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AEMOON :Optimizing Halal Agrotourism Through Internet of Things (IoT) Based Mini Aeroponic System Innovation to Support Sustainable Food Production

Hamdan Faudi, Atina Ma'rifah, Haya Fakhirah Fauziyah, Virginia Nur Rahmanti

Universitas Brawijaya, Malang, Indonesia

hamdanfaudi@student.ub.ac.id, atinamarifah@student.ub.ac.id, hayafakhirah22@student.ub.ac.id

Abstract

As an agricultural country, Indonesia is the main pillar of the agricultural sector in strengthening the economy. This is proven by the fact that agriculture is still listed as one of the lending business sectors which plays an important role in economic growth. This potential can become an asset for the Indonesian state, especially in contributing to the national economy, especially to GDP. Based on data from the Central Statistics Agency (BPS) as of 2023, the growth of Gross Domestic Product or GDP in the agricultural sector increased by 1.30% during the fourth quarter of 2023, meaning that the agricultural sector made a major contribution to the national economy, growing 5.05% per year. However, agricultural potential is currently experiencing several problems, one of which is climate change which causes the potential for crop failure. Based on the results of the Climate Central study, Indonesia is one of the countries in Asia with a tropical climate that has experienced an increase in temperature in the last year. Indonesia occupies a leading position among G20 members with an average temperature increase of 2.4 degrees Celsius, this temperature even exceeds Saudi Arabia (2.3 degrees Celsius) and Mexico (2.1 degrees Celsius). This condition is also exacerbated by the phenomenon of land degradation from agriculture to the industrial sector which has an impact on reducing farmers' harvest yields. Not only that, but land conversion also results in reduced food production, based on data from the Ministry of Agriculture (Kementan), agricultural land conversion reaches 90,000 to 100,000 hectares every year. It should be noted that currently the area of raw rice fields (LBS) has experienced a reduction, including in 8 large provinces in Indonesia. If we compare the LBS depreciation from 2019 to 2021, it was 0.13%, so this can be used as a reminder for the government to make regulatory updates in response to this problem. In line with this situation, especially in the current era of digitalization, agricultural problems have become a challenge that must be resolved in order to implement agricultural technology more efficiently. In overcoming these problems, halal agrotourism as an instrument of sustainable agriculture in Islam has enormous potential to attract Muslim tourists. The world's Muslim population according to the Global Muslim Population has reached 2,022,131,798 people out of a total world population of 8,088,527,193. So, the large Muslim population in the world can stimulate the interest of Muslim tourists, so that it can have a positive impact on the Indonesian economy, especially in the field of halal agricultural tourism. Thus, this research aims to provide recommendations for an innovative concept for the development of the halal agricultural tourism sector through AEMOON as a form of Optimization halal agrotourism through internet of things (IoT)-based mini aeroponic system innovation to support sustainable food production. This research uses a qualitative method and research and development approach which is included in the literature review category using descriptive analysis.

Keywords: Aeroponics; Internet of Things (IoT); Halal Agrotourism

1. Introduction

Indonesia is an agricultural country, where 40% of the majority of the population's livelihood is in the agricultural sector. Apart from that, Indonesia is known as the country with the 4th largest population in the world, reaching 278,848,736 people. The agricultural sector is still listed as one of the lending business sectors which plays an important role in economic growth. This potential can become an asset for the Indonesian state, especially in contributing to the national economy, especially to GDP. Based on data from the Central Statistics Agency (BPS) as of 2023, the growth of Gross Domestic Product or GDP in the agricultural sector increased by 1.30% during the fourth quarter of 2023, meaning that the agricultural sector made a major contribution to the national economy, growing 5.05% per year. As well as a significant increase in GDP, however, agricultural

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potential is currently experiencing several problems, one of which is land conversion which causes the potential for agricultural production to decrease.

