

EXECUTIVE SUMMARY

Creating a Better World with Sustainable Agrifood Management is the theme of second edition of SAMI Book of Essay: Sustainable Agrifood Management and Innovation Contemporary Agrifood Management Studies. It is one out of several output of a 10 days Virtual sustainable agrifood management in Indonesia (SAMI) international summer course. This virtual international summer course was incorporated reputable speakers from IPB University experts in collaboration with international universities and multinational companies expert that discuss agricultural, food technology and management science in a systematic manner.

This SAMI Book of Essay consists of several essays selected from dozens essays sent by the youths from 17 countries such as Spain, Oman, Myanmar, Thailand, Sudan, Sierra Leone, Bostwana, India, Bangladesh, Malaysia, Singapore, Cambodia, Vietnam, Kenya, Poland, Nepal, Nigeria and Indonesia. Qualified essay Book captured the participant's ideas, inputs, sharing knowledge and experiences with the theme "Creating better world with sustainable agrifood management".

The essays on this book were arranged by Seven categories:

- 1) Inclusion of smallholder farmers and collaboration system
- 2) Digital and technology innovation/ added value
- 3) Products and/or production
- 4) Agri-business development
- 5) Value chain development
- 6) Shaping an enabling development environment
- 7) Financing issues in agri-food sector

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SAMI 02 SUSTAINABLE AGRIFOOD MANAGEMENT AND INNOVATION
CONTEMPORARY AGRIFOOD MANAGEMENT STUDIES



SAMI

02 SUSTAINABLE AGRIFOOD MANAGEMENT AND INNOVATION
CONTEMPORARY AGRIFOOD MANAGEMENT STUDIES

CREATING A BETTER WORLD WITH SUSTAINABLE AGRIFOOD MANAGEMENT

*What does "Sustainable Agrifood Management" mean to you?
How do you think you can create a Sustainable Agrifood Management?*

Department of Management
Faculty of Economics and Management
IPB University, Bogor
Indonesia

Editors :
Musa Hubeis
Eko Ruddy Cahyadi
Zuraina Dato Mansor
Rindah F. Suryawati
Lindawati Kartika

Photo by Markus Spiske via Unsplash

SAMI 2020

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SUSTAINABLE AGRIFOOD MANAGEMENT**

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Preface

From IPB University Rector Prof. Dr. Arif Satria, SP, M.Si



Assalamu'alaikum Warohmatulloohi Wabarokaatuh,

Greetings everyone. It is my great honor and delight to greet all of you, and to particularly extend a warmest welcome virtually to the distinguished guest speakers and all participants in the 4th Sustainable Agrifood Management in Indonesia (SAMI) Summer Course and the 2nd Batch of SAMI Essay Competition.

SAMI 2020 will be one of the most interesting Summer Course focus on sustainable management and innovation. The theme, **"FROM TRADITIONAL TO DIGITAL"**, is very relevant with recent condition. This summer course can be an arena for getting to know each other while sharing ideas and information in an effort to create collaboration in disruptive era.

We've seen a lot of disruptive technology within the last decade. Innovation things like virtual reality, the internet of things (IoT), and artificial intelligence have shaken industries worldwide, including agricultural sector. Therefore, I hope this Summer course will create a unique opportunity of exchanging view, experiences and sharing good ideas, particularly in the field of management in disruptive era.

On behalf of IPB University, I would express my sincere gratitude to all stakeholders, especially for the organization committee, reviewer, Company and University partners. They have worked very hard in organizing and reviewing papers. We also would like to express our gratitude to invited speakers and moderators in the day of Summer Course. Special thanks to Ministry Research and Technology who selected this SAMI Summer course as one of events to celebrating Hakteknas (Hari Kebangkitan Teknologi Nasional).

We hope that SAMI 2020 will be successful and enjoyable to all participants

Rector

Prof. Dr. Arif Satria

Preface

from Dean of Faculty of Economics and Management

Prof. Dr. Ir. R. Nunung Nuryartono, M.Si



I would like to express my gratitude to Department of Management as an organizer and also to all the committees who have dedicated their time and contribution for Sustainable Agrifood Management in Indonesia (SAMI) summer course 2020. I would extend my sincere gratefulness to our international lecturer, local lecturer, and practitioners on agrifood business.

It is our pleasure to present this Book Chapter consisting of selected papers based on Essay Competitions, held September 14th - 24th 2020 virtually. The SAMI 2020 summer course is designed as 10 days sustainable agrifood management course with input from IPB University experts in collaboration with international Universities and multinational food companies, Banking and Technology Companies. Relevant issues in the field of sustainable agrifood management have been presented and discussed in the virtual plenary presentations. The topic of this summer course is “From Traditional to Digital”.

The industrial revolution 4.0 has changed the way of doing business and managing the organization. The concept of Industry 4.0 describes the increasing digitization of the entire value chain and the resulting interconnection of people, objects and systems through real time data exchange. The development of industry 4.0 era should have positive impact on agriculture, in the case of the supply chain of agriculture as a whole. However, in Indonesia, there are still many obstacles faced, especially the inefficient distribution chain, limited market access as the farmers rarely able to sell to large retailers, and payment conditions that burden buyers. Solutions to improve the agricultural sector in Indonesia are very important in order to improve the welfare of farmers, business people and to fulfill community needs for good quality agricultural products. This is closely related to the future goals of the SDGs regarding welfare and food security in the future. Through this summer course we could learn about integrated agrifood value chain from upstream to downstream and from traditional mechanism to digital transformation in agricultural sector.

We would like to take this opportunity to extend our gratefulness to the following reviewers of the Essays submitted for consideration in this volume for having so generously shared their time and expertise: Dr. Wita Juwita Ermawati, Mr. Syaefudin, Mrs. Hardiana, Prof. Dr. Musa Hubeis, Dr. Eko Rudy Cahyadi, Dr. Zuraina Dato Mansor, Mrs. Rindah F. Suryawati and Mrs. Lindawati Kartika. Finally, we wish to thank the IPB Press for supporting us in publishing this Book of SAMI 2020.

Bogor, September 24th 2020

Dean of FEM IPB University

Preface

from Head of Editorial Board

Prof. Dr. Ir. Musa Hubeis, Dipl. Ing. DEA



This issue of Sustainable Challenges in the Agrifood Sector and Management is the first to appear under my editorship. This Book of Essays is organized by Department of Management, Faculty of Economics and Management and its Authors represents region Asia, Africa and Europe in particularly from Spain, Oman, Myanmar, Thailand, Sudan, Sierra Leone, Bostwana, India, Bangladesh, Malaysia, Singapore, Cambodia, Vietnam, Kenya, Poland, Nepal, Nigeria and Indonesia. The publisher, IPB Press, SAMI Chairman Mrs Hardiana Widyastuti, SAMI Essay Contest Chairman Mrs. Lindawati Kartika and the commitee of SAMI 2020, who have also made outstanding contributions to the growing of this Book.

Agriculture is one of the most important sectors for humankind, but today's agriculture still facing many problems to fulfil the needs of people. Although technological development has been improving rapidly, but it is also cannot be implemented fully in agricultural sector due to the lack of some resources. As stated in United Nations about Sustainable Development Goals (SDGs) for its 193 member countries, it explicitly set a goal about Responsible Consumption and Production in SDG number 12 that support the sustainable development including in agricultural sector by producing more and minimizing the cost and emission produced. SDG number 2 Zero Hunger also set the purpose to rethink how we grow, share and consume our food. If done right, agriculture, forestry and fisheries can provide nutritious food for all and generate decent incomes, while supporting people-centered rural development and protecting the environment. This meaningful purpose is the key to be able to keep innovating for better agriculture development in all over the world. It also the aim of this book of sustainable agrifood sector and management to participate in giving solutions and ideas for Sustainable Agrifood Management in Indonesia and further be implemented for other countries.

The contribution of the authors are classified into six categorize which are inclusion of smallholder farmers and collaboration system, digital and technology/added value, products and/or production, agribusiness

development, value chain development, shaping an enabling development environment. The importance of the agri-food industry to all three pillars of sustainable effectiveness and predictions about the inability to feed future populations gives the discussion a certain urgency. Findings: Sustainability oriented innovations in the agri-food supply chain are different from traditional innovations. We develop propositions regarding the driving motivations, their nature and scope (i.e., more radical and systemic than incremental and focused), and the importance of a multistakeholder approach. The ten cases presented in the volume are summarized.

Finally, on behalf of myself, the Head of editorial Board, the editorial board, Dean of Faculty of Economics and Management IPB University, Head of Department of Management, the Committee of SAMI Summer course, and content designer Manggala Putra Halim, Yunicha Elisabeth Sihotang, Sultan Laga Putra Azdi, and IPB Press, I want to convey our general thanks to the authors and reviewers. It is they who have primary responsibility for the actual content and the success of Sustainable Challenges in the Agrifood Sector and Management book volume 2.

September 2020

Head of Editorial Board

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INCLUSION OF SMALLHOLDER FARMERS AND COLLABORATION SYSTEM



NO. Registration: 001/ICS/I/9/20

Agri-food, Innovation and Sustainable Development : Paradigm and Perspective

Abdullah Asahari bin Mohd Johari

Universiti Putra Malaysia, Malaysia

The Agri-food industry is one of the sunrise industries that is important all around the world. To survive and lead a better and peaceful life, all the basic necessities have to be fulfilled. One of the basic necessities is food. Food is cultivated from agricultural activities. With the advance of these activities over the century, the agri-food industry was established and build worldwide. Over the years, the Agrifood industry has become complex with its role not only to provide food for human survival but also to improve the country's economic, social, and environmental conditions. Therefore, the agri-food industry should be sustained in the long run, despite all the hurdles that this sector might face in the future. This is where sustainable management is important. Sustainable agri-food management promises a more stable future for an upcoming generation.

From my personal view, sustainable agri-food management means a promising life for the country's future generation. With global uprising competition of the food market

and the agri-food product demand characteristics, sustainable agri-food management has to take its full gear. To shift forward with the current demand and advanced technology that lingering around the agri-food industry's efficiency, sustainable agri-food management has to be created. Through my personal opinion with the current situation, a nation could create sustainable agri-food management with a precise and extensive strategy. However, the strategy could not be done alone. It needs the collaboration and strong commitment of the stakeholders involved in the agri-food industry itself. By focusing on the main player role in the agri-food industry, the competitive advantage that the agri-food industry aims to have could be addressed. Most of the agri-food industry's concern is the quality of the product without jeopardizing the price and polluting the environment, the availability of natural resources such as land, water, climate change, and employees' welfare. The Agrifood industry has to depend on the weather and overcome short shelf-

life issues, facing limited raw material. At the same time, stakeholders have to deliver high-quality agri-food products to the consumer. Without stakeholder collaboration, the price that comes to consumers will be higher as a stakeholder will increase the price to benefit their business and to minimize the imminent risk. Therefore, collaboration plays an important role in escalating the product's value and ensure that it follows the environmental policy that has been integrated.

There are several issues outstretched in the agri-food industry regarding sustainability as most of us know that in any market or value chain that are existed, certain challenges, problems, or issues will eventually arise. Several problems occur in order to achieve sustainability agri-food management. Among that are Inclusion of smallholder farmers and collaboration system, Digital and technology innovation/ added value, Markets and/or marketing, Products and/or production, Agri-business development, Value chain development, and shaping an enabling development environment. Out of all this problem, the subjects that capture my personal challenge best are value chain development.

For me, in order to create a strong and sustainable agri-food industry, it should come in managing the development of the value chain smartly. The value chain acts as a

driver for creating value for the agri-food product, creating competitive advantages, thus helping the business's success. Value creation is embedded within the value chain framework itself in which companies can operate efficiently as part of the chain. This is where value chain development is deemed important. However, to develop a value chain and to harness its full potential was not an easy task. The central problem within the value chain development is the disadvantages of the value chain analysis. It forces the company to break into the segment to access separately, and somehow along with its overall strategy and vision loss. To develop the value chain, the efficiencies of each value chain activities need to be improved and know how the activities relate to each other. Therefore, I think what I can do in addressing the problem is to identify the primary activities and support activities in developing the value chain. The first thing that I might do is identifying sub-activities for each primary activity. For example, three sub-activities created values in primary activities. Firstly direct activities that create value by themselves, for example, online marketing and advertising. Most of the farmers, especially in a rural area, have little to no access to the knowledge in creating good advertising for their products. Therefore I could be the distributor by advertising the product. Secondly, indirect activities, what I can do is keeping the book records, and

managing the sales forces, lastly, by checking quality assurance. I have to ensure that both direct and indirect activities surpass the expectation and reach the standards by assessing, comparing, and checking the produced product on par with global standards.

There are various stakeholders in the value chain. The five most important and/or influential (groups of) stakeholders in the problem are the producer (farmers), the distributor, traders, retailers, and wholesalers. The farmers' role was to produce high-quality agricultural produce. The distributors help provide training and sell quality inputs to farmers and then buy the product in the farmers' fair price. This improves the flow of information on the chain itself. The third group of stakeholders was traders. The traders help sell the produce from the distributor at a better price and increase its value by increasing the profits from additional inputs and aggregated produce. Then the traders buy the produce from the distributors and sell to retailers and wholesalers. Traders help to create new market relationships to enable better smallholders to produce to get to the market. Then retailers and wholesalers will act as another chain in providing more preserving agriculture produce through packaging, adding value to it, and finally reaching the final consumer.

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NO. Registration: 002/ICS/I/9/20

Creating A Better World With Sustainable Agrifood Management: Technology of Plant

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Agriculture has changed dramatically since the end of World War II. Food and fiber productivity has risen due to new technologies, increased chemical use, specialization, and government policies that favored maximizing production and reducing food prices. These changes have allowed fewer farmers to produce more food and fiber at lower prices. Although these developments had many positive effects and reduced many farming risks, they also have high costs. Striking among these are topsoil depletion, groundwater contamination, air pollution, greenhouse gas emissions, neglect of farm laborers' living and working conditions, economic concentration in food and agricultural industries, and break apart of rural communities.

During the past four decades, a growing movement has appeared to question the necessity of these high costs and offer innovative alternatives. Today this movement for sustainable agriculture is garnering

increasing support and acceptance within our food production systems. Sustainable agriculture has three main goals: environmental health, economic profitability, and social equity. Various policies and practices have contributed to these goals, but a few common themes and principles work through most definitions of sustainable agriculture. A food system gathers all the elements and activities related to the production, processing, distribution, preparation, and consumption of food and the outputs of these activities, including socio-economic and environmental outcomes. A sustainable food system is a food system that meets society's needs, the economy, and the environment.

An agroecosystem and food systems perspective is important to understanding sustainability. Agroecosystems are envisioned in the broadest sense, from individual fields to farms to Ecozones. Food systems, which include agroecosystems plus

distribution and food consumption components, similarly span from farmer to the local community to the global population. A systems perspective allows for a comprehensive view of agricultural production and distribution enterprises and how it will affect human communities and the natural environment. Conversely, a systems approach also gives us the tools to assess human society's impact and its institutions on farming and its environmental sustainability.

Technology has been proven to enhance efficiency in all areas, including storage, transportation, wholesale, and retail while empowering Malaysia's farmers by securing greater financial security. Smart farming had previously been limited to large-scale operations that could better support technology infrastructure and other resources necessary to implement precision agriculture and reap the benefits comprehensively.

Now in a world of drones, mobile apps, smart sensors, and cloud computing, precision agriculture is more accessible than ever from smaller operations such as agricultural cooperatives and family farms. Advances in technology are key to the future of agriculture as farmers strive to feed the world with limited natural resources, so here the top technology innovation in agriculture. Firstly, Urban Agriculture. Urban Agriculture is important in managing the balance of the

environment by processing waste into usable products. Composting is an activity that allows waste from food and other organic waste to be processed into useful and valuable. Compost is used as a fertilizer that acts as an excellent natural fertilizer in agriculture for soil fertility. This technology has great potential to be implemented in urban areas, which produces much organic waste to be processed and provides benefits and a significant impact on sustainability and the urban environment.

Secondly, it is rainwater collecting. This 'rain water harvesting' technology is a method that needs to be done and known by the urban population. Besides, this is garbage treatment of kitchen waste, and bathroom waste should also be utilized for the future. Rainwater collection is from buildings in urban areas that can be done with a suitable system and processed so that it can be used for agriculture. Sufficient rainwater can be collected through a single system and processed with appropriate technology. This water is economical and profitable because the cost of supplying water from existing sources is getting worse now and in the future.

In conclusion, sustainable agriculture is about what adds up to sustainability in environmental, social, and economic terms. For example, agriculture can adapt to climate change was not considered a critical issue 20 years ago but is now receiving increasing

attention. A sustainable system's details may also change from one set of conditions such as soil types, climate, and labor costs. Lastly, here I leave a quote by Thomas Jefferson 'Agriculture is our wisest pursuit, because it will in the end most to real wealth, good morals and happiness'.

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NO. Registration: 005/ICS/I/9/20

Livelihood Challenges of Marginal Farmers During COVID-19 in India

Amiya Kumar Sahoo

Indian Institute of Technology (ISM) Dhanbad, India

The COVID-19 disease is rapidly spread worldwide and declared as a pandemic by the World Health Organization in March 2020 (Organization & 2020, n.d.).

