. Chaikal Nuryakin, University of Indonesia, August 13, 2020, in the context of research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

reduces uncertainties in its business model by pivoting initial customer needs into product requirements. It can be done by analyzing consumer preference and product potential data. Data sets for user requirements analysis need to enter the Big Data era. It will enable much higher analytical capacities and the integrated use of new data sources (Janssen et al., 2017). Nevertheless, the essential stakeholder's primary concern is cost, user-friendliness and embedding the solution within their current work practice. Adopting better-matching Big Data solutions is modest (Osinga et al., 2022).

- (c) Cooperate intensively with the government (as well as the private sector) for business scaling up and promotion. Increasing collaboration between startups and the government will encourage the development of agricultural startup businesses in Indonesia. One of these collaborations can be realized as a Memorandum of Understanding (MoU) with Himbara to provide loans with relatively low-interest rates and/or CSR. This collaboration will help farmers with financing and capital to increase production and help raise awareness about the use of the warehouse receipt system among farmers.²

In addition to the central government, local governments are concerned about the agricultural sector to meet food needs and control inflation in the regions. These two reasons encourage local governments to innovate and cooperate with food agencies. For example, the Bekasi City Government and Bogor City Government, as areas with high food dependence from neighbouring regions, try to meet the food needs of the community by:

(a) encouraging household independence³ through urban farming programs, (b) cooperating with others, for example, with a cooperation agreement between the Bogor City Government and the Ciamis Regional Government to meet the needs, and (c) shorten the food distribution chain by establishing a ROEs for food.⁴

(2) **W-O Strategy**

- (a) Increase education and training to produce digital human resources with the number and quality according to the needs of agricultural startups. Digital talent will be an essential factor in digital transformation. The government is trying to help with many programs, for example, Kominfo with the Digital Talent Scholarship (DTS) program, which is an intensive training scholarship program with various themes which aims to improve the skills and competitiveness of human resources in the field of ICT. The Ministry of Education and Culture has an online learning program. The Coordinating Ministry for the Economy has a pre-employment card as a training fee

² Discussion result with Mr. Syariff Mahri from Sikumis, August 13, 2020, in the context of research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

³ Discussion result with Mr. Marjono M. Noer, Head of Sub-Division of Environment, Agriculture, and Food of Bekasi City Government, August 22, 2020, in the context of research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

⁴ Discussion result with Mr. Dody Ahdiat, Assistant for Economics and Development of the Bogor City Secretariat, August 25, 2020, in the context of research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

for the community to have or improve skills. In addition to holding training, digital talents will be equipped with digital skills certification to access the labour market (Rizkinaswara, 2020). On the other hand, universities are also starting to incorporate digital economics and business content into their curricula as an alternative to getting an education about the digital economy and related fields.

- (b) Contemplation and internal consolidation of the founder and teamwork towards the passion and visions of agricultural startups so that they can produce high-innovation products. Innovative ideas are not everything to the success of a startup. Three general points cause startup failure: the need for a market, running out of cash, and not having the right team (Priambada, 2020). Even some reviews and other research results place founders and teamwork as the main factors contributing to the failure of a startup (Jaya et al., 2017).
 - (c) Evaluating agricultural startup business processes by paying attention to high-risk business nodes. One of the W-O strategies is to evaluate startup business processes by paying attention to high-risk business nodes. This condition is based on the consideration that business in agriculture is considered or assessed as high risk because (a) it involves climate/weather change, which is difficult to control agricultural production, and (b) the business tends to be small-scale and spread out so that it is not bankable and has high costs. Therefore, startups carry out business planning by mapping the nodes of high-risk business processes. For example, Sikumis tries to work together with farmer kiosks and/or BUMDes to channel sales of production facilities and, at the same time, collect farmers' crops to be marketed in the marketplace. Likewise, Tanijoy collaborates with farmer shops and farmer group associations (gapoktan) as partners in terms of capital and trading of agricultural products, exceptionally high-quality potatoes.⁵
- (3) **S-T Strategy**
- (a) A lack of digital infrastructure, both hardware and software, would disrupt technological innovation and agricultural startup development. The government had to build and develop the initial digital agricultural infrastructure because of the costly investment and high risk. It is necessary to have a blueprint for digital agricultural infrastructure, including (a) shifting the digital management system from capital expenditures to operational expenditures⁶ and (b) integrating agricultural's data into Big Data. According to Wolfert et al. (2017), Big Data will cause significant shifts in roles and power relations among players in current food supply chain networks. Moreover, the Center for Sustainable Infrastructure Development (CSID) Director at the University of Indonesia said that digital infrastructure would increase worker productivity and provide more responsive and efficient services.

⁵ Discussion result with Muhammad Nanda Putra from Tanijoy (Agricultural startups), August 14, 2020, in the context of research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

⁶ Discussion result with Irsan Rajamin, CEO Habibi Garden (Agricultural startups), August 27, 2020, in the context of research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

In this case, one of the critical issues is how to accelerate the deployment of telecommunications networks throughout Indonesia (Mediaindonesia.com., 2020). The condition of Indonesia's communication technology network, which is not yet ideal, is managed by agricultural startups in various ways. An example is experienced by Tanijoy, where the data helps capture and ascertain information about farmers planting what and when to harvest. To deal with this, Tani Joy collects this information through the farmer's shop and the field operator.