Based on data from the Ministry of Agriculture (Kementan), agricultural land conversion reaches 90,000 to 100,000 hectares every year. It should be noted that currently the area of raw rice fields (LBS) has experienced a reduction, including in 8 large provinces in Indonesia. If we compare the LBS depreciation from 2019 to 2021, it was 0.13%, so this can be used as a reminder for the government to make regulatory updates in response to this problem. The conversion of land causes food production to decrease, which can result in stunting in the productive age because the decrease in food production results in an increase in food prices and has an impact on household food purchasing power. Apart from that, the lack of quality agricultural products can increase the risk of physical, biological and chemical contamination of agricultural products, so getting quality agricultural products is quite difficult.

Figure 1. Land Function Transfer in Indonesia

Land conversion is not the only cause, but climate change factors also result in food decline or crop failure. Based on the results of the Climate Central study, Indonesia is one of the countries in Asia with a tropical climate that has experienced an increase in temperature in the last year. Indonesia occupies a leading position among G20 members with an average temperature increase of 2.4 degrees Celsius, this temperature even exceeds Saudi Arabia (2.3 degrees Celsius) and Mexico (2.1 degrees Celsius). This condition is also exacerbated by the phenomenon of land degradation from agriculture to the industrial sector which has an impact on reducing farmers' harvest yield.

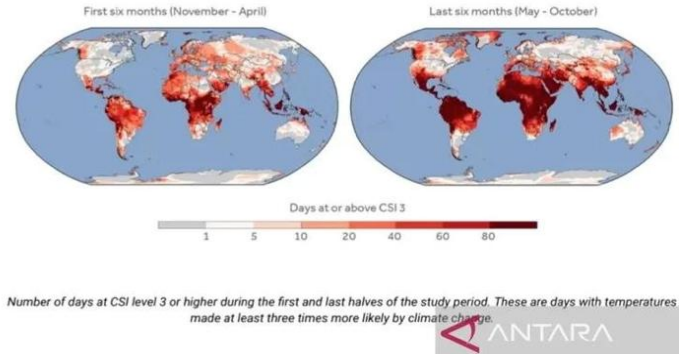

Figure 2. Increase in World Temperature Levels

Currently, agricultural land in Indonesia, especially in Malang City, is starting to shrink, referring to BPS data as of 2020, only 995 hectares of land in Malang City remains. The rapid rate of population growth as well as development that continues to increase in Malang City has a negative impact on the quality of the environment, especially the decline in the quality and quantity of natural resources. Agricultural land is shrinking every year and several other causes have a negative impact on the sustainability of agricultural products. Therefore, it is necessary to have environmental support capacity which is one of the government's considerations in following up on the decline in food. Due to this problem, there is greenhouse innovation but it is very unfortunate because the price is very expensive so small farmers cannot buy it. Even though it is expensive to make, having a greenhouse will benefit farmers because the maintenance costs are cheaper, and the risk of crop failure is small. However, not many farmers have large capital to procure a greenhouse. Therefore, there is a need for sustainable agricultural innovation that addresses the problems

of land shrinkage, climate change and expensive greenhouses. AEMOON is a form of Optimization halal agrotourism through internet of things (IoT) based mini aeroponic system innovation to support sustainable food production.

Implementing an aeroponic system is appropriate because an aeroponic system requires much less water than conventional plants, so it can save water and costs. Not only that, using an aeroponic system can increase aeration productivity in the roots, so that it can produce better results. The aeroponics system is appropriate to be implemented to answer the problem of agricultural yields which are decreasing every year. Implementing an aeroponic system can also reduce the use of pesticides and herbicides, thereby helping to improve soil and environmental health. By using an aeroponic system, agriculture can increase crop productivity without causing negative impacts on the environment. The aeroponic system is an effective solution to increase productivity and save costs in agriculture. By using an aeroponic system, agriculture can increase crop productivity without increasing costs, which will help improve people's welfare.