Many preventive measures, like social distancing, lockdown, constrain transportation, travel ban, etc. have been imposed to limit the disease's rapid transmission. This is a multi-facet disease that caused humanitarian challenges and declining the global economy. It has been explored the vulnerability of small and marginal farmers. Agriculture contributes a significant position in the Indian economy. About half of India's population solely depends on agriculture for their livelihood. As per agricultural census data 2015-2016, there are around 120 million smallholder and marginal farmers in India. The size of the landholding is below 2.0 hector. However, they produce about half of the agricultural production like paddy, wheat, fruits, vegetables, oilseeds, etc. Small and marginal farmers play

a significant role in poverty reduction and development (Lipton, 2006). Agricultural GDP growth is at least twice more effective than the non-agricultural GDP for poverty reduction (Lerche, 2008).

The nationwide lockdown due to COVID-19 has adversely affected agricultural activities and needed supply chains such as harvesting, processing, marketing, transport, retailer, consumer, etc. There are massive losses incurred to the marginal farmer, a large amount of food getting wasted due to a barrier in the supply chain. As agricultural product market committee (APMC) mandis shutdown due to implementation of lockdown in March 2020, many farmers were stuck with agricultural produce, leading to disruption in the food supply chain from production to consumption (Narayanan, 2020). At the same time, the health care system has been jeopardized in rural areas. There is a potential risk among the agricultural workers, farmers, and those working in the food supply chain

to get an infection of coronavirus. Agricultural workers relatively less adopt preventive measures like social distancing in rural areas.

The livelihood of marginal farmers

The livelihood of marginal farmers in rural areas is relatively significant for the sustainability of India's economy. The smallholdings and marginal farmers procured higher productivity compared to the medium and large farms. The NSSO data on the situation assessment survey of agricultural households shows that net income per hectare is higher in smallholdings than large holdings (India - Situation Assessment Survey of Agricultural Households, January - December 2013, NSS 70th Round - Overview, n.d.). However, monthly income and expenditure incurred imply that the marginal farmers have fewer savings than the large farmers. The monthly income of marginal farmers includes daily wages, cultivation, livestock, etc. which is minimal for the household expenditure. According to the National Commission for Enterprises in the Unorganized Sector, marginal farmers' poverty is higher than medium and large farmers. So, there is a need for promotion and an increase in productivity and income of marginal farmers. The commission states that "Consumption expenditure of marginal and small farmer exceeds their estimated income by a

substantial margin and presumably the deficits have to be plugged by borrowing or other means."

Challenges on marginal farmers livelihood

The outbreak of coronavirus brought a challenging time that severely affects life and livelihood in all forms. Many challenges emerged for marginal farmers in rural India during the COVID-19 pandemic crisis. These challenges are market produce, the difficulty of workers, effect on standing crops, money owing, etc. This is the time for the harvest of rabi crops. The harvested crops would reach the market year for assured procurement operation (Containing COVID19 Impacts on Indian Agriculture – ICRISAT, n.d.). Due to the coronavirus, the nationwide lockdown severely affects the harvest of rabi crops and other crops, such as peppers, coffees, and bananas, due to the nonavailability of machinery equipment, laborers, and restriction transportations. Simultaneously, unpreserved agricultural produce like vegetables, fruits, and flowers have been wasted due to marketing difficulty. Furthermore, getting access to fertilizers and pesticides for plantation crops is not easy. The rural communities and marginal farmers are the most vulnerable groups. The activities of rural communities like the collection and sale of timber and

non-timber forest produce have been seriously affected. In rural areas, the basic credit source is the informal sector. The marginal farmers cannot repay the high-interest borrowing rate during this crisis due to disturbance of the supply value chain.

On April 15, 2020, the Ministry of Home Affairs, Government of India, recommended protocols for an extension of lockdown by exempting agricultural and allied activities. However, there has been a gap in the grass-root level.

One can understand marginal farmers and agricultural workers' challenges to restore their lives and livelihoods in rural areas. The preventive measures include frequent handwashing, keeping social distance, sanitization, and wearing masks to continue to minimize the virus transmission. Post-COVID-19 phase proposals that distinctive prospective to reprocess the standing food and agricultural programs and regulations for a virtuous society.

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DIGITAL AND TECHNOLOGY INNOVATION ADDED VALUE



NO. Registration: 006/DTI/I/9/20

Intelligent Agriculture

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Thailand is shifting from agro-based to technology-based industries. The share of agriculture to GDP has decreased, while the share of manufacturing to GDP has increased over the year. However, the agricultural sector still important for the Thai economy as it can be a source of food security for the Thai people. Especially, Thailand has long been called “the Kitchen of the world.” Countries worldwide have faced many problems such as global warming, which is caused by climate change. Besides, the forecasting of the world population will increase to 9 billion by 2050. Therefore, urbanization will grow up around 70 percent, and the demand for food will increase by around 60 percent. For this result, the water consumption of the agricultural sector will increase by around 70 percent. All of this, many countries are turning to focus on agricultural development.

In the 21st century, global agriculture will undergo a paradigm shift to “agricultural 2.0”. It will shift from traditional agriculture using chemicals to biology agriculture (Synthetic

Biology) and shift from Outdoor Farming to Indoor Farming, such as Vertical Farming. Vertical Farms are modular and can be adjusted to fit any building. It also uses no pesticides and no fungicides, so the food is healthier and safer. Vertical Farms also reduce water consumption by using 90 percent less water than outdoor farms. Indoor farming can also control plant fertilizing nutrients, so the food that is grown is highly nutritious. Therefore, plants grow a large volume of food in a relatively small space and use less water. Vertical Farming is the practice of producing food in vertically stacked layers, such as in a skyscraper, used warehouse, or shipping container. The modern ideas of vertical farming use indoor farming techniques and controlled-environment agriculture (CEA) technology, where all environmental factors can be controlled. These facilities utilize control of light and environmental control.

From traditional to digital, intelligent agriculture is the advanced stage of agricultural production, integrating mobile terminals, IT platforms, cloud

calculations, big data, the internet of things, and internet technology. In the future, farmers will need to concentrate on precision farming by focusing on environmentally friendly farming and allocating resources for maximum efficiency, taking care of every process efficiently and precisely using a sensor system to collect and analyze data with modern tools. Starting from sowing seeds, watering, fertilizing, pesticides, harvesting, and selection of products to maximum productivity. Nowadays, many countries invest in agri-food by using modern technology. Then, the world becomes a digital food era. Although Thailand has the potential in agricultural products, it must improve to be an agri-business and strengthen the business ecosystem and improve human resources to support agricultural production and increase agri-productivity.

Thai farmers had faced price fluctuation in agricultural products such as rubber, palm oil, etc. due to excess supply and global economic slowdown. The government tries to solve these problems by using modern technology in the agricultural sector. First, the Ministry of Agriculture and Cooperatives and the Ministry of Science and Technology have developed the Agri online map system for proactive online management. This provided an up to date agricultural database for farmers and stakeholders to access. Then, farmers can use this

database to develop their agricultural management. Second, encourage the farmer to be a “smart farmer” by using innovation together with knowledge and local wisdom. The farmers should be applying technology to improve their quality production. It also uses information technology for decision-making and manages production planning for market demand, which changes over time. Moreover, the Ministry of Agriculture and Cooperatives adopted Big Data for integrating farmer’s database, namely the “Farmer ONE” application. It can link the farmer’s information between the government department and external agencies. The government will use this information to analyze and create policies to support farmers to upgrade their productivity. Third, the government encourages farmers to do an integrated farming system to follow a sufficiency economy philosophy. Integrated farming is a farming system with simultaneous activities involving crop and animal by support one another; hence, reducing external inputs.

In conclusion, the Thai government tries to drive traditional farmers towards a “Smart Farmer.” Using innovation and modern technology to develop an agricultural system in the digital era. The farmers can take advantage of the latest technology and adapt to smart farms. Then they can achieve higher productivity, improve skilled labor, create a production plan, and access the market.

Creating innovation digitized can transform traditional agriculture into modern agriculture, which focuses on management and technology. Therefore, the agricultural sector can be a sustainable agriculture system, leading to a better quality of life for the country population.

We are in the digital era, and we have to follow advanced technology to survive and compete with other countries. Traditional agriculture has been developed in intelligent agriculture, which is friendly with the environment and increases productivity. As a result, if a country can create a higher quality of life, it also creates a better world.

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NO. Registration: 007/DTI/I/9/20

Building Indonesia Autonomous Future in Agriculture Through Big Data and Artificial Intelligence

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There are more humans alive on Earth right now than ever before—7.3 billion—and that number is still growing, with UN projections that it will reach 9.7 billion by 2050. A population of this magnitude brings a lot of challenges, food production chief among them. The UN Food and Agriculture Organization predicts that we need to boost worldwide food production by 70 percent over the next several decades to feed the anticipated population of 2050.

Meanwhile, Indonesia is the fourth most populous country in the world based on the 2015 inter-census population survey (SUPAS), the population of Indonesia in 2019 is projected to reach 266.91 million. Indonesia is currently enjoying a demographic bonus period where the number of productive age population is more than the unproductive age, which is more than 68% of the total population.

However, this number is not evenly distributed in Indonesia, where people have begun to centralize in urban areas such as the capital city or industrial area. As a result, there is an imbalance in growth and development in facilities and infrastructure outside urban areas, which also impacts the agricultural sector.

In areas outside of urban areas, the drastic increase in population due to urbanization also creates problems in urban areas. One of which is land use; agricultural land that was previously used for farming and livestock is now converted into non-agricultural land such as housing, buildings, roads, etc. This case is very striking in Jakarta, as the capital city of the Republic of Indonesia. The city of Jakarta, which is the center of urbanization of all rural areas in Indonesia, where people migrate hope to improve their standard of living by looking for work in the capital, causes a surge in numbers. Population in the City of

Jakarta and increasing the amount of agricultural land converted to non-agricultural land, according to the 2012-2016 Agricultural Land Statistics (SLP) data released by the Center for Agricultural Data and Information Systems (PDSIP) from the Secretariat General of the Ministry of Agriculture in 2017, Plantation land or dry land in DKI Jakarta ranged from 1,075 Ha in 2012, changed to 497 Ha in 2016. It means that there has been a decline in the agricultural land area of more than 50% in just four years.

From the description above, it can be seen that serious problems will increasingly have an impact along with population growth and changes in land use. The urban community, which is the center of civilization, depends on the rural community's production results as the main agricultural commodities producer because of the limitation of land and resources to carry out agricultural production in urban areas.

This long term activity will depend on agricultural products being produced only from rural areas and urban suburbs. This supply chain method is not a permanent solution as the production demand grows larger, while the infrastructure in rural and suburban areas are still stagnating. There will be a huge gap between supply and demand, resulting in the government taking action that is

importing large supplies of agriculture products from nearby countries to keep up with the demand.

In order to fix that problem, we need industrial revolution 4.0 to occur in the field of agriculture, where the use of Artificial Intelligence and Big Data can help solve these problems.

Artificial Intelligence (AI) According to Stuart J. Russel and Peter Norvig, AI or artificial intelligence can be understood as a computer device that can understand the environment around it and respond according to its purpose actions. Artificial intelligence acts as a manager as well as a decision-maker replacing the role of humans.

Big data refers to the large, diverse sets of information that grow at ever-increasing rates. It encompasses the volume of information, the velocity or speed at which it is created and collected, and the variety or scope of the covered data points. Big data often comes from multiple sources and arrives in multiple formats.

Data analysts look at the relationship between different data types, such as demographic data and purchase history, to determine whether a correlation exists. Such assessments may be done in-house within a company or externally by a third-party who focuses on processing big data into digestible formats. Businesses often use the assessment of big data by such experts to turn it into actionable information.

Nearly every department in a company can utilize data analysis findings, from human resources and technology to marketing and sales. Big data aims to increase the speed at which products get to market, reduce the amount of time and resources required to gain market adoption, target audiences, and ensure that customers remain satisfied.

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Strong Aftermath Covid-19 – from Traditional to Digital

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As an agrarian and maritime country, Indonesia's results in agriculture and fishery sectors play an important role in our society. Particularly for the agriculture sector, it has historically in Indonesia. This condition provides fertile soil land to facilitate a variety of crops that can grow well in Indonesia. Therefore, this sector has created more job opportunities, produces many crops to strengthen national food security as well as raw material products for other industrial sectors. To achieve this, President Joko Widodo has made significant progress under a business-orientated administration.

Indonesia's total land area is 190 million hectares, and around 30% is employed for agriculture (Central Bureau of Statistic's data, 2020). The major agriculture products are rice because rice is one of the Indonesian main food staples. Other valuable commodities are tropical fruits and vegetables. Therefore, the development of the agriculture sector is still a challenge to increase domestic income. With the incorporation of science and technology under proper

treatment performed on our fertile soil, we believe that Indonesia can produce more agricultural products throughout the year.

Learning from past experience and achievements, the Indonesian government shall make policies to support local farmers such as limit the import of agricultural-based products, facilitate the training for farmers and/or the workers, specific crop(s) at a particular area, subsidize fertilizer, provide a reward for a certain achievement, provide equipment required in the field, etc. Indonesia is the third biggest rice producer in the world, but at the same time, we also import rice from other countries such as Vietnam and Thailand. We should learn from those countries how their government has supported local farmers, which leads them to become the biggest rice exporters in the world.

Our challenge today is how to synchronize several farming techniques to maximize the harvest. The nature of Indonesia's agricultural

production system is very diverse, from shifting cultivation to intensive crop farming, from rain-fed to intensive-irrigated paddy field, from vegetable mix farming to monoculture industrial plantations, from small-scale subsistence farming to large-scale commercial plantation. Notwithstanding the great potential resources and market demand, the sustainability of agriculture in the country remains challenging. We need to continue developing the agriculture sector to improve life quality and fulfill our growing population's basic needs. At the same time, we can achieve economic growth and protect the environment by reducing the carrying capacity pressure.

Digital farming offers the best solution to get advanced agriculture, especially in the era of New Normal. This system can overcome several drawbacks faced by traditional agriculture. Internet of Things (IoT) is a kind of technology innovation, cyber-physical system, as a tool in agriculture that can be linked to water resources management and weather information collection and thereby store databases that can be further developed to ease the technical operation in farmlands. Many traditional farming techniques can be simplified with digital farming, such as watering the lands, assisting fertilizer distribution, etc. Besides, digital farming can also be applied for post-harvest processing such as cleaning or disinfecting, sorting, or

grading and packaging to maintain the quality and extend shelf life. Hot water treatment is one of the common post-harvest treatments to maintain the quality of freshly harvested products. This technique is designed to be part of a sorting – cleaning – disinfecting line, whereby the commodity products are passed through brush rollers equipped with pressurized hot water spray. Disinfectant treatment is necessary in order to send fresh agriculture products into intra-national and international markets. This step is important to reduce common bacterial, and fungal diseases in fresh products occurred commonly during transportation and storage. The hot water treatment system setup in digital form, achieved by applying IoT in this agriculture sector, can help farmers do many operation techniques just by click on their gadgets, and all work can be done perfectly. Therefore, it is not surprising if Farming 4.0 will increase product quality and quantity, and thus, the farmer's welfare can be significantly increased.

'Village Fund National Program' conducted by the Indonesian Government should be a bridge for collaboration start-up between farmer, local government, academic, and business to reach digital farming. With their own roles, this team shall sit together to discuss strategies to implement and optimize technology usage in farmlands. It

is also necessary to call a millennial generation to be involved in the team since the young generation is always filled with creativity and something new, including the implementation of recent technologies to reduce capital expenditure. Subject Matter Expert can also contribute by sharing their experience to improve the process and quality control, followed by quality assurance implementation. By bringing together several partners related to this subject, the Indonesian government program to raise the farmer's living standard is not just a dream. However, it can actually be real in the near future.

Finally, digital farming supports the development of the micro-small-medium enterprise sector indirectly to improve the national economy. We know that the Covid-19 pandemic has fallen the global economy and, therefore, fully support such as

supply chain assistance, education, and technology assistance to those enterprise sectors as the basic structure of upstream and downstream lines is necessary to facilitate the farmer needs. Not only that, IoT development allows us to track product transportation and distribution, and thus, risk and disappointment among parties can be reduced. In the end, we suppose not to worry about the food crisis; even we can get food self-sufficiency or more. We can supply other countries' needs since our agriculture and fishery products have added value as well as competitive value. All of those things can be achieved if all of us (government, farmers, academics, business sector) work together start from now, in the middle of pandemic Covid-19, to investigate which parts need to be fixed and improved to start digital farming.

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Digitalization of The Agrifood Management From On-Farm to Off-Farm in Indonesia

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It is God's grace that Indonesia consists of more than sixteen thousand islands, known as one of the maritime and agrarian countries with a land area of 1.905 million square kilometers and crossed by the equator. Countries at the equator, like Indonesia, Ecuador, Colombia, Brazilia, Maldives, etc., are under the sun's rays for around 12 hours/day, so it has a tropical climate and only know two seasons, like in Indonesia, there are rainy and dry seasons. Furthermore, Indonesia has become the most active volcanic country. However, behind the treat to the creature due to natural disasters, like volcanic eruptions, that can occur at any time, volcanic eruptions are rich in nutrients such as calcium and magnesium that are needed by the plants. High rainfall in various regions in Indonesia causes long-lasting nutrients needed to stay by the soil and plants. Therefore, Indonesia has an abundance of natural resources, especially in agriculture, like food crops, horticulture, farm, and forestry.

