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Marketing Strategy in the Development of Agricultural Product Based on Artificial Intelligent

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***Abstract*—The next generation of information technology, embodied by big data technology, is developing so quickly that agricultural product production and marketing information services will follow a trend toward intelligent marketing of agricultural products based on big data technology. The purpose of this research is to examine Marketing Strategy in the Development of Agricultural Product based on Artificial Intelligent. The method employed in this research is a literature review conducted utilizing an online search methodology for national and international scientific journal articles on multiple journal search engines such as Google Scholar, Science Direct, and the Elsevier journals. The results show that Smart agricultural product marketing based on big data technology, a new wave of rapidly evolving information technology will be the development trend for agricultural product production and marketing information services. These methods need to be further improved as a result. The development, marketing, and distribution activities of agricultural product operators have started to use artificial intelligence (AI).**

Keywords: Marketing Strategy, Agricultural Product, Artificial Intelligent

I. INTRODUCTION

In many countries, the economy is built on the backbone industry of agriculture. The production, processing, marketing, and distribution of agricultural goods, as well as the logistics of shipping those goods, are all integral parts of agriculture's development. Important goals include reorganizing the agricultural supply side, improving agricultural mode and structure, encouraging the growth of various agricultural industries, accelerating economic development in agricultural counties and rural areas, raising farmers' incomes, enlarging the agricultural and rural economy, and fostering family farms, farmers' cooperatives, and other new economic forms.[1]

Artificial Intelligent (AI) can be broadly defined as programs, algorithms, systems, and machines that are embodied in the form of machines that exhibit characteristics of human intelligence and are capable of mimicking intelligent human behavior. These machines rely on a number of important technologies, including machine learning, natural language processing, neural networks, and deep learning. AI can be used for marketing strategy decisions, such as segmentation, targeting, and positioning. Mechanical AI is capable of learning consumer preferences, thinking AI is capable of suggesting target segments, and feeling AI is capable of communicating products to targeted clients.[2] There are numerous advantages to using AI technology to monitor agricultural land in terms of fertilizer use, fertility identification, and plant growth. With the help of AI technology, farmers can make decisions and take actions that can be applied in agricultural cultivation systems to increase productivity.[3]

According to the research of [4] Agricultural product production and marketing information services will follow a trend toward intelligent marketing of agricultural products based on big data technology as the next generation of information technology, represented by big data technology, develops so swiftly. Therefore, this research will examine Marketing Strategy in the Development of Agricultural Product based on Artificial Intelligent

II. METHODS

The method employed in this research is a literature review conducted utilizing an online search methodology for national and international scientific journal articles on multiple journal search engines such as Google Scholar, Science Direct, and the Elsevier journals.

Search by subject (title) with the keywords "marketing strategy," "Artificial Intelligent," or "Agricultural products." Articles containing only concepts are eliminated from the search, and article subjects are restricted to the last four years (2019-2023).

III. LITERATURE REVIEW

The Industry 4.0 transformation has brought about significant technological and digital improvements that are improving product quality, safety at work, defect prediction, and energy efficiency [5]. According to the research of [1] entitled Analysis and Research on the Marketing Strategy of Agricultural Products Based on Artificial Intelligence. It can be seen that the traditional techniques of agricultural product manufacturing, marketing, and management have experienced significant changes due to the steady growth of artificial intelligence (AI). As a result, there is a need for these methods to be more optimized. Operators of agricultural products have started integrating AI technology into the processes involved in product development, marketing, and distribution. This article looks at the condition of agricultural product management now and then looks into how artificial intelligence can be used to integrate production, marketing, and distribution. Furthermore, this research proposes a classification model that combines factor analysis with an upgraded support vector machine (SVM) based on genetic algorithms (GAs), in light of the shortcomings of traditional methods for identifying agricultural products.

Furthermore, based on [2] research, The study's findings show that the secondary sector, which consists of rice, corn, bananas, and pineapples—which are presently sold primarily as raw materials—has a lot of potential in the agricultural sector's industrial potential. Because it is still limited by the capabilities of human resources and technology, the creation of derivative products has not been handled as optimally as shown in the Republic of Indonesia's Ministry of Industry and Trade's source industry tree.