IoT, or Internet of Things, refers to the ability of various devices to connect and interact over internet networks. It involves the use of technology to control, communicate, and collaborate with hardware as well as exchange data over the internet. Thus, IoT facilitates connections between objects that are not operated directly by humans and the internet. Implementing this system in agriculture can increase efficiency and productivity. Not only that, currently Indonesia has entered the digital era so it is necessary to utilize technology in agricultural management. In this case, the IoT system is applied to review the productivity of agricultural product management even though it is not operated directly.

AEMOON not only applies IoT in its production activities but also applies the concept of halal agritourism. This is motivated by the level of the world's Muslim population according to the Global Muslim Population reaching 2,022,131,798 people out of a total world population of 8,088,527,193. So the large Muslim population in the world can stimulate the interest of Muslim tourists, so that it can have a positive impact on the Indonesian economy, especially in the field of halal agricultural tourism. Thus, this research aims to provide recommendations for an innovative concept for the development of the halal agricultural tourism sector through AEMOON as a form of Optimization halal agrotourism through internet of things (IoT)-based mini aeroponic system innovation to support sustainable food production.

With this innovation, it is hoped that it can be the best solution in overcoming the problem of decreasing agricultural yields. This system can help increase efficiency in the use of water and chemicals, as well as improve plant and environmental health. With AEMOON, agriculture can have a more efficient irrigation system, which will help save costs and reduce negative impacts on the environment, as well as reduce the use of pesticides and herbicides, which can help improve soil and environmental health. AEMOON is equipped with an IoT-based application as a mini aeroponic control pilot in halal agrotourism areas with various superior features which can definitely increase AEMOON's productivity even if it is not operated directly.

2. Literature Review

2.1. Aeroponics

Aeroponics is a method of growing plants where plant roots are suspended in the air and grow in a humid environment without using soil. With roots suspended in the air, plants can be planted almost anywhere, taking advantage of every available space (Reyes, et al., 2012). The origins of the word "aeroponics" come from the words "aero" which means air and "ponos" which means power, so it literally describes the use of air as a growth medium. The working principle of aeroponics involves periodically spraying a nutrient solution onto plant roots suspended in the air. This process allows plant roots to get optimal nutrition and oxygen, thus stimulating plant growth quickly and efficiently. By using air as a planting medium and supported by IoT (Internet of Things) technology, AEMOON or Aeroponic Monitoring is present as an innovative sustainable farming method with the advantage of having plants that are resistant to rot and growth that can reach 135% faster than manual or hydroponic systems. Therefore, AEMOON is an effective and efficient solution for increasing crop yields.

2.2. Internet of Things

IoT, or Internet of Things, is a concept that refers to the ability of devices to connect and interact via internet networks. This involves leveraging technology to control, communicate, and collaborate with hardware as well as exchange data over the internet. In other words, IoT allows objects that are not usually directly connected to the internet to connect and communicate via the network. The internet acts as an automatic intermediary between various devices.

The application of IoT technology brings a number of significant benefits. One of them is increasing speed, convenience and efficiency in various tasks. With automatically connected connections between devices, the control and management process becomes easier, more efficient and flexible.

In this context, AEMOON is present as a technological innovation in the agricultural sector that combines IoT integrated applications. Through the application of AEMOON, plant planting management can be carried out more effectively and efficiently. This technology allows farmers to monitor and control various aspects of planting, such as temperature, humidity and irrigation, in real- time via an internet-connected application. Thus, AEMOON not only speeds up agricultural processes, but also increases yields and efficiency of resource use.

2.3. Halal Agrotourism

The concept of halal agrotourism is an integration of agrotourism principles with practices that are in accordance with Islamic sharia values. Within this framework, there is the development of tourism destinations that not only offer ordinary tourist experiences, but also act as educational centers about halal food production. The facilities and infrastructure provided also support the entire food production process in accordance with halal principles. Sharia-based tourism villages, in this context, are a real implementation of the commitment to express nuances of religiosity in all aspects of life, including muamalah, which is used as a benchmark in social, economic and cultural life, with a foundation on sharia principles (Sofyan, 2012; Irfan, 2019). In this case, the mudharabah agreement can be implemented as a form of AEMOON's collaboration with local farmers. So indirectly, the integration of the AEMOON concept, which is an IoT-based aeroponic system, opens up great opportunities for villages to develop Islamic food products and has a significant impact on the welfare of village communities.