This strategic geographical and tropical climate has good potential for optimizing Indonesia so that Indonesia can become the world's food barn in 2045. However, the reality of Indonesia agriculture's current state, it seems there are still many things that need to be more considered. Such as climate changes which causes the extreme weather, government policies that have not to maintain sustainable agricultural areas, decreasing the fields year to year due to the conversion of agricultural land, decreasing the number of the farmer, 69% of Indonesia's land is in a severe category (Food Agriculture Organization/FAO, 2018) due to the lack of understanding to maintenance the farm, the problem at the distribution to the remote areas, problem of capitalization of the farmer so they can not produce the optimal quality and quantity product. If the problems are not resolved immediately, it will threaten a food crisis in the next few years.

Progress of plan to utilizing resources must be detailed and sustainable with the synergy of various stakeholders, such as the role of the government in arranging policies, farmers as the main actors in processing agricultural land, industry as the shelter for crop yield and the distribution, the role of technology in digitalization as a collaboration of agriculture process, ranging from on-farm to off-farm, the role of startups that facilitate the transactions directly from consumers and farmers. Technology will support the adaptation process from traditional to modern agricultural, start from the presence of a digitizing process that provides the literacy to farmers, monitoring soil quality and plant's growth, serve the data market for direct transactions between consumers and producers, eliminating digital-gaps between farmers and investors and will be one of the solutions to the problem of capital needed for farmers and in the end can improve the quality and quality of agricultural products to support the sustainability of agriculture in Indonesia.

On-farm digitalization

Technology on-farm process can be served by various things related to the cultivation process, such as informed on agro-climate in the region (physical, chemical, biological land conditions), weather

(temperature, humidity), monitoring of the supply of production facilities (tools and machinery), monitoring the process during plant growth, give literacy about plant diseases, help to connectivity the farmers and investors by the information about capital needs during the on-farm process with the apparent agreement benefit for both parties.

Off-farm digitalization

The post-harvest condition of agricultural products also needs to be considered. According to Downey and Erickson (1989), 'Profits from farming/cultivation are only 30%, while 70% are in the downstream processing and marketing sectors.' Therefore, if the downstream processing and marketing sectors can be optimized and developed, it will increase the farm's value product and well distributed to the consumer. The existence of the startups in the agricultural sector can perhaps be one of the solutions that can help farmers sell their land products directly to the consumer so they can get more profit compared to the middleman/wholesaler. Besides, off-farm digitalization can provide the newest information on the number of stocks of agricultural products. It can make it more accessible to manage the distribution and storage of the product.

Sustainable agrifood management in Indonesia expects to occur but needs the latest developments and can be quickly adapted by agricultural actors. Therefore, by the synergy of various stakeholders can help the process of agrifood sustainability in Indonesia, so that can become an independent country to fulfill the food needs and export to other countries and reach the vision in 2045, which is to become the world's food barn and decrease the hunger rate in the world. The situation at the time of the Covid-19 pandemic makes a negative sentiment for various industrial sectors, both from the processing and distributing agricultural products. Fulfill the food needs of Indonesia people must occur, but the on-farm process must continue to replenish food stocks. In addition to the digitalization process using seeds, anti-pests can be a solution to optimize the decreasing area of agriculture and increase the quality and quantity of agricultural products to reach sustainable agrifood in Indonesia.

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Why Do We Need to Implement E-Commerce for Agrifood Marketing Supported by The Power of Collaboration Right Now?

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Food is our primary need—the support system to keep us continuing our life. Unfortunately, a decreased number of people want to become food producers farmers in this current era. According to The future of food and agriculture: Trends and Challenges (FAO 2017), the youth in rural areas often avoid working in agriculture fields because of the lack of income and gender inequality in pay and opportunities. This makes them join the flow of internal and international migrants. Farmers who stayed in rural areas are now aged, making it harder to disseminate new agricultural innovations. This is also associated with their decision to sell their farming land to other industries or even housing. This situation needs consent as the population's number is kept rising, and the ability to fulfill our food needs is threatened.

Agrifood is the linkage of agricultural production food events from production processing, trading,

distribution, and consumption (from fields to fork)(FAO 2017). Globally, consumers and farmers alike are unable to access the market (O'Boyle 2019). Agri-food markets and functioning are also considered essential for sustainable development, as stated in SDGs Framework number 2 'Zero Hunger' target 2.3, 2.b. And 2.c which are "markets and opportunities for value addition and non-farm employment, correct and prevent trade restrictions and distortions in world agricultural markets, adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information" (UN 2015)

Using the internet's role as the media without the barrier of time and place to market agrifood products would be the best solution. Especially in this new normal era, everyone is forced to use the internet like alternative

media to continue their daily activities. The process of electronic buying and selling goods, services, or information over the internet is called e-commerce. Maman and Sugiarti (2016), in their research about the need for agribusiness e-commerce to support staple food self-sufficiency, explain the advantages of e-commerce both for the companies and the consumer. The companies can shorten the distance, get closer to their consumer, market expansion unlimited by geographic area, expand the network of business partners, and reduce operational expenses such as papers for the transaction, advertising, and recording. The benefits for consumers are getting the needed information more quickly, physically secure, and flexibilities. Implementing e-commerce in an agrifood system could help increase youth and exciting opportunities without gender barriers.

The main problem with implementing e-commerce is the use of information technology itself. Some rural areas still have not got a proper provider signal. The government should grant internet access to the entire country, mostly in agrifood e-commerce. In several rural areas with challenging natural conditions. Second, the capability of the farmer. Farmers often avoid adopting innovation because they are afraid to try new things. They are afraid of failure, which causes money loss. They also feel comfortable doing things the way it is. After several field

trips to rural areas, the community also did not believe in themselves. They have the perception that they are not as good as urban communities. They think they are uneducated. This is where the professional extension workers play the role, which they have the abilities and strategic approach to farmers. The extension workers should be equipped with digital literacy competency.

Besides extension workers, the next generation of farmers, the youth in rural areas, should also be considered the most potential targets. The youths are more in touch with the latest information technologies. Implementation of online schools in mostly all over the world because of covid-19 pandemic also forced them to one step ahead on using information technologies. To make them believe and positively perceive implementing e-commerce, safe, and secure cyberspace should be made. The Department of Information and Technologies collaborating with the national security department should grant the data and transaction safety in all e-commerce, especially in agrifood e-commerce. In several countries, there is already agrifood-based e-commerce, but still, they did not get the consumers' awareness. The government collaborating with media owners (radio and TV stations) should create public service advertisements to make their existence more recognized.

Implementing e-commerce as the marketing space for agrifood management needs to be fully supported. Unlimited time and no geographical barriers will increase the farmers' income, which leads to attracting the next farmer generations' interest. However, we also realize that there are still core problems to improve the capability of rural farmers. The collaboration of the government, extension, youth generation (especially in the rural area), The Department of Information and Technologies, The Department of National Security, and the Media owner is needed to brace rural farms to implement e-commerce. With all the problems that we have, it is not the time to say and think about "if." It is time to think about "will" and "now."

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Harvest Moon Apps: AGIS (Agricultural Geographic Information System) Mapping for Future Agrifood in Indonesia

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Indonesia is the world's largest archipelagic country, stretched between two continents, Asia and Australia, and between the Pacific and Indian. The Archipelago is extended over 5,500 km from east to west and 1,900 km from north to south. It consists of more than 17,000 islands, 81.000 km coastline, 1.9 million km² land territory, and 3.2 million km² of sea territory (Syuaib 2016). This location made Indonesia a strategic place for agricultural aspects, and the demand for agricultural production is high. There are still many problems to supply agrifood in high quality and quantity. Some of the problems are pre-post harvesting, meteorological aspect, distribution, land degradation, technology, and infrastructure.

Precision agriculture that leads to low input, high efficiency, and sustainable agriculture mainly benefit from the emergence and convergence of several technologies (Yousefi

& Razdari 2014). That technology including the Global Positioning System (GPS), geographic information system (GIS), miniaturized computer components, automatic control, infield, and remote sensing, mobile computing, advanced information processing, and telecommunications (Yousefi & Razdari 2014). AGIS and several remote sensing methods are useful for the macro and micro levels of agricultural and environmental mapping. This technology can create an agrifood solution based on satellite information and mapping from various regions summarized in one application, named Harvest Moon Apps.

Concepts and features of Harvest Moon Application

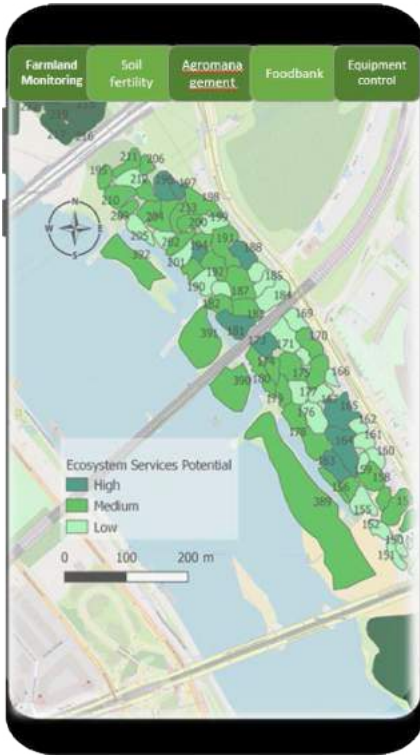


Figure 1 Harvest Moon Apps Display

Harvest Moon Apps is an application that could be a solution to problems that exist in the agrifood management system from upstream to downstream.

1. Farmland Monitoring

There is information on climate/ weather, fertilizers and pesticides, arable land area, harvest time, and

crop conditions in this feature. Farmers can easily find out the state of the land without having to be in place directly. They can get detailed information quickly and precisely through gadgets.

2. Soil Fertility

Information on this feature includes soil information from physical, chemical, and biological aspects. Physical factors include structure, texture, and soil moisture, while the chemical factors include nutrient content, humus content, pH, and microelement content. Biological factors include microbial activity in the soil or other organisms that help humification and nitrogen fixation.

3. Agro management

This feature contains information, tips, and tricks about agrifood land management to post-harvest products and management cited from various trusted sources.

4. Foodbank-Map

This feature contains a mapping of food harvests in all regions of Indonesia. This feature is useful for monitoring food commodities in various regions to understand the distribution and trends of food crops harvested in various regions. By better understanding the harvesting trend, farmers can understand the market model and do better marketing after.

5. Equipment Control

The equipment in the field can be controlled through this feature. Apart from using satellites' help, specific sensors are needed to be able to control equipment in the field via gadgets.

as fund donors in the process and program sustainability. NGO agencies, especially those engaged in agrifood, play a role in disseminating information to farmers and the community regarding the programs they carry.

The stakeholders

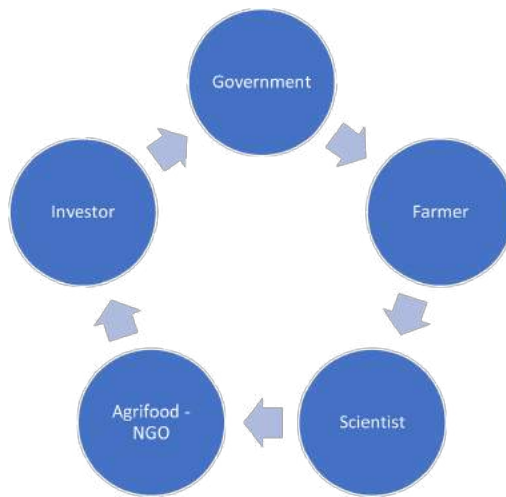


Figure 2 The Program Stakeholders

Harvest moon apps would become an effective and efficient solution only if various stakeholders contribute to it. The government (especially the Ministry of Environment) acts as a facilitator and promotes and cooperates with various vital parties. Scientists play an essential role in initiating initial research throughout the program, starting from data collection and continuous data maintenance. Investors act

The innovation of harvest moon application is a solution to agrifood problems in Indonesia. Problems from upstream to downstream can be monitored and managed correctly through one application through an informative gadget. It takes much preparation before finally, this application can be realized and used by the community.



Figure 3 Program Plan

- a. Research

This process is the starting point for the application to be made. Without mapping data in the field, all the information needed by farmers through gadgets would not exist. The scientific role is needed for doing research and measurement in the field.
- b. Data collection

Data collection was carried out after researching the field. Scientists still carry out this process. The data that has been collected will later be used as the basis for making the application.
- c. Application making

Making applications based on the collected data is made by scientists and people that experts in information and telecommunications. Making this application needs to be made according to the needs of farmers in the field to be used properly.
- d. Application trial

Before launching the application to the public, this application will be tested first. The suitability,
- e. Promotion

ease, and continuity of application use will be the benchmarks for launching the application to the public. If there are things deemed lacking and need to be fixed, the application will be refined again before it is officially launched in the community.
- f. Application released

During the trial period, the application can be promoted to the public. This is so that the application can be readily accepted by the public when the application is ready. Besides, the community is also expected to be familiar with the features and using the application.

After the entire process has been successfully passed, the application can be launched. This launch will be accompanied by counseling and training for people who directly use this application. It is intended that the application can be used effectively and efficiently so that agrifood problems in the land can be solved one by one.

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Sustainable Agrifood Management with Agroforestry System

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Sustainable Development Goals (SDGs) provide the mandate that everyone has the right to obtain decent food needs (Goal 2) through the fulfillment of good agricultural production results and resilience to climate change (Goals 13 and 15). Population growth, which is always increasing every year, causes food needs every year also increases. The explosion in population growth is in line with the increasing land conversion in Indonesia. The land conversion causes the land used for agricultural activities to decrease. According to data from the Central Statistics Agency (2015), the SAMAS land growth rate is less than 1% th⁻¹. Based on agreement data, total SAMAS Indonesia land is recorded at 8.08 million ha (BPS, 2015) and based on a statistical land area of 11.5 million ha (Kementan, 2017). Based on the 2003 agriculture census results, the SAMAS land conversion rate was around 110,160 ha th⁻¹, where around 75% turned to the house, especially on Java (Irawan, 2005). The high land conversion in Indonesia has led to a

decrease in land use in agriculture. The high rate of conversion of agricultural land and climate change can decrease the capacity to produce food commodities.

On the other hand, there is still a lot of forest land that has not been utilized optimally and adequately to produce sufficient and quality food production. The total area of natural forest produced by the Business Permit for the Utilization of Timber Forest Products of Natural Forest or Plantation Forest (IUPHHK-HA / HT) has been abandoned (de facto there is no management) is 35.75 million ha. This can cause massive and permanent damage to forest areas. Not only IUPHHK-HA / HT but also in the Industrial Plantation Forest (HTI) area, which recorded 35%, was not managed from a 10.5 million ha concession area (APHI, 2016).

The extent of forest area Land conversion also supports climate change in Indonesia, which threatens food availability and agricultural sustainability in Indonesia. Indonesia's

population, which continues to increase every year, presents a more significant challenge in meeting domestic food needs. According to UN DESA (2018), the prediction of the population in Indonesia will increase from 258,162,000 people in 2015 to 321,551,000 people in 2050. High population growth rates cause Indonesia to experience food sovereignty problems.

Agroforestry is a natural resource management system that combines agricultural production, including trees, fruits, and/or livestock, with forestry plants. The agroforestry system is a system of natural resource management that is dynamic and ecologically based by integrating various types of trees at agricultural land and on a landscape (Senoaji 2012). Nair (2012) said that agroforestry needs a technological revolution for future adaptation. Agroforestry makes it possible to combine agricultural, forestry, fishery, or livestock commodities.

Kholifah et al. (2017), agroforestry accounts for 98.47% of farmers' income in terms of integrated land use compared to non-agroforestry businesses 1.53%. However, the facts on the ground show that Indonesia's farmers have not optimally implemented agroforestry systems due to the lack of understanding of farmers regarding agroforestry systems. Agroforestry is a future solution for the integrated use

of agriculture, forestry, animal husbandry, and fisheries. Agroforestry can support climate change adaptation and mitigation programs because of its ability to absorb carbon and create a microclimate conducive to the community and the surrounding environment (Lestari and Premono, 2014). Agroforestry also supports sustainable forest management and agriculture, especially in the forestry and agriculture sectors, and contributes to implementing Sustainable Development Goals (SDGs) in Indonesia.

The 4.0 industrial revolution has five leading technologies that support implementation: the Internet of things, artificial intelligence, human-machine interface, robotic and sensor technology, and 3D printing technology. Agroforestry systems need technology as a catalyst to optimize it. Therefore, the authors can create an innovative application to educate farmers in answering the problems of food sovereignty, land conversion, and climate change through agroforestry systems with accurate data and obtained from reliable sources. This idea makes it easy for farmers to access data accurately and adequately through reliable sources, especially in agroforestry systems, to increase the type of harvest commodity in fulfill domestic agricultural commodities and increase economic growth in Indonesia.

SAMAS is an innovative application that can answer farmers' lack of understanding of agroforestry systems. SAMAS or the acronym for Sustainable Agrifood Management with Agroforestry System is an innovative application based on information technology to provide information education in applying an effective and efficient agroforestry system. SAMAS has features that can support harmonization in an effective and efficient agroforestry system in Indonesia. SAMAS supports farmers in land information, agricultural, forestry, livestock, and fisheries commodities that can be combined, and financial and marketing information related to commodities used in agroforestry systems. The SAMAS application provides education to farmers in implementing agroforestry systems. SAMAS motivates and facilitates farmers to access information related to the implementation of an effective and efficient agroforestry system to affect both the environment and economic growth in Indonesia.