- (b) Improving the digital system used and complying with regulations related to consumer data security. Risks to data security and privacy are essential issues in digital transactions. According to the APJII report (2018), 37.2% of the public feels insecure when transacting via an internet connection. Therefore, data security and privacy aspects must exist in a digital product development process. The scope of data leakage on a large scale usually occurs because of the system's vulnerability created by an entity. Based on incident report development data, the current trend of attacks and data leaks is due mainly to the people factor through social engineering. For this reason, education about social engineering to all parties involved in business processes is a priority to maintain data security, especially customer data.
- (4) **W-T Strategy**
- a) Developing ideas out of the box with a mature, comprehensive, and solid business plan to produce competitive products. Sikumis has changed the core business several times and reformed the behaviour of the food market. However, it is still relatively complex for farmers or food producers to go online.⁷ Business incubation is crucial in accelerating startup business development. IPB's Science Techno Park incubator helps startups from the beginning. The startups took approximately three years, starting from the tenant recruitment stage, then the mentoring, training, monitoring, evaluation, exit strategy, and facilitating financing.

Furthermore, startups need post-incubation through an offer to become a companion and tenant at the Science Techno Park IPB with an industrial business scale.⁸ Digital Innovation Lounge (DILo), an incubator initiated and sponsored by PT Telkom, helps the birth of startups from the initial idea.⁹

- b) Improving the competence of digital human resources so that they are responsive to support business competition. Several ways that can be done to improve HR competencies are (a) digital HR training by startups, startup communities, and/or the government, (b) regulatory support, for example, Government Regulation no. 45 of 2019 concerning Amendments to Government Regulation No. 94 of 2010 concerning the Calculation of Taxable Income and Settlement of Income Tax in the Current Year, which regulates the provision of super tax deduction incentives of

⁷ Result of discussion with Mr Edward SS, CEO of Sikumis, August 13, 2020, in the context of field research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

⁸ Results of discussions with Mr Deva Primadia, Incubator- Science Techno Park IPB, August 24, 2020, Op.Cit.

⁹ The discussion results with Mrs Rissa Angrainy Rentua from DILo-Depok, August 22, 2020, in the context of field research on "Agricultural Startup Development Strategies in Supporting National Food Logistics", Secretary General of The House of Representatives of Republic Indonesia.

200% for companies that carry out competency-based HR development and 300% for companies conducting research and development activities in Indonesia, and (c) cooperation with vocational schools and universities through the curriculum and making them strategic partners.

- c) Access to capital from banks and non-banks and even foreign investors with a good business portfolio. The reluctance of banks to finance agricultural startups has a high business risk due to the nature of the agricultural business, which is highly dependent on the weather or climate. Based on data from the Financial Services Authority (OJK) in March 2019, the composition of credit disbursement to the agriculture, hunting and forestry sectors only reached 6.69% and the fisheries sector 0.23%. On the other hand, fintech in the form of P2P lending in the agricultural sector has not developed much. OJK noted that as of March 2020, there were only five fintech, namely iGrow, iTernak, Crowde, TaniFund, and DanaLaut. One is because fintech has difficulty getting data due to limited internet access in certain areas (Fitriani, 2018).

Several options that can be done from the banking side to increase access to financing and capital from banks are (a) making loans with cluster system. This system will enable banks to measure risk correctly so they can channel credit prudently and (b) the channelling method to agricultural startups, making it easier for both parties to monitor loans. Risk mitigation can also be carried out as long as agricultural startup transactions and farmers/producers are carried out in a closed system using a bank system. Applying the system or method poses a significant challenge because not all farmers and business actors understand banking transactions and financial literacy well. In this case, banks are also required to become business advisors. Meanwhile, increasing access to financing and capital from the agricultural startup side can be done by (a) compiling and running an agricultural startup model business with measurable risks, (b) a smooth financial loan record and following banking advice, (c) the need for a loan or capital with strategic plan startups (d) cooperate with the government and incubators to increase access to capital by considering business matching.

4 Conclusion

The strength and opportunity factors in developing agricultural startups in Indonesia are relatively more significant than the weaknesses and threats. The strategy concentrates explicitly on horizontal integration in each part, starting from the upstream, on-farm, downstream, and supporting elements. Horizontal integration in (a) external perspective through merger or acquisition or taking over other agricultural startups or (2) internally by optimizing the resource management of each agricultural startup in various business lines to increase market share. The strategies for developing agricultural startups are mixed based on internal and external strategic factors.

The S-O strategy includes: (1) agricultural startup business expansion, (2) market and product innovation development, and (3) intensive cooperation with the government and the private sector. The W-O strategy includes:

(1) increasing digital HR education and training according to startup needs, (2) contemplation and consolidation of the founder and teamwork startup, and (3) evaluation of startup business processes based on risk. S-T strategy consists of (a) dealing with the limitations of digital infrastructure, (b) working together to expand and develop the distribution system, (c) intense promotion of competitive products, and (d) digital system improvement and compliance with regulations. While the W-T strategy covers (a) developing ideas out of the box, (b) increasing the competence of digital human resources, and (c) access to capital from banks or non-banks.

The government and other parties need to make genuine efforts to accelerate agricultural startups to grow faster and bigger with more manageable risks, such as: (1) building and developing hard-digital and soft-digital infrastructure, particularly the Big Data and digital talent, (2) collaborating between the government and the private sector, (3) developing commodity futures markets and warehouse receipt systems for hedging, especially for large-scale agricultural startups, (4) increasing the role of incubators and accelerators to encourage the success of agricultural startups, starting from the solidity of teamwork and planning, and (5) policymakers require the availability and accessibility of integrated and up-to-date data for agricultural startups in Indonesia.

Further research pays attention to the following points: it is necessary to consider other approaches, such as the Analytic Hierarchy Process (AHP) or the Analytic Network Process (ANP), to determine the priority factors that influence agricultural startup development. Disaggregation of agricultural startups based on business scale and locations in Java and Outside Java to produce specific strategies for developing agricultural startups.

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