3. Research Method

3.1. Types of Research

This paper uses a type of descriptive research that provides an overview and explanation of Indonesian economic problems, especially the agricultural sector. Descriptive research is a form of study aimed at describing existing events, both natural and artificial (Sukramadinata, 2005). The approach used in compiling this paper is qualitative methods and research and development related to innovation creation. Research using qualitative methods is a method that aims to examine scientific objects with research results that emphasize general meaning. On the other hand, the type of research is Research and Development, namely research used to produce certain innovations and test the usefulness of these innovations (Sugiyono, 2007). This research will create an innovative agricultural technology to overcome the problem of shrinking rice fields and also climate change which causes crop failure.

3.2. Data Sources

The data used in this research is secondary data. Secondary data is data obtained from objects that are observed indirectly based on studies that have been carried out. This research uses secondary data from journals and news that explain the current condition of Indonesian agriculture.

3.3. Data Acquisition Method

The data acquisition method is based on literature studies, namely the method used to collect data or sources related to the topic raised in a research. Literature studies can be obtained from various sources, journals, books, documentation, the internet and libraries. This research uses data from journals, books, the internet which explains agricultural problems in Indonesia, especially the shrinking of rice fields and also climate change which affects agricultural yields.

3.4. Data Acquisition Method

The method used is a descriptive data analysis method which aims to answer problems in research by describing a phenomenon based on the data presented so that it is easy to understand (Hasan, 2006). This research will explain an agricultural innovation which has a solution that has been collected, especially in the agricultural sector.

4. Result and Discussion

4.1. AEMOON Innovation Implementation Scheme

AEMOON is an agricultural technology innovation that utilizes Internet of Things (IoT) technology in the planting process to maximize agricultural yields. In the implementation process, AEMOON has an implementation scheme so that it can be useful for farmers in Indonesia. (1) AEMOON will collaborate with farmers in Indonesia, especially those who do not have rice fields. (2) Farmers can apply for an MOU and fill out a cooperation sheet with AEMOON. (3) After that, AEMOON will analyze and select the MOU application and whether the width of the cooperation meets the criteria. (4) When the application for the MOU and cooperation sheet has been verified by AEMOON, the next stage will be for the farmers to be given socialization on how to operate the AEMOON BOX and also the AEMOON Application so that they can use it independently. (5) When the farmers are trained, AEMOON will provide equipment to the farmers so they can operate optimally. (6) When agricultural products are available, farmers can sell them in vegetable shops, e-commerce, etc. which will later use a profit sharing system with a mudharabah agreement between AEMOON and the farmers. With AEMOON, it can become a characteristic attraction for out-of-town and even overseas tourists to visit agricultural tourism, especially in the cities of Malang and Batu.