First, SAMAS Soil is one of the features that predict soil fertility, soil pH, and the feasibility of planting land through a soil color scanner. Secondly, SAMAS Sky is a feature that functions to predict rainfall and land altitude in an area. Third, SAMAS Product is a feature that functions to predict the productivity of the commodity to be planted, the harvest period of the

commodity, and the average price on the market. Fourth, SAMAS News is a feature that displays the latest news related to the implementation of agroforestry in Indonesia and the world.

Based on the description above, it can be concluded that the application of SAMAS (Sustainable Agrifood Management with Agroforestry System) can provide solutions to farmers who are considered not yet familiar with the concept of agroforestry.

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Harnessing The Power of IoT Based Drone Technology for Sustainable Agriculture in Global Markets

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The past decade has seen the rapid development of the agriculture sector in many areas globally. According to IBRD/IDA report (April 1, 2020), sustainable agriculture is one of the essential weapons to stop poverty and hunger, improve sustainable economic growth and nourish a forecasted 9.7 billion by the year 2050. Agriculture growth is 2 to 4 times more efficient when it comes to increasing productivity among the least fortunate than other industries. In short, we need to achieve/ design sustainable agriculture management to address the social, environmental, and economic aspects of global agribusiness soon. To achieve sustainable agriculture management, we need to focus on the following:

- Trying to improve livelihood opportunities and enhancing economic growth and development.
 - Achieving the adaptability of people, communities, and ecosystem functions.
 - Adapt new technologies to survive and withstand to new challenges
- “Adopting Technologies like IOT based Drones for building sustainable agriculture to thrive in future” is the central theme of this essay, which would be discussed in detail. As a research scholar working in Business Analytics, I firmly believe that technological advancements have a lot to contribute to the development and sustainability of the agriculture sector globally. My research in the Department of Operations and Business Analytics, ICFAI Business School, Hyderabad, India, targets “IoT based smart farming and analysis of Agri based supply chain in the Indian

market.” By 2030, food grain demand in India would increase by about 20%. Hence there is a need for an increase in the crop yield.

Issues confronting Indian Agriculture

India’s annual crop loss due to Pest and Disease is approximately 15% (the US \$ 36 Billion). Existing methodologies are highly inefficient in controlling pests and diseases. Moreover, timely intervention is affected due to human resources availability. Also, there is a lack of efficient input methods (irrigation, fertilization, etc.), which further reduces the genetic potency of crops by 30 to 40 %. In recent years Locust attack has affected approximately one million-hectare farmland in India.

Moreover, there is an excellent threat to mismatches in demand and supplies with the pandemic scenario. Due to the spread of viruses, contact among humans during farming practices and distribution has become a significant threat. A significant 53 percent of Indian business organizations address the massive effect of the coronavirus epidemic on business activities at an initial stage. Although with the uncertainties that remain in 2020, there have been potential opportunities for interruptions and transitions in the agriculture industry. These opportunities are motivated

by a shift towards the more high-tech industry that boosts capital expenditure in agriculture.

- The Majority of the farmers are using software applications to monitor crops consistently.
- More localized weather data allow farmers to better prepare for planting and harvesting times.
- Social media allows farmworkers to interact directly with their customers, as studies show that 40 percent of all farmers are on social media.

Hence there is substantial growing importance of digital and technological transformations in the agriculture sector. The technology will continue to impact the way we live and work with added value. The need for such mechanisms has further been fueled by COVID -19.

The present model helps the farmers to unique AI-based early detection of crop damage. Some of the possible advantages like:

- Convenient farming
- Automated control of planting
- Better control over-irrigation of the farmland by allowing remote monitoring and control.
- The system to dynamically update itself on change of the crop cycle
- Continuous maintenance of moisture to crop allows the farmer has more time to concentrate on other aspects of farming

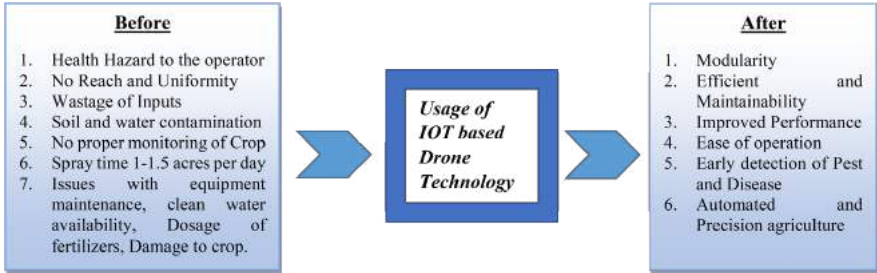


Figure 1. Proposed model

In the Indian context, according to the PwC report, the addressable IOT based Agri drone market is projected to expand from USD 1.2 billion by 2019 to USD 4.8 billion by 2024 at a CAGR of 17%. A 5% penetration in the Indian market would mean a yearly service revenue of US\$ 750 million. It is expected that 25000 drones deployed can cover only 5% of paddy fields in India.

Challenges and possible solutions:

Some of the challenges that I would like to work on in the future as a part of my Ph.D. work.

1. Technology adoption by farmers: As we (Technical or Research teams) cannot go convince farmers. Possible ways to alleviate this problem is to develop a B2B revenue sharing model with the existing Agri player with a significant farmer base across India. Also, by enabling micro-entrepreneurship to work with local panchayaths by uniting all the farmers in small villages with areas of land (less than an acre), with positive ROI in the first year in collaboration with rural finance institutions.
2. Efficient utilization of the system for quick ROI: Achieving a positive ROI would take more than the first quarter of the year. This can be resolved by providing advisory to the small service providers based on the advanced cloud-based data analytics. The leveraging network of existing agriculture equipment suppliers towards after-sales support would be a solution.
3. Regulations and Monitoring: The solution for this can be by centralizing the activity monitoring, thereby ensuring adherence to regulations and support.

To conclude, this technology has multiple applications for better agriculture like fighting crop diseases, food security, herbicide, Thermal cameras, planting seeds, pollination, Artificial intelligence, Near-infrared sensors. Thereby adopting this technology will help to achieve sustainable agriculture shortly.

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Using High-Technology for Sustainable Agrifood Management

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Currently, Thailand has 38.2 million; there are workers in the agricultural sector up to 13.5 million, or 35% of the total workforce. In 2010, Thailand's agricultural sector accounted for 7.3% of GDP, and it decreased to 5.7% of GDP in 2019. Although the proportion of agricultural to GDP was declined, the agricultural sector is still essential for the Thai economy. There is much high skilled labor that can lead to high-quality agricultural products and export to the international market.

The problem of Thailand's agricultural sector is the farmers cultivate a similar crop. Therefore, when the agricultural products are released into the market, the excess supply will occur. It results in products price will fall. Similarly, when one product is popular and the price going up, many farmers try to cultivate that crop, so in the following year, the price of a particular product will drop due to it oversupply. Besides, Thai farmers always faced natural disasters, such as drought, floods, and wildfire. Then, crops will be damaged, lost productivity, and farmer's income

will decrease. Thailand's agricultural sector has been affected by COVID-19 in the first half of 2020. It is predicted that agricultural products will increase in the second half of 2020. After COVID-19 resolve, we hope that Thai agricultural products' demand will be increased, such as rice and other agri-food. If foreign demand increase, the export volume of agricultural products also therefore increase. Besides, the government should persuade the domestic consumption of agricultural products. If both foreign demand and domestic demand for agricultural products increased, the agricultural sector would be expanded.

The government should encourage farmers to use advanced technology and innovation for production, management, planning, and marketing. Thus, traditional farmers can be smart farmers by using high technology. The farmer can benefit from adapted information technology, agri-database, the internet of things, and local wisdom to improve the production management system.

However, to access high technology is a big problem for Thai farmers because most of the farmers are low; they have not enough money to provide such high technology. Therefore, farmers are not able to utilize benefits from technology as they should be. Besides, the government should study the feasibility of the utilization of higher technology for the farmer. Providing free applications that farmers are easy to access and use and high-speed internet for all rural areas.

Furthermore, the government must provide a learning course for farmers to understand and apply technology with their production. For this reason, the agriculture sector has changed from traditional to digital farming; farmers can improve their skills by using higher technology. The agricultural sector can achieve productivity and developed its product to high-quality standards.

Thai farmers focus on production and focus on marketing due to consumer demand has changed all the time. The farmers can produce the right quality product, but they will not receive any income if they do not have markets to sell. Advanced technology offers an online market instead of a traditional market. Producers can use social media, platforms, applications, and other e-commerce to sell the products to fulfill the consumer needed. Therefore, this is an opportunity for the farmers to increase the

agri-food sales through the online channel. Besides, many universities in Thailand establish plaza for local products, which gives local farmers more chances to sell their products to increase their income. Nowadays, people put more concerned about their health, so clean food has become more popular. Smart farmers must produce safety products, such as organics products, non-chemical products, and low-fat products, for a better life.

Although Thailand is well-known for agri-food exports, competition between countries has become more serious. Thus, Thailand agricultural sector should continue to improve agri-food products to compete with other countries. By using high technology and innovation in agri-food management, smart farmers can take benefit from specializing and economies of scale. If it can improve product quality, reduce the production cost, and release various products, Thailand agri-food will have a comparative advantage over other countries. It leads Thailand agricultural sector to gain from trade by increasing export value.

In conclusion, using high technology leads Thailand to enhance smart farming. Technology can improve agri-food management in terms of increased productivity, safety, variety of products, planning, and online marketing. The production

system must be done in a friendly environment. Therefore, farmers will get more benefits and income to increase well-being. If each country uses a suitable technology for agrifood management, it can create a better world, then the quality of life will be better with sustainable global growth.

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The Importance of Raising Awareness of Investing In Agriculture P2P Lending Platforms (Study Case: Indonesia)

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Agriculture is an important sector, especially in Indonesia, which is an agrarian country with fantastic natural potential and is expected to create prosperity for farmers. However, the fact is, farmers in Indonesia are still not prosperous. According to the Central Statistics Agency (BPS, 2020), in nominal terms, the average national farm labor wage in February 2020 compared to February 2019 increased by 0.23%, but it decreased by 0.25% in real terms. Even though agricultural laborers' income increases nominally, but the purchasing power of these wages decreases, which is due to the increase in the price of goods. One thing that causes farmers not to prosper is the problem of farmers' capital. The challenges in Indonesia's agricultural sector are limited access of farmers to financial institutions and high credit interest rates for agricultural businesses (Wibawa, 2013). Therefore we need facilities for farmers to obtain capital through Fintech with peer to peer (P2P) lending in agriculture. P2P lending is

an example of the implementation of Financial Technology (Fintech) in information technology-based lending and borrowing services (Bank Indonesia, 2017). However, the platforms are still small in Indonesia and also low community participation to invest. Collaboration from all stakeholders is needed so that farmers are prosperous and sustainable agrifood can be realized.

First is the farmers who play an essential role in increasing agricultural yield as a provider of agricultural products. Farmers who have farming skills and are adaptive to technology are needed. However, unfortunately, many Indonesian farmers still use traditional methods rather than using existing technology. Though such technology can help improve agricultural output in terms of quality and productivity of farmers. However, there are cost constraints, which are also difficult for them to make loans in banks and those who prefer to sell their agricultural products to

middlemen at prices lower than the prices sold on the market. This is undoubtedly detrimental to the farmers. The difficulty of the credit system for farmers because of their low incomes is that they do not qualify for the credit, making it difficult for farmers to obtain agricultural capital to get seeds of superior quality, sophisticated agricultural machinery, and others. Therefore, having a P2P lending platform can significantly help farmers. However, farmers' awareness is needed so that they wish to improve their farming skills, utilize technology, and matters related to the quality of agricultural products and the credibility of the platform. This is because it also requires a large commitment from farmers to produce quality agricultural products and compete in the market and generate massive profits so they can also provide guarantees for lenders who provide capital to these farmers with returns the amount that lenders will get.

Second is the P2P lending platform in agriculture, which is very important as a means for farmers and lenders. That platform must have good management, which can allocate capital to farmers, select farmers, conduct various supervision, and provide facilities that make it easier for farmers and lenders. In Indonesia, some platforms have worked closely with the Financial Services Authority, namely TaniFund and Igrow, to give

a sense of security. The existing platforms still have farmer partners that are not evenly distributed throughout Indonesia. This is due to the strict selection. So it is essential to improve the skills and awareness of the farmers. Transaction convenience and the platform management company's responsibility are also important to increase people's intention to invest in P2P lending. The platform can also maximize the use of social media to promote the platforms and products to reach a wider community.

The third is the community that plays an important role in helping farmers, especially those with excess money and want to invest but do not have farming skills. Compared to saving, it would be better if they use it by investing in getting passive income because of the platform's profit-sharing system. However, because of the low level of public awareness of this investment's importance, there are still a few lenders who are members of this platform, making it difficult for the platform to expand their partners, namely farmers. It is, therefore, important to increase public awareness to invest in the platform. This investment is also easy to do, especially for people who want to invest but lack knowledge in the capital market, which is complicated and requires much knowledge of economic matters. Investment with an agriculture fintech platform can be the right choice.

Fourthly, the government plays an important role in raising the awareness of the community about the platforms. This can be done through socialization to the community. The government also plays an important role in providing counseling and training to farmers to improve their farming skills so that these farmers can be qualified partners with the platform because the quality of their agricultural products is good and guaranteed.

Finally, academics also play an essential role in helping farmers, especially in guiding farmers to improve farming skills. At present, many farmers prefer to use traditional methods due to a lack of knowledge and skills in the use of agricultural technology. Therefore academics can help guide farmers through collaboration like community service by providing socialization, training, coaching, and counseling. As a student, I can help them by applying my knowledge related to my financial

management to get passive income by investing in P2P lending platforms or providing socialization and guidance to the community and farmers about the importance of investing in the agricultural sector form of community service. Which is profitable for me, the community and also can help farmers. This investment also does not require as much knowledge and complicated as investing in the capital market to facilitate students who want to invest without knowing the capital market.

Based on the explanation above, raising awareness of investing in agriculture, P2P lending platforms are very important and very helpful for farmers, especially in overcoming capital problems. However, all stakeholders' collaboration is needed so that the existing fintech platforms in agriculture can work optimally. That way, farmers can become more prosperous and able to create sustainable agrifood.

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Achieving Sustainability in Agri-Food Supply Chain Through Emerging Technologies

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Introduction

The past decade has seen the rapid development of the agriculture sector in many areas globally. According to IBRD/IDA report (The World Bank IBRD/IDA, 2020, April 01), sustainable agriculture is an essential means to reduce poverty and hunger, improve sustainable economic growth and nourish a projected 9.7 billion by the year 2050. Compared to other industries, agriculture growth is 2 to 4 times more efficient when increasing productivity amongst the least fortunate. The development of sustainable crop patterns and the implementation of more innovations and technology are crucial objectives of the agri-food sector (The Economic Times, 2020, Feb 01). In short, we need to design sustainable agriculture management to address the social,

environmental, and economic aspects of global agribusiness. To achieve sustainable agriculture management, we need to focus on the following:

- Increasing productivity, work opportunities, and value addedness in agricultural practices.
- Prevent the over-exploitation of environmental resources.
- Improve livelihood opportunities and enhance economic growth and development.
- Achieving the adaptability of people, communities, and ecosystem functions.
- Implement digitalization and other new technologies to survive and withstand to new challenges

The study's focus is to highlight, in an Indonesian context, advancements in the agri-food supply chain

through the adoption of emerging technologies. The implementation of modern techniques like on-farm and off-farm digitalization, IoT (Internet of Things) based smart farming, plant-based synthetic meat production, and shipping management software are discussed.

Indonesia consists of more than sixteen thousand islands, with a combined land area of 1.9 million square kilometers straddling the equator. It has a tropical climate and only has two seasons, rainy and dry. Both a maritime and an agrarian state, Indonesia has an abundance of natural resources, especially in food crops, horticulture, farming, and forestry, in what some would say is a Grace of God.

This strategic geographical position and tropical climate have an excellent potential for optimizing Indonesia's agriculture so that Indonesia can become one of the world's food baskets by 2045 (Indonesia's Vision 2045). However, in Indonesia's current reality, it seems that there are still many things that need to be considered. Extreme weather events from climate change, government policies that failed to prevent over-exploitation of agricultural areas, deforestation due to the conversion to agricultural land, urbanization, excessive use of fertilizers and pesticides, inefficient infrastructure, insufficient financing in rural areas.

Without an urgent address, the situation may form a threat to food security within the next few years. The Indonesian government forms part of the triple helix, together with academia and the industry, to encourage sustainability according to the needs and abilities of farmers.

Experiences from innovations at IPB University, Indonesia

IPB University, as part of academia, forms the technological node of innovation. Spearheading the effort is the Tani Center, which provides consultation and information to farmers in need. With the expanding internet infrastructure across the archipelago, the Tani Center would expand its reach to many farmers. The introduction of digitalization and cooperation with farmers and other agricultural supply chain stakeholders will also contribute to sustainability.

Issues with the current agricultural model

Crossing the digital divide: Many farmers in Indonesia still rely on traditional farming techniques to maintain their fields. Emerging technologies such as satellite photography and smartphone-based microfinance platforms need significant consumer education before they can be adopted.

COVID-19 pandemic: The COVID-19 pandemic has exposed the fragility in our agri-food supply chain, from transport disruptions in the short term to supply chain realignment in the subsequent economic recovery. The pandemic and its memories will drive divergence from a purely efficiency-based model towards more significant ecological and technically sustainability. Companies that can adapt will gain increased survivability in the new normal environment.

Opportunities and Solutions: Unleashing The Potential of Technology

Indonesia's vision is to become one of the world's breadbaskets by 2045, achieving food security and becoming a net agricultural food exporter. The synergy of various stakeholders can help the process by introducing the latest technological developments and quick adoption by industry actors. Under the current crisis, certain aspects of digital transformation are expected to gain increased momentum.

On-farm digitalization:

On-farm cultivation processes can be improved by things such as regional environmental updates (physical, chemical, biological land conditions), weather (temperature, humidity), monitoring of the supply of production facilities (tools and machinery), monitoring the process during plant growth, online education

and diagnostics on plant diseases, help to connect the farmers and investors through information about capital needs during the on-farm process with explicit benefit agreement for both parties.

Off-farm digitalization:

The post-harvest condition of agricultural products also needs to be considered, because according to Downey and Erickson (1989), "Profits from farming/cultivation are only 30%, while 70% are in the downstream processing and marketing sectors.' Therefore, if the downstream processing and marketing segment can be optimized and developed, it will increase the farm's value product and be well distributed to the consumer.

Startups in this sector perhaps can provide farm to table solutions to help farmers sell their produce directly to the consumer, preserving the margin lost when they go through a wholesaler. Also, off-farm digitalization can provide the newest information on price levels of agricultural products and make it easier to manage distribution and storage.

IoT based smart farming:

Technological advancements like IoT based smart farming have a lot to contribute to the development and sustainability of the agriculture sector globally. The demand for IoT agriculture is projected to rise from USD 12.7 billion in 2019 to USD 20.9

billion by 2024, at a CAGR of 10.4 percent between 2019 and 2024 (Khanna and Kaur, 2019). Precision farming has the largest share of the agriculture IoT market and has huge potential to develop sustainability in the Agri sector.

IoT based smart farming model helps the farmers through early detection of crop damage. Other possible solutions include Convenient farming; Automated planting control; Remote monitoring to prevent over-irrigation; Dynamic crop cycle monitoring and planting suggestion, and Automated moisture monitoring in crops. With the uncertainties that remain in 2020, both models and solutions face continuous disruptions and innovative challenges.

Shifting demand from plant-based synthetic meat production:

Agricultural demand must be reassessed as plant-based synthetic meat is introduced to the market. Apart from specific crop varieties supplied as the raw material, supply chain alignment is also expected as synthetic meat requires components such as cultured stem cells, which can only be produced in a lab environment. Growers and logistics providers will need to transport to production facilities instead of the traditional farm to table concept. Farmers with early access to procurement information can move quickly to secure a place in this growing market segment.

Shipping management software:

Our team member has developed a shipping software that combines minimal training with compliance with international shipping standards—allowing small to medium-sized suppliers to manage their shipping without relying on large logistic companies. A combination of increased climate fluctuations and Indonesia's archipelago setting may drive buyers to diversify their procurement sources.

Challenges in implementing digitalization:

These opportunities are motivated by a shift towards the high-tech industry that boosts capital expenditure in agriculture. However, there are challenges and limitations concerning farmers and specific stakeholders involved in building an Agri-digitalized world.

Technology adoption by farmers:

Technical or Research teams often face a trust deficit or lack the footprint to convince farmers. A possible way to alleviate this problem is to develop a B2B revenue sharing model between the existing agricultural players with a significant farmer base across the country. Enabling micro-entrepreneurship could work with the local government to unite all the farmers with small land plots.

Targeting a positive ROI in the first year in collaboration with rural finance institutions.

Achieving quick ROI: This can be resolved by providing advisory to the small service providers based on cloud-based data analytics to link them up with knowledge centers or academia. Leveraging networks of existing agriculture equipment suppliers to provide contacts and after-sales support would be a possible solution.

Regulations and Monitoring: Remote monitoring tools such as long range drones and satellites can be deployed to ensure compliance and execution. Internet infrastructures in rural areas can enable regular consultation to ensure the realistic drafting of the legal framework.

Conclusion

The COVID-19 pandemic has accelerated the trends in supply chain transformation. This study reviews the implementation of four significant advancements like digitalization On-farm and Off-farm, IoT based smart supply chain, Plant-based synthetic meat, and Low-cost shipping management software. While the study is focused on the Indonesian context, the solutions and approaches proposed can be flexibly applied globally in other issues.

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Engineering (R)evolution

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The global agricultural market has undergone significant changes from traditional trading systems to modern markets. Nowadays, agricultural market trading had changed when modern technology came in and helped consumers be more convenient. Technology and innovation will be essential in increasing productivity and increasing farmers' knowledge competitiveness to make decisions in cultivation.

As an agrarian and maritime country, Indonesia results in agriculture and fishery sectors playing an important role in our society. Particularly for the agriculture sector, it has historically in Indonesia. This condition provides fertile soil land to facilitate a variety of crops that can grow well in Indonesia. Therefore, this sector has created more job opportunities, produces many crops to strengthen national food security and raw material

products for other industrial sectors. To achieve this, President Joko Widodo has made significant progress under a business-orientated administration.

Indonesia's total land area is 190 million hectares and employed around 30% for agriculture (Central Bureau of Statistic's data, 2020). The major agriculture products are rice because rice is one of the Indonesian main food staples. Other valuable commodities are tropical fruits and vegetables. Therefore, the development of the agriculture sector is still a challenge to increase domestic income. With the incorporation of science and technology under proper treatment performed on our fertile soil, we believe that Indonesia can produce more agricultural products throughout the year.

Learning from experience and achievements in the past, the Indonesian government shall make

policies to support local farmers, such as limit the import of agricultural-based products, facilitate the training for farmers and the workers, specific crop(s) at a particular area, subsidize fertilizer, provide a reward for a particular achievement, provide equipment required in the field, etc. Indonesia is the third biggest rice producer in the world, but at the same time, we also import rice from other countries such as Vietnam and Thailand. We should learn from those countries how their government has supported local farmers, which leads them to become the biggest rice exporters in the world.

Our challenge today is how to synchronize several farming techniques to maximize the harvest. The nature of Indonesia's agricultural production system is diverse, from shifting cultivation to intensive crop farming, from rain-fed to intensive-irrigated paddy field, from vegetable mix farming to monoculture industrial plantations small-scale subsistence farming to a large-scale commercial plantation. Notwithstanding the great potential resources and market demand, the sustainability of agriculture in the country remains challenging. We need to continue developing the agriculture sector to improve life quality and fulfill our growing population's basic needs. At the same time, we can achieve economic growth and protect the environment by reducing the carrying capacity pressure.

Digital farming offers the best solution to get advanced agriculture, especially in the era of New Normal. This system can overcome several drawbacks faced by traditional agriculture. Internet of Things (IoT) is a kind of technology innovation, cyber-physical system, as a tool in agriculture that can be linked to water resources management and weather information collection and thereby store databases that further can be developed to ease the technical operation in farmlands. Many traditional farming techniques can be simplified with digital farming, such as watering the lands, assisting fertilizer distribution, etc.

Precision agriculture that leads to low input, high efficiency, and sustainable agriculture mainly benefit from the emergence and convergence of several technologies. These technologies include the Global Positioning System, geographic information system, miniaturized computer components, automatic control, infield, remote sensing, mobile computing, advanced information processing, and telecommunications. A GIS and several remote sensing methods are an effective tool for agricultural and environmental mapping macro and micro levels. This technology can create an agrifood solution based on satellite information and mapping from various regions summarized in one application, named Harvest Moon Apps. This application could be

a solution to problems in the agrifood management system from upstream to downstream.

Therefore, it is not surprising if Farming 4.0 will increase product quality and quantity, and thus, the farmer's welfare can be significantly increased.

'Village Fund National Program' conducted by the Indonesian Government should be a bridge for collaboration between farmer, local government, academic, and business to reach digital farming. This team shall sit together to discuss strategies to implement and optimize technology usage in farmlands with their roles. It is also necessary to call the millennial generation to be involved in the team since the young generation is always filled with creativity and something new, including implementing recent technologies to reduce capital expenditure. Subject Matter Expert can also contribute by sharing their experience to improve the quality control process, followed by quality assurance implementation. The Indonesian government program to raise the farmer's living standard is not just a dream by bringing together several partners related to this subject. However, it can be real in the near future.

Finally, digital farming supports the development of the micro-small-medium enterprise sector indirectly to improve the national economy. We know that pandemic has fallen the global economy and, therefore, fully supports supply chain assistance, education, and technology assistance to those enterprise sectors as the basic structure of upstream and downstream lines is necessary to facilitate the farmer's needs. Not only that, IoT development allows us to track product transportation and distribution, and thus, risk and disappointment among parties can be reduced. In the end, we suppose not to worry about the food crisis; even we can get food self-sufficiency or more. We can supply other countries' needs since our agriculture and fishery products have added value and competitive value. All of those things can be achieved if all of us (government, farmers, academics, business sector) work together to start from now, in the middle of the pandemic, to investigate which parts need to be fixed and improved to start digital farming.

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Fishpreneur: Developing Entrepreneurial Skills in the Gillnet Fishermen Joint Business Group (JBG) in Barsela Aceh through Simulation and Sensitivity Training

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Often discussing fishermen's conditions in Indonesia, especially traditional fishermen, can not be separated from the poor economic conditions and welfare far from feasible. Based on the 2018 BPS data, 20-40% of fishermen in Indonesia are in poverty. Of course, this proves that improvements are still needed from the fisheries sector in Indonesia.

Improving the welfare of fishermen is a must, considering that the fisheries sector is one of the sectors that can be a mainstay for improving the national economy, such as increasing the country's foreign exchange. During the Covid-19 pandemic situation, the fisheries sector can still export 1.24 billion dollars or equivalent to

Rp18.2 trillion during January-2020. That figure is 9.82% greater than the export results in January-March 2019 (KKP, 2020). Also, Indonesia's marine fishery stock, which continues to increase every year, is a good potential for national fisheries sustainability (KKP, 2017). In 2014 Bappenas did a mapping of fishermen's problems through a fishbone diagram. As a result, in the human resources perspective, Indonesian fishermen are still plagued by problems regarding low business management knowledge, stuttering in obtaining information technology and capital, and knowledge about the importance of association, which is still low. This can be caused by various factors, one

of which is fishermen's education, who are below standard qualifications. Of the 38 million workers in agriculture and fisheries, around 14.6 million are only elementary school graduates. Even 10.6 million people who pursue this sector do not complete primary school and have never received education (BPS, 2020). It is ironic if we compare it with the skills needed for a fisherman, namely to exceed the basic education level.

The problem of fishermen who lack expertise in understanding their work can still be solved, such as by accelerating through the right program. In Canada, the development of the ability of fishermen has been done a few years back. The program provides essential skills that encourage Canadian fishermen who sail to the Atlantic ocean to be better in the fields of computers, languages, and calculations (CCPFH, 2015). In Indonesia, there is a National Program for Community Empowerment in Maritime Affairs and Fisheries (PNPM-MKP) through the Development of Rural Mina Enterprises (PUMP), aiming to increase production, grow entrepreneurs, value-added, and improve institutional functions.

However, the PUMP program has been ineffective due to a lack of monitoring and aspiration groups (Hikmah et al, 2017). Also, the bottom-up system used by PNPM, which is the community itself, which conducts program planning and monitoring, causes a lack of effectiveness of this program. On the other hand, PUMP activities' interpretation is more on channeling funds and forming fishing groups. Therefore a breakthrough is needed in overcoming existing problems. Fishermen are present as a forum to overcome the skills gap and improve the ability of fishermen entrepreneurs.

Then the question, "Why did Fishpreneur choose JBG gillnet fishermen as an object in applying the program?". Based on research conducted by Rizal et al (2016) on the performance of the Gillnet fishermen Joint Business Group (JBG) in Barsela Aceh, the answer showed unfavorable results for economic aspects, even though the JBG of gillnet fishermen in Barsela Aceh has received PUMP assistance for four years. The indicators for the JBG of gillnet fishermen in Barsela Aceh are shown in the following table.

No	Indicator	Existing condition	Important value	Gap
1	The level of capital utilization per JBG	1.54	3.38	1.85
2	The circulation of capital to each member	1.54	3.69	2.15
3	Efficiency of continuous business production	2.15	3.69	1.54
4	The percentage rate of saving from profits	1.54	3.38	1.85
5	Interest in JBG member savings	1.85	3.38	1.54
6	The active savings and loan activities of JBG members	1.23	3.69	2.46
7	level of development of JBG turnover	0.62	4.00	3.38
8	The level of neatness and accuracy in bookkeeping	2.15	3.69	1.54
9	financial and inventory bookkeeping	0.92	3.08	2.15
10	The level of market opportunity for the JBG fishing business	0.62	4.00	3.38
11	The level of commitment in the preparation of financial design	2.15	3.38	1.23
12	JBG management and members conduct JBG financial audits	1.54	3.38	1.85
13	Make a year-end balance sheet financial report	1.23	3.08	1.85
14	empower saving habits for future economic needs	1.23	3.38	2.15
15	Pattern of revenue sharing among members	0.62	3.08	2.46
16	The realization of an independent MFI	1.54	4.00	2.46
17	business development towards a productive business economy	1.54	3.69	2.15
Total		24.00	60.00	36.00
Average		1.41	3.53	2.12

Table 1. Evaluation of performance level on economic aspects of JBG gillnet fishermen in Bursela Aceh (Source: Rizal et al, 2016).

In the table, the important value is a number that becomes a benchmark in the success of JBG performance, while the value of existing conditions is a number that indicates the level of JBG performance at the time of the study. From these data, it is seen that the level of development of JBG turnover and the level of market opportunities still require more attention. Overall,

from the economic aspects, there are many gaps whose values are still far from standard. From research Rizal et al. (2016) also added that monitoring of JBG is still lacking.

Then, "How can the concept of Fishpreneur help JBG Gillnet Fishermen in Bursela Aceh?". Fishpreneur applies the concept of off-

the-job training through a simulation approach and sensitivity training. Simulation is making situations close to the actual situation through management games, case studies, role-playing, and in-basketball training (Raheja, 2015). According to Jacobs and Dempsey (1993) in Milhem et al (2014), simulations are often used in business practices. With this concept, fishermen can be encouraged to carry out business practices carried out by simulators or practitioners, like the practice in doing digital marketing, preserving, and providing value-added to the catch. The second concept is sensitivity training. Sensitivity training is another name for T-group training that aims to make group members understand other group members and their problems (Raheja, 2015). Through these two concepts, fishpreneur is expected to be a smart solution to the JBG problem. The fishpreneur program's realization involves various stakeholders such as the government, academics, practitioners, and JBG gillnet fishermen as the main actors.

It is hoped that the fishpreneur program can be realized in order to welcome a better fishing life. Besides, the implementation of the fishpreneur program also contributed to implementing the Sustainable Development Goals (SDGs) program in point 4 on decent work and economic growth in the target of entrepreneurial growth and employability.

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The Urgency of Online Market Realization in Agrifood Systems

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No one would ever doubt the role of food as an important aspect of our lives. Waibel (2020) said that food is our instrumental needs and our intrinsic needs. It has a unique status in our lives, different from other goods (cars, computers) because we ingest it. Ironically, as Malthus (1798) in Oladimeji (2017) stated that the world population is growing geometrically while food production is only increasing arithmetically, is pretty much the way we can describe our agrifood situation nowadays. The youth in rural areas often avoid working in agriculture fields because of the lack of income along with gender inequality in pay and opportunities. This makes them join the flow of internal and international migrants workforce (FAO 2017). Farmers who stayed in rural areas are now aged, making it harder to disseminate new agricultural innovations. Moreover, poor economic conditions push them to sell their land to other industries

or housing. A comprehensive collaboration is needed to support our farmers through this situation.

Agri-food links agricultural production food events from productions-processing, trading, distribution, and consumption (from fields to fork) (FAO 2017). Globally, consumers and farmers alike are unable to access the market (O'Boyle 2019). Agri-food markets and functioning are also considered important keys for sustainable development, as stated in SDGs Framework number 2 'Zero Hunger' target 2.3, 2.b. And 2.c (UN, 2015). Using the Internet could be a smart solution to solve this problem. Especially in this new normal era, when everyone is forced to convert their daily activities into online-based. The Internet could expand geographical and time barriers. This could expand the agrifood market: the Higher market, Higher income, and the Higher interest of agrifood sectors.

We realized that there would not be a simple solution to transform traditional-digital agrifood systems quickly. However, what we need is not a simple solution except an optimal solution that could fulfill all the parties' needs. Every community has its own social and environmental criteria, such as culture, norms, human and natural resources, that could be seen as to whether a positive or negative potential. Therefore, we believe a micro-oriented problem-solving approach should be implemented. We proposed the collaboration model as described in this image below:

1. The government

The Central government should give autonomy to the local mayors (or local government leaders) to evaluate the real problem they faced in their area according

to the implementation of ICT. With a detailed evaluation, the government could make strategic internet access (with help from other departments) grant to the entire country.