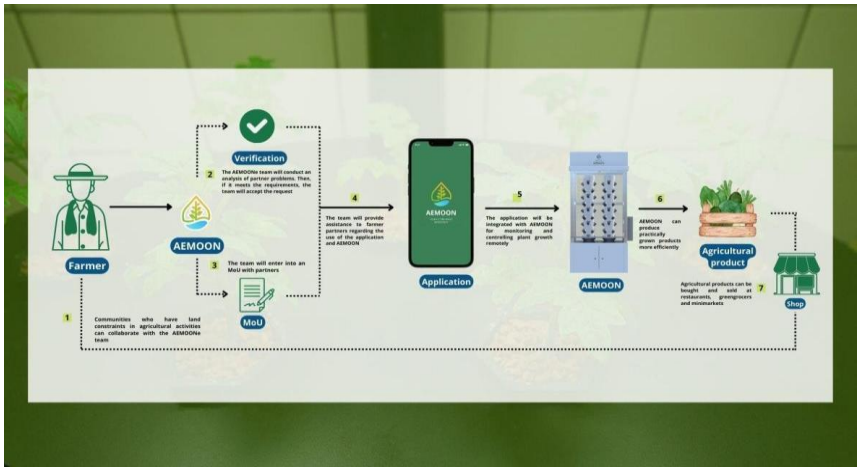

Figure 3. AEMOON Innovation Implementation Scheme

4.2. AEMOON BOX Innovation

AEMOON presents innovation to overcome the problems of decreasing agricultural land and climate change in the form of AEMOON BOX. AEMOON BOX itself is an agricultural technology that uses an aeroponic system that utilizes water flow from top to bottom to water the roots. The advantage of the aeroponic system itself is that the plants do not rot easily and have a fairly quick time for harvesting.

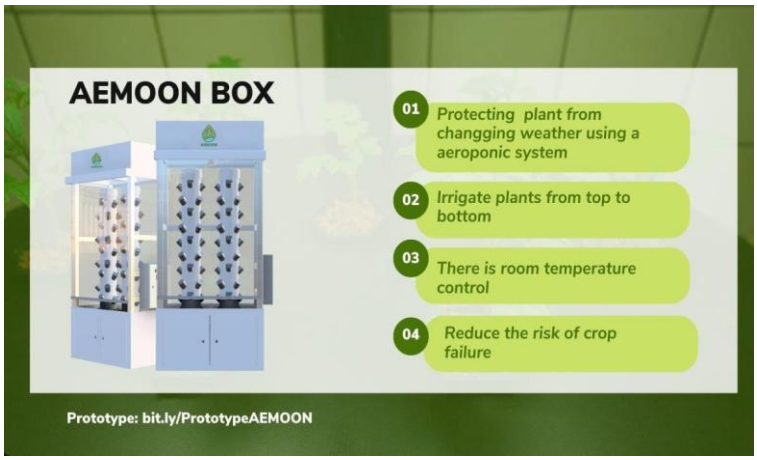

Figure 4. AEMOON BOX Innovation Prototype

To overcome climate change which causes crop failure, AEMOON BOX has a room temperature controller so that plants can be stable in their growth process. Farmers can control the room temperature automatically remotely using the controlling feature found in the AEMOON application. Of course, with this system, farmers can experience maximum harvest results. With the AEMOON BOX which has been implemented in Malang City and also Batu City, it can become a special attraction for tourists from outside the city and country to visit.

4.3. AEMOON Application Innovation

The AEMOON application offers various features that have various advantages, including:

1. *Monitoring Plant Status*
   In the AEMOON application there is a real-time plant status monitoring feature, including monitoring pH, light intensity, temperature and air humidity using IoT sensors integrated in the application. When a problem occurs with a plant, a notification will appear via a smartphone connected to the AEMOON application, so that farmers or application users can immediately resolve the problem that is occurring.

2. *Controlling Temperature, Water, and Light*
   AEMOON is also equipped with an automatic control feature that can regulate temperature, water and light in plants. Through the application, users can control the irrigation system to provide water to plants as needed. Apart from that,

you can also adjust the lighting automatically, both intensity and duration to suit the plant's growth phase. The temperature control feature can regulate the room temperature to remain optimal for plant growth, either by using a cooling or heating system. With this feature, users can ensure that the environmental conditions around the plants are maintained optimally, so that plant growth and yields are better.

3. *Record Plant Development*
   With this feature, users are able to record and track the development of their plants over time, from the planting phase to harvest. Users can also record planting dates, plant varieties, environmental conditions, and changes that occur during the growth period. So this feature is very helpful in monitoring plant progress which can later become a reference for users to make better decisions in caring for plants and agricultural products.

4. *Educational Facilities*
   The AEMOON application presents educational features for its users. In this educational facility, there are features such as articles containing tips and tricks about aeroponics to increase user knowledge. This feature also provides free training on digital marketing and aeroponic cultivation with IoT technology for farmer partners. This is AEMOON's contribution in implementing the Halal Agrotourism concept with efforts to empower community skills and develop aeroponic digitalization to generate additional income for the community.

5. *Harvest Time Notification*
   Through the AEMOON application, users can easily find out harvest time. In the harvest time notification feature, there is an automatic detector that indicates that the plant is ready to harvest. Users will receive timely notifications via the AEMOON application, so that users can harvest at the right time while ensuring the quality of the harvest is maintained.

6. *Estimated Farmer Income*
   The AEMOON app offers an income forecast feature. With this feature, farmers can easily get information about the plants they plant, the area of land they own, the production costs they incur, and the selling price that users expect. Based on this information, the AEMOON application will show the estimated income they get from the crop harvest. So, this feature can be useful for determining buying and selling prices later for farmers.

Figure 5. AEMOON Application Innovation Prototype

4.4. AEMOON IoT System

The IoT system on AEMOON consists of a combination of components designed to provide accurate measurements and pulleys of the plant environment. The following are the main components contained in the AEMOON IoT system:

1. NodeMCU ESP32
   The ESP32 NodeMCU is the center of the AEMOON IoT system. This is a microcontroller that functions as a control center that regulates all operations in the system. NodeMCU ESP32 has WiFi connection capabilities which can communicate with the AEMOON application to transfer data easily.

2. TDS sensors
   The TDS sensor is used to check the pH levels of the water and nutrient solution in the AEMOON BOX tank. By continuously monitoring the pH of the water, farmers can ensure the pH level is in optimal conditions. So, this sensor can help prevent problems caused by unbalanced water pH, such as a lack or excess of nutrients.

3. LDR sensor
   LDR sensors are used to monitor light intensity around plants. This is important because light intensity is an important factor in plant growth. By monitoring light intensity, farmers can ensure that plants receive sufficient amounts of light for optimal photosynthesis.
4. DHT22 sensor
   The DHT22 sensor is used to monitor the temperature and humidity of the air around the plant. It provides important information about the plant's growing environmental conditions, which can affect the plant's overall growth and health.
5. Ultrasonic Sensor (HC SR04)
   Ultrasonic sensors are used to measure the water level in the watering tank. This allows farmers to monitor water levels in real-time and know when is the right time to water plants.
6. Water pump
   Water pumps are used to water plants and provide necessary nutrients. The water pump is controlled by the NodeMCU ESP32, which will be activated based on measurements from the ultrasonic sensor and plant needs.

4.5. AEMOON as a Halal Agrotourism Supporter

Considering the high number of Muslim populations throughout the world, especially in Indonesia, the concept of Halal Agrotourism is an attraction for Muslim tourists. The presence of AEMOON provides a significant boost in increasing interest from both local and global tourists. Through the implementation of AEMOON in several villages in Malang City, the potential to become a unique and attractive tourist destination for visitors can be realized.

AEMOON not only acts as a tourist attraction, but also has a positive impact on the welfare of village communities. Educational programs organized by AEMOON, such as the introduction of effective aeroponic planting methods, as well as digitalization of appropriate product marketing, can provide new knowledge and skills to local residents. Apart from that, through a cooperation scheme with local farmers through mudharabah agreements, AEMOON can increase the income of local farmers.

In the national context, agricultural products produced through IoT-based aeroponic systems promise better quantity and quality than conventional agricultural methods. This has the potential to have a significant impact on Gross Domestic Growth (GDP) in the area. Thus, collaboration between AEMOON and local farmers not only provides economic benefits, but also encourages innovation in the agricultural sector and increases regional contributions to the national economy.