2. Extension professionals

Farmers often avoid adopting innovation because they are afraid of new things. Trial and error could cause money loss. They also feel comfortable doing things traditionally. After several field trips to rural areas in West Java, we found that the community lacks self-confidence in trying new innovations. They perceived that they are not as good as urban communities and thought that they are uneducated. This is where the professional extension workers play the role. They

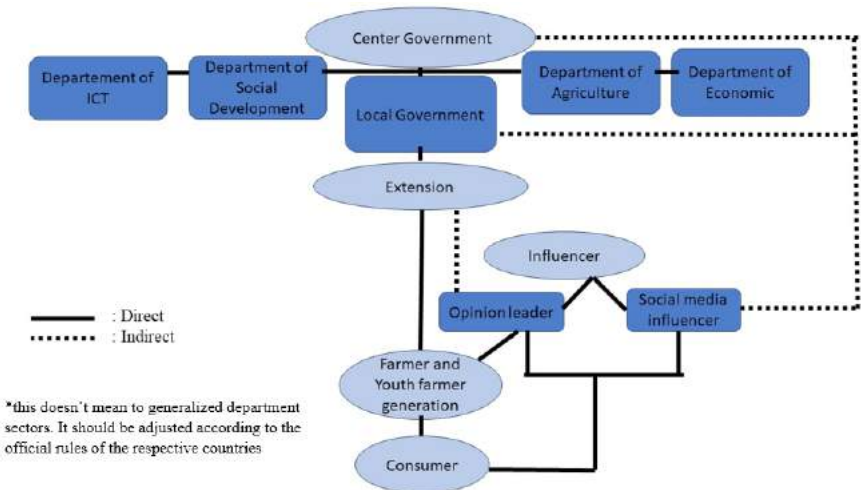


Image 1. Stakeholders: connection and roles

expected to be able to convince farmers to start implementing digital tools. The extension workers should be equipped with digital literacy competency. We are also aware that the process of adopting new information will not be implemented instantly, as Roger’s (2003) model of diffusion of innovation is explained in the image below.

To make it more effective, the diffusion information process needs the support of influencers that will be discussed in the next point.

3. Influencer

Transferring the relevant technologies is the main job of extension personnel. However, opinion leaders must play a vital role in the dissemination of agricultural information amongst

their followers. Opinion leaders are those individuals who have a greater than average share of influence within their community because they informally modify the opinions of others. They can bridge desirable change in the community for its overall development (Hameed and Sawick 2017). History has taught us that the greatest social movement is rooted from the bottom-up. That is why community participation has important roles. The opinion leaders in the consumer community also play an important role in changing their online grocery shopping habits. Another type of influencer is a social media influencer. Nowadays, they have a strong power to lead public opinion, whether in live fashion, sport, hobbies, and expenses behavior. The government could

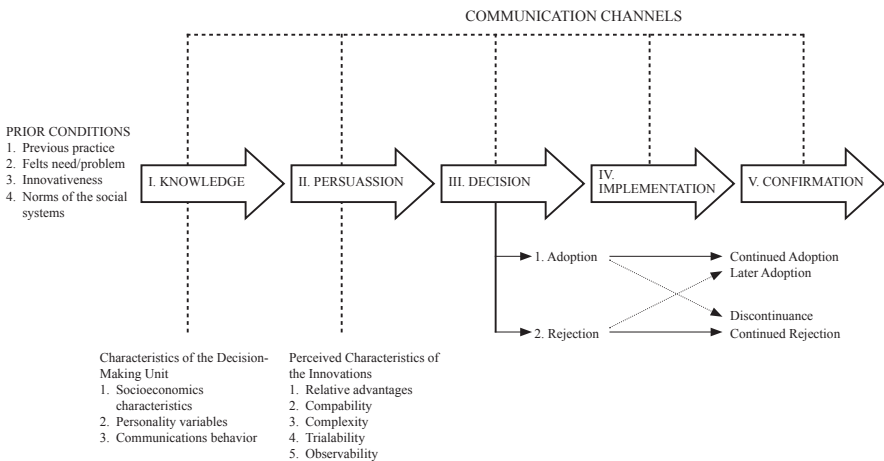


Image 2. diffusion of innovation model Roger (2003)

collaborate with them to influence society in using agri-food digital apps to buy our daily food's needs.

4. Farmer and youth farmer generation

Besides extension workers, the next generation of farmers, the youth in rural areas, should also be considered the most potential targets. The youths are more in touch with the latest information technologies. Implementation of online schools in mostly all over the world because of covid-19 pandemic also forced them to one step ahead on using information technologies.

5. Consumers

The consumer needs to start converting to online grocery shopping. Everyone who has ICT devices access could contribute. Changes in consumer behavior could trigger the transformation of the online agri-food market. With the benefits they have (efficiency and effectiveness in buying), they could spread a positive message and encourage each other to change.

Injecting ICT in an agri-food marketing system needs to be fully supported. Unlimited time and no geographical barriers will increase the farmers' income, which leads to attracting the next farmer generations' interest. However, we also realize that there are still core problems to improve the capability of rural farmers. With all the problems that we have, it is not the time to say and think about "if." It is time to think about "will" and "now."

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PRODUCTS AND OR PRODUCTION



NO. Registration: 016/PAP/I/9/20

Create a Better World with Agriculture Value-Added

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Indonesia is the fourth-ranked country in the category of the most populace in the world. Besides, it also has a rich natural richness of many people in livelihood as a farmer. However, as time grows, people migrate to the capital to work as an industry employee. The impact of this makes the resource to manage the farm less. It is disrupting food supply because the increase in population is not accompanied by food independence. Then it was worsened again by the pandemic Garry that spread throughout the world. Counted in March, the Covid-19 began to spread in Indonesia.

The global agricultural market has shifted from traditional trading markets to modern agricultural markets. Agribusiness becomes an important factor for economic development, leading to changes in the agriculture management system. In Thailand, the agricultural sector consists of small farmers that they lag of use technology. The

farmers use traditional knowledge and instruments together with local wisdom. Besides, Thai farmers rely on a middleman, causing farmers less benefit from their products.

Due to the changing consumer taste, the farmers and entrepreneurs should improve the production and management system for variation of consumer demand. Most farmers try to reduce the cost of production to get higher revenue. However, smart farmers should focus on how to increase the value-added of agricultural products, such as improve the quality of the products, produce various and safety products, and realized the production that friendly environmental. Also, agricultural production must consider an ecosystem, farm management system, and social responsibility to achieve sustainable agriculture.

The price of agricultural products always fluctuated because of seasonal, climate changes, and excess supply. These are the factors that

Thai farmers cannot control, causing farmers to have uncertain income. The way to survive is that farmers must increase products value-added as it can upgrade the general product to be high-quality products, and the price will rise. For this reason, farmers must be increase skills and update the latest knowledge about modern production over time. Hence, when farmers produce high-quality products, they will benefit from higher sales and take advantage of economies of scale. Then, the farmer's income will increase in the long-term.

The technique to create Agri-food value-added is food processing. Food processing is any method used to turn fresh foods into food products. This can involve various processes, including washing, chopping, pasteurizing, freezing, fermenting, packaging, cooking, and many more. Food processing also includes adding ingredients to food for extending shelf life. Moreover, when agricultural

products faced oversupply situations, food preservation and food processing can be helped farmers reduce losses from such products. Besides, food processing can make new types of agriculture products. Nowadays, consumers prefer a convenient life. Processed food becomes more important for the new generation. As a result, when the sales of processed food increase, farmers will benefit from agricultural products as well.

In the digital era, technology and innovation played an important role in the agricultural sector. It can increase the productivity and competitiveness of agricultural products. Farmers can improve knowledge and adopt high technology to achieve a modern production management system and online marketing. Creating products value-added leads to enhancing agriculture development, as well as farmer's income therefore increase. Finally, agriculture value-added can create a better life and a better world.

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NO. Registration: 017/PAP/1/9/20

Achieving Sustainable Agrifood Management Through Agricultural Innovation

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Sustainable agrifood management approaches proper long term of healthy food supply globally considering the natural environment. It focuses on optimizing production, minimizing negative environmental impacts, and promoting actions for the protection, conservation, enhancement, and efficient use of natural resources. It is planned in such a way to benefit current generations and future generations. It is intended to protect the environment, expand the earth's natural resource base, and maintain and improves soil fertility. Based on multipronged goals, increase profits from income, and promote environmental stewardship.

One way to create a world with sustainable agrifood management in agricultural innovation and technology. Agricultural innovation can be defined as the process whereby individuals or organizations bring new or existing mindset, approaches, products, processes, or ways of the

organization into use for the first time in a specific context to increase effectiveness, competitiveness, or environmental sustainability. That way will contribute to food security and nutrition, economic development, or sustainable natural resource management.

Also, it essential to decrease losses and waste and develop the production and consumption of more nutritious food.

One example of agricultural innovation is visual data that farmers can collect from exsatellites, and drones equipped with cameras can provide high-resolution images of arable land, giving farmers an overview of yield patterns across vast amounts of land. This is beneficial to both farmer and inventor. As well as the government for the prosperity of agriculture and recovery of the economy, the consumer benefits by receiving a low price of the product.

Critical challenges of sustainability agrifood management are production, manufacturing, wholesaling-retailing (trade), and consumption.

1. Production

The global challenge of food availability is the increasing demand for food. Due to income and population growth over the world, the demand for food is over expected supply, increasing pressure on productivity advancements, and increased mobilization of land, water, and other resources. Therefore, global markets will increase food prices and, so, the availability issue affects nations with low food affordability, and the first victim is the consumer.

2. Manufacturing

The agrifood sector is essential in many agri-based developing countries. The government can support local farmers by providing infrastructures like rural roads and electrical power grids and storage and refrigerated transportation. However, the lack of essential infrastructure in the country negatively will affect the amount and cost of production which farmers bear.

3. Wholesaling–Retailing (Trade)

International trade can positively impact rural development by supplying inputs and equipment and by fulfilling food demand. On the other hand, trade liberalization effect growing imports, which benefits consumers. On the other hand, restraining local production will negatively affect the local farmers because the low demand for their products, such a gross domestic product of the country, becomes low. Hence, the government needs to impose regulations to restrict imports.

4. Consumption

Due to the increase in the number of population and income growth, the food demand globally increases. The dietary patterns and consumer preferences become diverse such as the declining role of cereals and the growing demand for protein-rich diets due to the observed increase in average incomes.

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AGRIBUSINESS DEVELOPMENT



NO. Registration: 018/AGD/I/9/20

Catfish Agribusiness: A Youthful Agripeneurial Experience from Nigeria

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The global population is increasing, and so is the demand for food. The three basic essentials required for a sustainable and comfortable life are Food, clothing, and shelter. Food is the most important because all beings depend on food as a source of strength and continuity of existence. This makes ensuring a secure and sustainable agrifood system, both locally and globally critical. The agrifood system involves all production processes to the agricultural product consumption to ensure everyone is nourished and properly fed.

Unfortunately, the current global agrifood system is being threatened by a myriad of challenges ranging from food and financial crises, climate change, fast population growth to depletion of natural resources. Reports by world organizations such as Food and Agriculture Organization (FAO), International Food Policy Research Institute (IFPRI), and World Bank Group have shown that developing and least developed countries are much at the receiving end of these

challenges, which my home country Nigeria is not left out. A critical review of the situation allowed me to critically think that if I could not solve the world problems, I could create a local impact by developing an agribusiness. After graduating in 2012 with a degree in Agricultural Economics and Extension from Ladoke Akintola University of Technology (LAUTECH), I settled for Catfish farming, Ogbomosho having in mind that catfish farming could be a daunting venture that could be breathtaking.

My journey into catfish production in an urban area was not spared of challenges that linked to an uncoordinated linkage of stakeholders (actor) in the agribusiness development chain. I had to deal with problems of lack of finance, quality feed production, and marketing. These are contributory factors to why youth are not willing to venture into agribusiness. Despite all, I was determined to fill the increasing gap of catfish supply-demand in Lagos, Nigeria. My father was magnanimous

enough to give me his backyard for farming. At that time, I had no collateral to secure finance from the banks (financial actor), so I opted to use my moral credibility to secure funds from friends and family members. To reduce ponds construction cost and achieve the desired pond size specification, I used an innovative wooden tarpaulin pond capable of rearing 3,000 juvenile catfishes till the table-size stage and generating an annual harvest of about 6 tonnes. Production on this scale requires some helping hands; as a result, I had to employ 1 to 2 people on a part-time basis. My family and friends took the role of financial stakeholders.

Catfish feeding consumes about 70 percent of the variable cost of production. In-depth knowledge of feed formulation, local feed ingredient (FI) sourcing, and production is core to maximizing profit. As a novice in this area, I lost a considerable amount of money in the first business cycle to feed fish millers who supply me with low-quality feeds. This was worsened because there was no catfish farmer group in my locality to serve as an information base. I embarked on an ultimate search for other farmers and formed an informal group of about 5-10 local farmers. This paid off because we could share profound information on feed formulations and a local replacement of imported FI and jointly purchased materials that reduced business cost. I learned to

formulate and produce good quality feed to meet different developmental stages of catfish.

My catfish agribusiness is not complete without a reliable market channel to sell. Local market women are our traditional customers who, in turn, sell fresh fish to direct consumers. In collaboration with middlemen, the market women dictate the price and have forced small-scale farmers like me out of agribusiness. Having this in mind at the time of my harvest, I leveraged on technology by advertising on social media (Facebook and WhatsApp) platforms and dispatch bulk text messages to phone numbers of buyers retrieved online. With this, my market base expanded outside my locality and helped determine the price and sell at reasonable margins. Also, I reached out to other actors, called "Fish Smokers," in the market channels that specialize in value addition through drying of catfish to increase shelf life.

The Fish smokers' contribution to my agribusiness chain boosted this business initiative because some are just waiting for me to produce the fish so they could dry and export.

The challenges and experience witnessed in my catfish agribusiness do not fall short of what other various agribusiness developers face around the world. For agribusiness to create a better world with sustainable

agrifood management, a particular framework and strategies need to be put in place. Such framework and strategies could include empowering and engaging farmers (farmer organizations) in the value-added chain, encouraging synergy between large firms and farmers to sustain the small agribusiness, propagate use of innovation and technology in farming, less stringent requirement by financial institutions for obtaining funds for agribusiness and governments policies stimulating agribusiness development, most especially for the youth.

Conclusively, the world is vast, becoming a global village. I believe that the goal of sustainable agrifood systems and food security is achievable when a country can tap from its neighbor's successful agribusiness development models and adapt or replicate it to its prevailing local situation.

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NO. Registration: 005/AGD/G/9/20

Agrichain A System to Boosting Marketing of Agri-Food Products

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Agriculture in Indonesia is running on the road. To support the lives of the Indonesian people, the agricultural sector needs strong and increasing economic growth. This sector also needs to be one of the main components in government programs and strategies to reduce poverty. One problem that occurs is the lack of marketing of agricultural products. Farmers find it difficult to sell their products. The agricultural marketing system is a unified sequence of marketing institutions. His job is to carry out marketing functions to facilitate the flow of agricultural products from initial producers into end consumers' hands. Furthermore, vice versa smoothen the flow of money, the value of products created by productive activities carried out by marketing institutions, both from the hands of end consumers to early producers' hands in a commodity

system (Gumbira Sa'id, E. and A. Haritz Intan, 2001). What is often found in marketing agricultural products is that there are still gaps in the distribution of profits between distributors/middlemen and farmers. The farmer is the weakest party who receives the least profit. Such conditions that cause work as farmers do not seem promising. The advantage is not much, not to mention the loss when the weather does not support or pest attacks.

The basic understanding of marketing is a calling and meeting the needs of humans and society; in other words, marketing is fulfilling needs profitably. Marketing can be defined as "managing" the market to produce exchanges that satisfy human needs and want. Marketing is a process in which individuals and groups achieve what they want and want through a product and value to others (Kotler

and Keller, 2009). a process of meeting the needs and desires of consumers. In this process, marketing activity is needed as a series of activities or services carried out to move a product from producer to the consumers. Marketing is a productive activity because it creates utility, form, place, time, and property (Kotler and Keller, 2009).

The agricultural product marketing system is complex in various subsystems that can be arranged with each other and with various marketing environments. Thus the five subsystems, namely the production sector, consumption channels, flow, and each other's functionality in the sixth subsystem, namely the environment. The agricultural yield target is unique and deserves special attention because most agricultural products are basic needs, so that the government strategically regulates prices and distribution. In this case, the government directs the orders of legal institutions in the agricultural marketing sector.

Agricultural business actors in Indonesia face many problems. Based on the results of a study on Indonesia's agricultural problems, these problems can be summarized in the concept of a basic component of marketing called the marketing mix. The marketing mix in question is Product, Price, Place, and Promotion.

1. **Product**

Marketing, of course, starts with the product. In this case, the product we mean is agricultural products. This function is intended to simplify an agricultural product to simplify and reduce moving commodities' costs through marketing channels. Grading is sorting products into specific units or units. Standardization is a justification for uniform quality between buyers and sellers, between places and over time. The characteristics of agricultural products (perishable products) are perishable and must be available fresh (freshness). Therefore handling must be fast when required for harvesting, processing, transportation, and storage must ensure freshness, not damage. The health (hygiene) level is still guaranteed, and marketing requires more direct marketing (Peter and Donnelly, Jr. 2009).

2. **Price**

The price of agricultural products always fluctuates, depending on the changes that occur in supply and demand. The ups and downs of prices can occur in the short term, namely per month, per week, and even per day, or can also occur in the long term (Syahza, A., 2003). For perishable agricultural commodities such as vegetables

and fruits, the effects of changes in market demand are sometimes very striking so that the prevailing prices change rapidly.

3. **Place (Distribution)**

Distribution is a physical process that addresses the marketing function specifically carried out to complete the marketing process to move agricultural products from producers to consumers. Several important functions in the marketing of agricultural products include storage, transportation.