4.6. Contributing Parties

AEMOON collaborates with various parties to improve marketing

1. Farmer
   In managing mini aeroponics to improve the agricultural sector, AEMOON collaborates with local farmers through outreach and training in aeroponic management. Apart from that, this collaboration will later be able to increase the economic income of local farmers
2. Student
   Students as agents of change need to provide innovations that have an impact on the nation in the future, as well as in environmental management, currently only 995 hectares of Malang City land remains if referring to BPS data as of 2020, in order to optimize agricultural income, students are present as researchers presenting agricultural products effective.
3. Research institute
   In order to guarantee the usefulness of AEMOON, it is necessary to screen the quality and durability of the materials in managing mini aeroponics. Therefore, AEMOON is collaborating with research institutions to provide effective mini aeroponics for Indonesian agriculture.
4. *E-Commerce*
   Currently online shopping is something that Indonesian people often do, digital marketing is sought after because it is more practical and effective. For this reason, AEMOON collaborates with e-commerce companies in marketing agricultural products to increase food needs in Indonesia. And the availability of digital markets can increase the expansion of farming businesses so that local farmers can prosper.
5. Company
   As a supporter of cost management and mini aeroponic operations, in this case AEMOON collaborates with companies that can support AEMOON's needs in the future. Where the company will later provide financial assistance as well as develop AEMOON products.

Figure 6. Parties Contributing to AEMOON

4.7. AEMOON Implementation Strategy

In an effort to realize this idea, there are a series of implementation stages which include initiation, elaboration, monetization and sustainability stages. The description of these stages is as follows:

1. Initiation
   Initiation is the initial stage, namely preparation and planning, market analysis, making projections and prototypes of the AEMOON and AEMOON BOX applications, and application testing.
   a. Idea planning
      Designing an idea, namely providing an initial overview of the AEMOON innovation work system in helping problems in the agricultural sector, especially the limited agricultural land and also climate change which causes crop failures. AEMOON BOX is a sustainable agricultural solution where farmers can grow crops without large areas of land and can also control the room temperature so that the quality of agricultural products can improve.
   b. Projection design and application prototype
      This stage is the projection design for making the AEMOON application prototype. In this stage, it projects the design that has been carried out by previous research.
   c. Capacity Building
      The next stage is improving the quality of human resources through education regarding entrepreneurial and institutional concepts. Education regarding entrepreneurship is carried out so that farmer groups can understand the entrepreneurial process which is effective and in line with current developments. On the other hand, education about institutions is also important so that the output from empowerment can later be in the form of formal business units that have a legal basis and are organizationally structured.
2. Elaboration
   Elaboration is an advanced stage that aims to prepare farming communities to develop their agricultural land. This stage is used to implement IoT-based agriculture in an application that is automatically integrated with AEMOON BOX. Apart from that, there is also business assistance, namely assistance to farming community groups regarding three aspects, namely production, business management and marketing. In terms of production, assistance includes providing raw materials, production equipment, supporting factors, product development and quality assurance. Meanwhile, business management includes business permits, business models, competencies, education and training. Finally, in marketing management, assistance will be provided regarding packaging, branding, promotions, expos, business matching, distribution channels and digital marketing.
   a. Inauguration and Application Launch
      At this stage, the application will be inaugurated and launched, so that it can be used by the public as intended. The process of this launch will be carried out first by outreach to farmers and the village government.
   b. Market Expansion

This stage aims to expand market reach through collaboration with several parties. B2G collaborates with the government through the farming community (GAPOKTAN) and the Agriculture Service to carry out outreach to increase awareness of economic actors in using the AEMOON application. Apart from that, AEMOON will collaborate with RT and RW in various regions so that it can reach and assist farmers in inputting files into the application. As a form of appreciation, every RT and RW who accompanies farmers will be given wages. We base this on the fact that many farmers look down on existing technological innovations (Johan, Maarif, and Zulbainarni, 2022) so they need a companion role (Aryana et al., 2016). AEMOON will also collaborate with other businesses (B2B) in the form of expedition companies, national waqf or amil zakat institutions, and labor supply institutions.

3. Monetization
   Monetization is an advanced stage with the aim of developing the AEMOON agricultural program. There are several programs or stages carried out, namely:
   a. Business Digitalization and Automation

      This stage is a process of digitizing business operations to increase effectiveness and efficiency in business. To help with this implementation, a web and mobile-based platform called Cashafa is provided which will help startup business units in managing their business, including digitalization and business automation.

   b. Inauguration of the AEMOON and AEMOON BOX Applications

      At this stage, AEMOON's collaboration with local governments will be expanded and formalized. Income data and user barriers will be used as an evaluation as a feasibility study for developing other features so that economic actors can be reached as a whole.

   c. Establishing Partnerships

      This stage aims to establish partnerships with various parties based on Pentahelix Collaboration which include academics, business institutions, financial institutions, government, communities and media.

4. Sustainability
   At this stage, the target market will be expanded to the national level, namely the entire general public in Indonesia directly. Also this year, it is hoped that a sustainable agricultural ecosystem can be formed by utilizing massive Internet of Things (IoT) technology in Indonesia and implementing advanced platform development. This stage is a continuation of the business process by expanding markets abroad and creating new innovations through two programs, namely business matching and partnerships abroad.

5. Conclusion

Indonesia is an agricultural country with the agricultural sector playing an important role in the national economy, which can become a major state asset. However, the agricultural sector is currently experiencing several problems, such as land conversion and climate change, which has caused the potential for agricultural production to decrease. Increasing agricultural productivity can be a solution to improve community welfare and reduce negative impacts on the environment. Innovations such as aeroponic systems and the application of IoT can save costs and increase efficiency in agricultural management. The halal agrotourism innovation system through AEMOON as a form of optimization can have a positive impact on the Indonesian economy, especially in the field of halal agricultural tourism.

For this reason, AEMOON is an agricultural technology innovation that utilizes IoT technology in the planting process so that agricultural yields are maximized. In the implementation process, AEMOON collaborates with farmers who do not have rice fields and provides equipment and property to the farmers to operate optimally. Once the agricultural products are available, farmers can sell them through a profit sharing system with a mudharabah agreement between AEMOON and the farmers. With AEMOON, the cities of Malang and Batu can become a hallmark of halal agricultural tourism that attracts out-of-town and overseas tourists.

References

[1] Aryana, I. M., Maarif, S., & Zulbainarni, N. (2016). The importance of a companion role in technological innovation dissemination. Agricultural Extension Journal, 12(3): 45-50.
[2] Climate Central. (2023). Climate change and temperature increase analysis. Climate Central Reports. 5(1): 15-20.
[3] Hasan, I. (2006). Metode penelitian kualitatif dalam ilmu sosial. Jurnal Ilmu Sosial. 8(4): 100-105.
[4] Irfan, M. (2019). Development of Islamic-based tourism villages. Sharia Economic Journal. 14(2): 75-90.
[5] Johan, R., Maarif, S., & Zulbainarni, N. (2022). Challenges in integrating technology in agriculture. Journal of Technological Adaptation. 10(1): 55-65.
[6] Ministry of Agriculture (Kementan). (2023). Land conversion and its impact on agricultural production. Agricultural Policy Review. 15(2): 30-42.
[7] Reyes, R., et al. (2012). Aeroponic technology for plant growth. Journal of Agricultural Innovation. 8(4): 150-162.
[8] Sofyan, S. (2012). The role of halal tourism in the national economy. Economic Studies Journal. 20(1): 89-100.
[9] Sukramadinata, N. S. (2005). Penelitian deskriptif: Teknik dan metode. Jurnal Pendidikan Indonesia. 10(3): 40-50.
[10] Sugiyono. (2007). Metode penelitian pendidikan: Pendekatan kuantitatif, kualitatif, dan R&D. Jurnal Metodologi Penelitian. 5(2): 15-25.