4. **Promotion**

The promotion function is intended as a form of communication to inform consumers what is available for purchase and to change demand for a product (Alma, 2006). To be recognized, agricultural products must have a certain brand so that the brand will be promoted to consumers because it is the identity of a product.

The development of the world of competition is now more open with the start of the free trade era so that the competition that occurs is not only domestic competition but also competition with other countries. Competition is not something to be afraid of, but it should be watched out for. Competition can be a separate form of motivation to continue to compete and win the market. Agricultural entrepreneurs must be

able to change their mindset from “Sell what u can produce” to “produce what you can sell” (Suprpto, 2008, Shepperd, 2007).

To answer the problem of marketing agricultural products in Indonesia, we must have a system that can facilitate the marketing of agricultural products, namely Agrichain. Agrichain is an Information system used to collect, analyze, and disseminate information about prices and other relevant information used for farmers, ranchers, traders, buyers, and all those involved in managing agricultural products. Agrichain plays an important role in the agroindustry and supply chain of agricultural products. The more information collected, the more convenient it is for everyone who can access the information.

If producers know the quoted price levels, farmers will have the ability to negotiate with dealers and/or bring agricultural products directly to the market. The selling price is higher than farmers selling their products to local dealers. Agrichain farmers' markets may also decide to produce supplies if the harvest season in other countries has not yet arrived, and prices will likely increase in the near future. The role of Agrichain is to provide information to farmers, as producers, dealers, and especially consumers about product availability and on selling prices.

Anyone can easily access the AgriChain system that has been developed. In the future, it is hoped that agricultural marketing will not only be carried out conventionally but also online-based agricultural marketing. In this way, the length of the distribution lines can be reduced significantly. AgriChain's ability to provide useful information must be strengthened by developing internet and electronic technology and resource development human.

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Sustainable Agrifood Management: Case of Catfish Business Development

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The global population is increasing, expected to reach 10 billion by 2050, and so is the demand for food. The three basic essentials required for a sustainable and comfortable life are Food, clothing, and shelter. Food is the most important because all beings depend on food as a source of strength and continuity of existence. This makes ensuring a secure, and sustainable agrifood system both locally and globally critical. Agrifood system involves all processes from production to consumption of agricultural produce to ensure everyone is nourished and properly fed.

Unfortunately, the current global agrifood system is being threatened by a myriad of challenges ranging from food and financial crises, climate change, fast population growth

to depletion of natural resources. Reports by organizations such as Food and Agriculture Organization (FAO), and International Food Policy Research Institute (IFPRI), have shown that developing and least developed countries are much at the receiving end of these challenges, of which our home countries (Nigeria, Indonesia, Malaysia and Thailand) are not left out.

Catfish production is lucrative agribusiness globally and countries like Malaysia, Indonesia and Nigeria are top producers. Catfish farming could be breath-taking and challenging especially for youthful agri-preneurs. The challenges faced by a group member catfish agribusiness in Lagos (Nigeria) spanned across uncoordinated linkages of agribusiness stakeholders, lack of finance, inferior feed inputs, and

marketing. Despite all, the member was determined to fill the increasing gap of catfish supply-demand in Lagos. Funding the business at onset was difficult because the member had no collateral to secure finance from the banks (financial actor) and instead opted to use moral credibility to secure funds from friends and family members to make the catfish business survive. In order to further ameliorate funding challenge, an innovative wooden tarpaulin pond capable of rearing 3,000 juvenile catfishes (6 tonnes annual harvest) till the table-size was constructed. Production of catfish on this scale requires some helping hands; as a result, a part-time job for 2 youth was created. This also supports the fact that small scale agribusiness can enhance job creation.

Catfish feeding consumes about 70 percent of the variable cost of production. In-depth knowledge of feed formulation, local feed ingredient (FI) sourcing, and production is core to maximizing profit. Being a novice in this area, a considerable amount of money in the first business cycle was lost due to feed fish millers supply of low-quality feeds. This was exacerbated because there was no catfish farmer group in the locality to serve as an information base. The member embarked on ultimate search for other farmers and was able to form an informal group of about 5-10 local farmers. This paid off, because they were able to share profound

information on feed formulations and local replacement of imported FI and also jointly purchased materials which reduced business cost.

Farmers need focus not only on production but also marketing due to continuous changes in market conditions. Farmers knowledge of market conditions contributes to generating sustainable income. Marketing was also a key challenge faced by the catfish agribusiness experience from Nigeria. Local market women are traditional customers who in turn sell fresh fish to final consumers. In collaboration with middlemen, the market women dictate the price and have forced small-scale farmers out of agribusiness. Having this in mind at the time of harvest, the member leveraged on digital marketing by advertising on social media (Facebook and WhatsApp) platforms and dispatch of bulk text messages to buyers. This action not only expanded the market base but also allowed the business to determine the price and sell at reasonable margins. In addition, other stakeholders in catfish agribusiness, called "Fish Smokers", specializes in value-addition through drying of catfish to increase shelf life. The Fish smokers' contribution to the agribusiness chain boosted the business because they waited for the member to produce catfish so they could dry and export. Smart farmers need key into value-addition agriculture in order to maximize profits.

The challenges and experience witnessed in Nigeria catfish agribusiness experience is a reflection of the challenges faced by various branches of agribusiness developers around the globe. The recent pandemic, COVID-19, further exposes how fragile the world agrifood system could be. The pandemic has spread directly through livestock or agricultural and aquaculture commodities, and therefore does not directly disrupt production in agrifood. However, the crisis undermined the ability of farms and aquacultural companies to ensure a consistent supply of food to markets due to forced closures, labour shortages due to disease, and a slowdown in operations caused by physical distancing and lockdowns. All of these circumstances jeopardize the ability of agrifood companies to continue business as usual and, in certain cases, threaten the survival of some companies after the crisis, especially small businesses consisting of farmers, agricultural companies, traders, food producers, distributors and retailers.

For agribusiness to contribute to a better world with sustainable agrifood management, certain frameworks and strategies need to be put in place. Firstly, agricultural productivity needs to be increased in order to survive the COVID-19 pandemic. This productivity development needs to be varied

from the upstream to downstream agricultural sector. Farmers as the main players in the agricultural sector should be supported by policies such as capital assistance, less stringent requirements by financial institutions for obtaining loans, product distribution, and digital marketing. Secondly, licensing and tax collection need to be considered. Productive agricultural land needs to be protected from rapid conversion efforts. Farmers' burden should be eased through eliminating land taxes, subsidized fertilizers, and so on. In fact, the converter needs to be controlled by the tightness of sustainable agricultural land policies. Thirdly, empowering and engaging farmers (farmer organizations) in the value-addition, encouraging synergy between large firms and farmers. Lastly, friendly policies targeted at stimulating willingness of youth to have a paradigm change about agricultural profitability

Conclusively, innovation and technology development can be a useful driver for improving agribusiness and agri-food management. The goal of sustainable agrifood systems and food security is achievable when everyone sees agribusiness development as a collective effort.

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NO. Registration: 007/AGD/G/9/20

Creating A Better World With Sustainable Agrifood Management

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Are you ever concerned about what food you are eating? People can just avoid eating food products that they already know containing non-halal ingredients written on the label, but they cannot avoid all the non-halal things involved in food production. The halal food industry plays a huge role in contributing to the global market, not only to Muslim customers but also to serve consumers from non-muslim countries.

Before digging deep into this issue, let us acknowledge what is actually involved in the halal industry. Traditionally known by the common community, halal is often associated with processed food and beverages, organic and non-organic ingredients, and logistics. As globalization occurs, increasing the population of people who are aware of the halal industry, many new sectors are emerging, such as cosmetics, tourism services,

modest fashion and etc. Each of these sectors is developing fast and taking its part in expanding the halal industry. The halal concept is more to enhancing the quality of life as it emphasizes complying with the cleanliness and hygienic qualities in every production or service as halal being the new source of economic growth.

There are three main phases that are focal points in halal food production, starting from raw materials, the food process, and its authentication. The potential critical areas for complying halalan toyyiban aspects are from the raw materials used, slaughter, processing operations and equipment used, packaging, storage, transportation, ingredients and additives, and not to forget all the safety and quality aspects. When applying the halalan toyyiban concept in food production, it is critical to

ensure that the source of origin to all the ingredients are totally free from any non-halal substances. This means the raw material used must be free from carrion, blood, swine flesh, and animals that are not slaughtered in the name of Allah. During the food processing, it is brought to attention that no cross-contamination occurs between the raw materials processed and any haram substances, including the machine and equipment. The storage and transportation are other important phases to be subjectified on to ensure that the food is not stored in a similar area as non-halal products to avoid any possible cross-contamination.

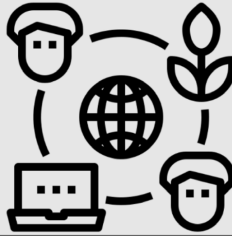
This also applies to the transportation of halal food. Any ingredients such as additives, emulsifiers, food conditioners that have non-halal origins are prohibited and can damage the halal food product quality. In addition, many food blending is based on pork, which is prohibited in Islam and affect the quality of the product. By assuring all ingredients that are added to the food product are from halal origins will improve the halal food quality and be guaranteed to be 100% halal. Safety aspects and quality control also must not be neglected as it is also comprised of the halalan toyyiban concept. In other terms, halal food is important not only to satisfy the Islamic principles on food, but it also has to maintain the quality of halal food.

Each year, millions of tons of halal food wastes are being disposed of into the environment through land-filling or illegal dumping activities. Currently, the government has no other cheaper and easier options than landfills. Dumping of organic waste materials into the environment will partly contribute to the global warming phenomenon due to methane gas generation through the anaerobic process, occurred inside the landfill or river bed. Methane gas has 21 times higher global warming potential than carbon dioxide and can severely affect the environment if not properly managed. Also, it is well known that biorefinery could enhance the current state of halal food waste handling, which include kitchen waste, waste cooking oil, food waste, landscaping and garden waste, wet market waste, night market waste, halal slaughterhouse waste, food processing facility waste and other types of halal waste. Through biorefinery complex, these waste materials can be converted into value-added bioproducts such as biodiesel, biogas, bioethanol, animal feed, biofertilizer, bioplastic, biomaterial, and others.

This will enhance the halal food industry and also support the government's aspiration towards achieving a high-income country. As a result, the better halal food industry in the global market can be easily sustained for the better of the community and the future generation.

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VALUE CHAIN DEVELOPMENT



NO. Registration: 020/VCD/11/9/20

Sustainable Agriculture Management: Developing the Value Chain to Help Reduce the Malnutrition Globally

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I may not be a specialist in sustainable agri-food management or have had solid training in this matter, but during the research, prior to carrying out this essay, I have been able to reinforce my concern about the serious problem posed by unequal access to food in the world. I have decided to analyze this problem from the perspective of the value chain in terms of the production and distribution of the product globally, as well as access to a healthy diet by the population of both developed and underdeveloped countries.

Countries and international organizations have worked side by side to stop the main problem at the global health level. However, in recent years it has been found that the trend toward the undernourishment of the population has increased due to causes such as the succession of armed conflicts, adverse climatic phenomena, as well as the economic recession in some areas of the world. Around 820 million people suffer

from chronic food shortages in the world, which represents 11% of the world's population (one in nine people). In 2015, the World Bank released data on patent malnutrition in Indonesia, such as: that 37% of children under five years (8.4 million) are behind in their development, which places Indonesia as the fifth country in the world according to stunting percentage rates. It should be noted that malnutrition can appear in different forms and in any social and geographic context, from micronutrient deficiencies to stunted growth, emaciation, and obesity. The implementation of a healthy diet in the population of a country is linked to the ability of our food systems to ensure that the necessary food is available and affordable for the population. The concept of a system refers to "a whole that cannot be separated into parts independently, and there are properties of the whole that none of the parts have" (Bertalanffy, 1996). Therefore, the food system is the sum of the various elements, activities,

and actors that allow the production, distribution and consumption of food. For this reason, and assuming the concept of a system, it is necessary to transform the food system from its roots. Therefore, governments cannot be the only agents of change in the development of market value in an effort to eradicate malnutrition. The main stakeholders are presented below as a group that cooperates interactively to achieve SDG 2 through clear and strategic planning:

1 & 2. Government institutions and development agents:

As the main agent of change in the field of sustainable agri-food management, the goal of sustainable development of zero hunger must be tackled through a joint collaboration between FAO, country governments, and development agents at regional, national and global levels. FAO pursues an interactive dialogue with the governments of countries where policies, strategies, laws, or plans are not being effective in the fight against malnutrition and hunger in order to assist these countries in assessing the influence of their development policies. Subsequently, FAO and its partners serve as a guide for the governments of these countries through the search for coherence and concentration in the application of these policies to achieve better conditions of food security and nutrition. A characteristic example of this assumption is the FIRST (Food and Nutrition Security Impact Resilience

Sustainability and Transformation) program, an alliance between the European Union (EU) and the Food and Agriculture Organization of the United Nations (FAO) to promote public investments and private companies in sustainable agriculture and create an enabling environment in which such investments contribute to achieving food security and improved nutrition. Since becoming a member in 1948, Indonesia has collaborated with FAO on more than 650 projects in the food and agriculture sector.

3. Tertiary sector: To find the solution to a problem, you have to start from its origin, the agri-food producer. This producer plays a key role in the food system but, unfortunately, is undervalued in terms of economic and labor stability. It is a matter of vital importance that the governments of the countries at the regional, national and global levels work for the improvement of the economic-labor conditions of the producers through investments and policies that allow the achievement of higher prices by the producers themselves.

4. Product distributors: Another part involved in sustainable agri-food management is that of food distributors, those who establish a value for the product based on the base value of said product imposed by the producer. As mentioned above, malnutrition is subject to the obvious difficulty in society to access foods that promote healthy eating. This

healthy food can only be addressed through a fair price policy that allows access to these foods to the entire population, regardless of their economic situation. Urbanization and technological advances accelerate the demand for highly processed foods, which have a lower level of vitamins and minerals and are cheaper than foods rich in nutrients. Through economic investment in production, it is possible to guarantee not only the export of surpluses at more affordable prices but also a more diverse export with quality products. It is worth highlighting the importance of supporting policies that seek to improve the quality of the products of informal and open-air markets, as well as proposing incentives at the monetary level, so that street vendors use higher quality products since people heavily travel this type of shops with fewer economic resources.

5. Education system: As a student of educational sciences, schools and the figure of the teaching staff are a source of great value when it comes to consolidating a vision of what society will be in the future. The establishment of healthy eating programs and management of expenses in terms of food is a way of creating minds that are aware of the problems of the modern era, such as malnutrition. Said training should not focus solely on children, but in any educational context, always being subordinated by the ministry of education and regional institutions.

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NO. Registration: 008/VCD/G/9/20

Sustainable Agriculture Management: Developing The Value Chain to Help Reduce The Malnutrition Globally (Problem Focus: Facing Zero Hunger Worldwide)

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Before entering into the writing of the theoretical body, by way of introduction, it should be noted that we are not specialist in sustainable agri-food management or have solid training in this matter, but during the research, prior to carrying out this essay, we have been able to reinforce our concern about the serious problem posed by unequal access to food in the world. We have decided to analyze this problem from the perspective of the development of the value chain, giving special importance to the financial sphere of production.

Around 820 million people suffer from chronic food shortage in the world, which represents 11% of the world's

population (one in nine people). In 2015, The World Bank released data on patent malnutrition in Indonesia, such as that 37% of children under five years (8.4 million) are stunned, which placed Indonesia as the fifth country in the world with a higher percentage in terms of stunning. The implementation of a healthy diet in the population of a country is linked to the ability of our food system to ensure that the necessary food is available and affordable for the population. Therefore, we are going to propose in what way through the development of SDG 12 (Ensure sustainable consumption and production patterns), the goal of SDG2 (Zero hunger) can be achieved.

1 & 2. Government institutions and development agents: As the main agent of change in the field of sustainable agri-food management, the goal of sustainable development of zero hunger must be tackled through joint collaboration between FAO, country governments, and development agents at regional, national and global levels. FAO pursues an interactive dialogue with the governments of countries where policies, strategies, laws, or plans are not being effective in the fight against malnutrition and hunger in order to assist these countries in assessing the influence of their development policies. Subsequently, FAO and its partners serve as a guide for the governments of these countries through the search for coherence and concentration in the application of these policies to achieve better conditions of food security and nutrition. A characteristic example of this assumption is the FIRST (Food and Nutrition Security Impact Resilience Sustainability and Transformation) program, an alliance between the European Union (EU) and the Food and Agriculture Organization of the United Nations (FAO) to promote public investments and private companies in sustainable agriculture and create an enabling environment in which such investments contribute to achieving food security and improved nutrition. Since becoming a member in 1948, Indonesia has collaborated with FAO on more than 650 projects in the food and agriculture sector.

3 & 4. Farmers & P2P lending platforms: Agriculture is considered one of the key sectors in the Indonesian economy. Farming and cropping represent a crucial source of income for Indonesian people. To ensure food security, which means reducing hunger, more attention needs to be paid to farmers (smallholders). Farmers are playing an important role in increasing agricultural yield as a provider of agricultural products. Farmers who have farming skills and are adaptive to technology are needed. But unfortunately, there are still many Indonesian farmers who use traditional methods rather than using existing technology. Though the existence of such technology can help improve agricultural output in terms of quality and productivity of farmers. But there are cost constraints which are also difficult for them to get loans from the banks and those who prefer to sell their agricultural products to middlemen at prices lower than the prices sold on the market or they prefer to borrow money from moneylenders with high-interest rates. This is certainly detrimental to the farmers. The difficulty of the credit system for farmers because of their low incomes, so that they are not qualified for credit makes it difficult for farmers to obtain agricultural capital to get seeds of superior quality, sophisticated agricultural machinery, and others which are needed to increase agricultural yields thereby increasing farmer

productivity. Therefore we need facilities for farmers to obtain capital, one of which is through Fintech with peer to peer (P2P) lending in agriculture. P2P lending Platform is an example of the implementation of Financial Technology (Fintech) in the form of information technology-based lending and borrowing services (Bank Indonesia, 2017). P2P lending platform can greatly help farmers to increase their productivity by helping solve the capital problems faced by farmers. However, awareness from farmers is needed so that they wish to improve their farming skills, utilize technology, and matters related to the quality of agricultural products and the credibility of the platform. This is because it also requires a large commitment from farmers with the ability to produce good quality agricultural products and be able to compete in the market and generate large profits so they can also provide guarantees for lenders who provide capital to these farmers with returns the amount that lender will get.

P2P lending platform in agriculture is very important as a means for farmers and lenders. That platform must have good management, which is able to allocate capital to farmers, select farmers, conduct various supervision, and provide facilities that make it easier for farmers and lenders. In Indonesia, there are platforms that have worked closely with the Financial Services Authority, namely TaniFund and iGrow, so that

give a sense of security. The existing platforms still have farmer partners that are not evenly distributed throughout Indonesia. This is due to the strict selection. So it's important to improve the skills and awareness of the farmers. Transaction convenience and the responsibility of the platform management company are also important to increase people's intention to invest in P2P lending platform. The platform can also maximize the use of social media to promote the platforms and products so that they reach a wider community. P2P lending platforms are still small in Indonesia and also low community participation to invest. Collaboration from P2P Lending Platform, community, government, farmers, and academic are required so that farmers are prosperous and sustainable agrifood can be realized.

6. Product distributors: Another stakeholder involved in sustainable agri-food management are food distributors, those who establish a value for the product based on the base value of said product imposed by the producer. As mentioned above, malnutrition is subject to the obvious difficulty in society to access foods that promote healthy eating. This healthy food can only be addressed through a fair price policy that allows access to these foods to the entire population, regardless of their economic situation. Urbanization and technological advances accelerate the demand for highly processed foods,

which have a lower level of vitamins and minerals and are cheaper than foods rich in nutrients. Through economic investment in production, it is possible to guarantee not only the export of surpluses at more affordable prices but also a more diverse export with quality products. It is worth highlighting the importance of supporting policies that seek to improve the quality of the products of informal and open-air markets, as well as proposing incentives at the monetary level, so that street vendors use higher quality products since this type of shops are heavily traveled by people with fewer economic resources.

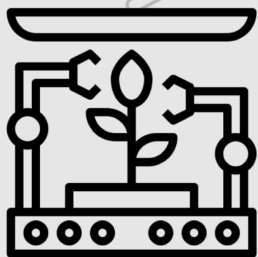
To summarize, we must be aware that we live in a world governed by the monetary question based on the development of the different areas of our life: economic, social, in terms

of health, education, among others. The problems related to malnutrition are those that, to a greater extent, occur globally. Hence the importance of fighting for the implementation of affordable prices for everyone, taking into account the economic conditions of each region and, thus, allowing the right to food to be not just a necessity but a reality. All work whose premise is to improve the world comes from a group of interconnections that produce a final product and which, in turn, are interdependent on each other. This is the case of the value chain, which originates from farmers (producers) and reaches consumers through the product distribution function. This chain could not bring an innovation if it were not for the effort of different stakeholders to invest in a market with great potential in the current idiosyncrasy, such as agriculture.

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SHAPING AN ENABLING DEVELOPMENT ENVIRONMENT



NO. Registration: 022/SDE/I/9/20

Preparing Indonesia Agrifood Management in the New Normal Era

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At the beginning of 2020, the world was shocked by the deadly virus that originated in China precisely in Wuhan. This virus is called coronavirus. The virus spread to various countries in the world, including Indonesia. The coronavirus is currently an epidemic (SARS-CoV-2) and causes COVID-19 disease. Patients with COVID-19 also increased from time to time until now, which is stated positively also still increasing. Governments in various countries affected by the coronavirus carry out a lot of policies to reduce the spread of this virus. Lockdown or PSBB (Pembatasan Sosial Berskala Besar) is one of the significant policies to reduce the spread of COVID 19 in every country, including Indonesia. There are so many pros and cons to this Lockdown and social restrictions. Because many parties find it difficult to move out of the house. The COVID-19 pandemic greatly impacted the Indonesian sustainable agrifood. We can see from the news on television and on social media that many companies have bankrupt, employees have experienced a

reduction in salaries, and there has been an employee discharge (PHK). All this happened because the company could not survive this situation. Likewise, many business actors were affected by this COVID-19. Until now, the world has begun to move towards a new normal, so that every business actor must have arranged his new work system so that he can again improve his business performance process.

According to the Chairman of the Task Force Expert Team for the Acceleration of Handling of COVID-19 Wiku Adisasmita, explained that new normal is a change in behavior to continue carrying out normal activities but by adding a health protocol to prevent transmission of COVID-19. The main principle of a new normal is to be able to adjust to the pattern of life. "This transformation is to organize life and new behavior, when the pandemic, which will then be carried forward in the future until the discovery of a vaccine for COVID-19". Food is the guarantor of life, while the environment is the guarantor

of sustainable development. Saving food security and environmental (ecological) sustainability are two things that must be brought together. In the condition of the COVID-19 pandemic, the challenges are increasingly severe in bringing participation as well.

Therefore, every business actor can do to start entering this new system or what is called a new normal. Businesses in Indonesia, especially in agrifood, must be able to adapt to current changes. For example, a student from Indonesia received a scholarship to study a master's degree in America. The student inevitably has to be able to adapt to life in America. The ethnic, race, religion, and culture are very different in Indonesia, he must understand. We can be seen now more people transact from offline to online because it is required to have to switch systems. Especially since the COVID-19 pandemic, the government has appealed to the community to reduce activities outside the home and work and learn from home. As we know, there are a lot of sectors that are turbulent due to COVID-19 pandemic.

Indonesia is known for its extraordinary natural resource potential. This is evidenced by the high biodiversity they have, both in terms of the agriculture, fisheries, and livestock sectors. Indonesia is also known as an agrarian and maritime country because of its rich

natural resources. In addition, the strategic geographical conditions and tropical climate make the quality of natural potential superior to other countries. This potential must be optimally utilized to make Indonesia advanced, especially from sectors close to natural resources, namely agriculture.

Agriculture in Indonesia can be said to be the driving force of the national economy. In addition to producing food to meet the community's needs, agriculture is also a priority for increased productivity. Currently, the Indonesian agricultural sector in terms of production is the second most influential sector on national economic growth, after the processing industry. The position of the agricultural sector is still above other sectors, such as trade and construction. But as a result of the COVID-19 pandemic Indonesian agriculture has become weaker.

This condition is a warning that concrete steps must be taken immediately in order to strengthen the carrying capacity of the environment in the aspect of food. Over the years, Indonesia has developed and used new technology and equipment to replace almost all traditional farming methods. But there are still many small-scale Indonesian farmers who have fallen into poverty without getting welfare. Therefore there needs to be a change in Indonesian agriculture. Indonesian farmers still

use old traditional farming methods because they lack the resources to use modern methods. In addition, this is the only sector that contributes to growth not only itself but also other sectors in the country. First, agricultural productivity needs to be increased so that it can survive the COVID-19 pandemic. This productivity development needs to be varied. They are starting from the upstream to downstream agricultural sectors. Farmers as the agricultural sector's main actors are very important to grow and supported with policies such as capital assistance, guidance from parties who understand agriculture, product distribution, and digital marketing.

Second, it is necessary to pay attention to the licensing and tax levies in this pandemic era. Productive agricultural land needs to be maintained and protected from rapid conversion efforts. Urgent incentive and disincentive mechanisms are realized. Farmers should have lightened their burden, for example, by eliminating

the land tax, fertilizer subsidies, and others. In comparison, the converters need to be controlled with the firmness of sustainable agricultural land policies or maximizing licensing and tax levies. Third, the farmer's behavior needs to be directed in order to create agriculture with minimal pollution. Organic farming policies can be developed. Farmers must also be protected from the economic game of large fertilizer companies. Fourth, the diversification of food and culture using local food products needs to be encouraged again. This is to reduce dependence on rice production, while environmental carrying capacity is not necessarily suitable for rice commodities. In addition, diversification can also improve soil quality and reduce pests and diseases.

It is expected that with the improvements in basic management of the agricultural system, Indonesia can prosper farmers, and agriculture can run well during the COVID-19 pandemic to reach this new normal.

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NO. Registration: 009/SDE/G/9/20

Challenges Faced By Youth Farmers Who Ventured In Agribusiness Globally

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The labor in the agricultural sector has decreased in terms of numbers, but efforts are made to increase in skills. It is hoped that the workforce working in the primary agricultural sector will increase the agricultural sector's productivity and reduce the number of farmers living in poverty. This indicates that there will be an increase in the welfare of farmers in rural areas, a level of welfare that is relatively the same as other industrial and service sectors.

The average income of workers in the agricultural sector, which is lower than the industrial and service sectors, which promises a more certain career path, is one of the main factors causing the agricultural sector to be less attractive. Some farmers make this excuse not to want the next generation to become farmers. This condition is exacerbated by the large conversion of agricultural land, which can cause agricultural businesses to not reach economies of scale.

In addition, many young generations of farmer households do not have the knowledge and skills in running agribusiness, including in terms of managerial abilities. Likewise, with internal conditions/plant physiology and external conditions / environmental factors. This can affect the decline in land use, resulting in decreased productivity,, which is closely related to farmers's technical abilities.

Agribusinesses have proved to be growing all over the world and to be a solution to the unemployment affecting youth mostly, and the unemployment rate has been escalating worldwide. Some youths chose to venture into Agribusiness so as to make a living. Agribusinesses they venture in may be growing of vegetables, fruits, herbs, and rearing of livestock probably for sale to make a living out of it. Just like any other business can face challenges, youth

Farmers too face challenges that can hinder or disturb their progress and success in their businesses.

There are several challenges that can affect young farmers, but there are three major ones who are;

1. Meeting the population demand

The world's population is currently around 7.8 billion people. The research estimated that it will grow in the next few decades and reach its peak in 2064 with a number of around 9.7 billion; before the end, it decreased to 8.8 billion in 2100. The population is increasing all over the world, and as such, this becomes a challenge to youth farmers who ventured into Agribusiness as they will be challenged to supply. The population will be looking up to farmers to supply them with produce for consumption or for use. This can put farmers under pressure and are expected to supply more than their actual demand, which can lead to business mistakes.

Solution/recommendation

Youth farmers will have to have a relationship among themselves and help each other as one cant run the business alone without the help of those in line with what you are doing. They also have to partner with other youth farmers who ventured

in Agribusiness so that they produce enough supplies to meet the demand of the population.

In addition, young farmers must also study and understand supply chains and distribution chains. It is intended that young farmers are able to market and distribute agricultural products widely and globally. That way, agricultural products can meet the food needs of all levels of society in the world. On the other hand, farmers will also get sufficient income, and it is hoped that they will be able to improve the welfare of the farmers.

2. Managing the death of land

The increasing number of population is directly proportional to the need for a place to live. So that the property or housing business is increasingly mushrooming. Property developers contest agricultural land where the groundwater is good. Farmers who are lured by high prices are finally interested in selling their agricultural land to developers. This causes less agricultural land. And this is one of the challenges for young farmers. Farmers must be able to maximize the potential of less and less land to meet the global community's needs.

Solution/recommendation

Youth farmers must create or use technology to make the most of the less and less agricultural land. Hydroponic, aeroponic, and

viticulture systems are solutions that are currently found and practiced by many people. Or the concept of digital farming is also a new trend today, which develops agriculture with the help of application-based technology to facilitate farmer work. By involving technology, narrow land is no longer a problem for agriculture in the future.

3. Government mandate and regulations

The forever changing of the regulations and policies affect youth Farmers as they are expected to follow the regulations of which it might lead them to change some of their farming strategies that might be the ones that made their businesses a success and also the changes might disrupt the production and be costly to farmers.

Solution/recommendation

Farmers need to find a way of working around the new Regulations to avoid disruption of their businesses and also avoid unnecessary costs that can lead them to lose. In addition, it is also important for the government to make policies that support farmers in fighting for their rights as farmers. Starting from the policy of agricultural product prices, fertilizer prices, land ownership, and others.

Farmers must build a community to be able to aspire their voice to the government or other stakeholders. So that in the future, the policies decided by the government are expected to be able to support or solve the problems experienced by farmers.

Conclusion

The challenges of young farmers in the future will be even more severe. These challenges include the needs of the world community that has increased dramatically, the existence of agricultural land is decreasing, and the last is government policies that still do not support farmers. With these challenges, it is hoped that young people, especially prospective young farmers in the future, are expected to be able to find and implement solutions to agricultural challenges in the future.

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NO. Registration: 010/SDE/G/9/20

The Importance of Management Natural Resources (Study Case: Indonesia)

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Agricultural development is a process that aims to increase agricultural production is to increase agricultural production for every, consumers that also heightens income and business productivity every farmer the way add capital and skill to enlarge the intervention to people in the development of plants and animals widely agricultural development not only the process or activity increased agricultural production but a process that produces a change in social, good value, norm, behavior, institutions social and so on to reach economic growth and to improve the welfare of farmers and society that is better. Agriculture is the major producer of food materials, and materials can be processed to industrial materials,

clothing, food, and traded for, therefore, agricultural development is part of Economic development.

The purpose of agricultural development, according to the GBHN, based on the implementation of Pelita II, increase food production carbohydrates non-wheat, toward self-sufficiency as well as improving society through the provision of protein, nutrition fat, vitamin, and minerals. Boost its holding to increase the level of live farmers through farmers' incomes. Expanding employment opportunities in the sector of agriculture in order to farmers' incomes and expanding employment opportunities in the sector of agriculture in order to smooth income. Increase their

exports and reduce imports in the agricultural sector. Increase strong support for the industry to produce goods so or half so. They were using and maintaining sustainability natural resources as well as maintaining and improving the environment. Growth integrated rural development and felt within the framework development area. The purpose of the end of this development with the creation of a just society, prosperous, either material or spiritual. Therefore agricultural development is part of economic development, which must always be suggested can be achieved in the end.

One of the 21 related to the agricultural sector is Sustainable Agriculture and Rural Development (SARD). A moral message to create better environmental conditions for all generations is accepted universally by a world leader, so sustainable agriculture has become the basic principles of agricultural development globally, including in Indonesia.

Approach and agricultural practice conventional carried out in most of the country forward, and developing countries, including Indonesia, practice agricultural is not adhering to the principle of sustainable development (Untung K., 2006). Conventional agricultural based on the industrial approach to the orient agribusiness a large scale, solid agricultural capital, solid technological innovations,

planting seeds / varieties as uniformly and temporal superior spatial, input and reliance on production, agrokimia (including the use of various types of fertilizer and pesticide), and the agricultural machinery. Recently agricultural in fact that conventional practice in some areas negative impacts on the environment, such as many reported by various research institutes and NGO and economic experts and environment. Salim, e .(2011) revealed that the exploitation of natural resources by plantations and mining development activities had exceeded the capacity for support ecological , so there is excessive exploitation of natural resources. A variety of ecological effects, economic, social, culture, and public health more dubious the world ecosystem will provide the sustainability of agriculture in bearing human life in the next.

As revealed by Sutamihardja (2004), in the concept of sustainable development, the collision occurred between policies that might need digging natural resources to fight poverty and prevent degradation needs and environmental needs to be avoided as far as possible can run in equal. Sustainable development also requires fulfilling basic needs an opportunity for the community and the citizens to pursue broad ideals will a better life without sacrificing future generations.

As revealed by Hall (1998), sustainability is located on three basic axioms: (1) treatment of the present and the future that puts another positive in the long run; (2) environmental assets realized that contributed to economic well-being; (3) know obstacles due to environmental implications arising on assets. This concept is still very perceived normative, and operational aspects of the concept of sustainability are difficulties.

Perman et al., (1997) Try to combine sustainability further by asking five sense this alternative: (1) a condition sustainable, if utility obtained all the time and the reduced consumption has not declined in terms all the time (2) sustainability is conditioned as natural resources managed in such a way to maintain production in the future, the (3) sustainability is a condition a time when natural resources (natural capital stock) not diminished all the time (non-declining), (4) sustainability is conditioned as natural resources managed to maintain natural resources, production services (5) and sustainability are the condition balance and endurance fulfilled

Of various, the concept of which was the formulation of the basic principle of any element of sustainable development. In this case, there are four attention should be given to components, namely even distribution, diversity, integration, and that long-term perspective. Sustainable development should be an integrated program to between cross the discipline that needs to be coordinated in a powerful manner, starting at central up to sub-national level and the public at large as an offender's economic development. The success of sustainable development also depends not only on the economic sector but also the holder of power, in this case the government, to implement even distribution of sustainable development to welfare. Hence, sustainable development-oriented in having the quality of life of right and conditions is conducive.

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