IV. RESULTS AND DISCUSSION

The primary deficiency in agricultural products management is an inadequate degree of professional skill and experience within the field. Operating in geographically dispersed areas, agribusinesses depend on a multitude of links to maintain the traditional circulation of agricultural products. These links include producers of agricultural products, local supply and marketing organizations, middlemen, and processing companies, with different personnel participating at each level. A growing number of agricultural products are now marketed in real time via mobile phones thanks to the advancement of artificial intelligence technology, which has changed the function of the producer from that of the operator in prior years.[1]

It may have appeared strange to combine the terms artificial intelligence (AI) and agriculture in a statement up until now. Considering that even the most basic AI just appeared a few decades ago, agriculture has, for millennia, been the foundation of human civilization, producing both food and economic growth. Despite this, new and creative ideas are being introduced in all sectors of the economy, including agriculture. Global agricultural technology has advanced rapidly in the last few years, completely changing agricultural methods. Since the sustainability of our food systems is threatened by global issues like population expansion, resource scarcity, and climate change, these advances are becoming more and more significant. With the advent of AI, many problems are resolved and the negative aspects of traditional farming are lessened. AI systems make autonomous crop management possible. In conjunction with Internet of Things (IoT) sensors that track soil moisture content and meteorological conditions, algorithms are able to determine in real time how much water plants require. The goal of autonomous agricultural irrigation systems is to encourage sustainable farming methods while conserving water. (Lenniy, 2S023)

Internet of Things (IoT) is considered as a concept for connecting physical devices to the internet to be used for communication and sharing data freely. The application of IoT has had a positive impact on sharing in all sectors, including the agricultural sector [7]. The use of the Internet of Things (IoT) in agriculture has brought a revolution in the way farmers manage gardens, farmland and crop production. IoT refers to a network of physical devices that are connected and communicate with each other over the internet. In the agricultural context, IoT implementation enables real-time data collection, data analysis, and smarter decision making. Sensors connected to an IoT network are used to monitor soil conditions, temperature, air humidity, water quality and other environmental factors. This data helps farmers to respond quickly to changes and adjust farming practices. Additionally, IoT-connected irrigation systems enable precise watering of crops at the right time, based on analysis of crop water requirements at specific locations. Data collected from IoT can be used for advanced analysis, predicting weather, crop yields and providing valuable insights to increase productivity. From this explanation, the main advantage of applying IoT in agriculture is its ability to provide real-time information, increase efficiency, reduce resource waste, and provide the basis for better decisions in agricultural practices. This opens the door to greater innovation in increasing agricultural production in a sustainable manner.

By 2050, it is expected that there will be more than 10 billion people on the planet. Agriculture and food production must rise by 70% in order to meet the growing population's food needs as well as other needs. This presents significant challenges for the agri-food sector. A sufficient amount of arable land will be required first. Given the limited availability of resources, the effects of climate change, epidemics, and other socioeconomic issues, it is imperative that all agricultural production and marketing operations accurately measure demands and employ appropriate estimating methodologies [5]. Artificial intelligence has brought about significant modifications to the conventional techniques of producing, marketing, and managing agricultural products, which calls for additional optimization of these approaches. Growers of agricultural crops have started integrating AI technology into their marketing, distribution, and production procedures.

In enhancing crop production, the use of pesticides in agriculture is perceived to be beneficial. However, manual pesticide application has the potential to damage crops due to the process involving trampling on many plants. Furthermore, other impacts felt by farmers include pesticides, which commonly contain chemicals, causing symptoms such as dizziness, itchy skin, seizures, and even death. Therefore, there is a need for innovation to reduce the risks associated with pesticide use. As indicated by the

Directorate General of Development of Disadvantaged Regions (Ditjen PDT) in 2019, agri-drones can be utilized to apply pesticides, liquid fertilizers, and targeted irrigation, thus avoiding excessive use of fertilizers and pesticides [8]. This technological support maximizes agricultural yields in achieving food security.

The Ministry of Agriculture has introduced a new breakthrough with the AWR (Agriculture War Room), also known as the agricultural renewal control center [8]. This AWR is used to oversee and control pest attacks, monitor seed distribution, and serve as a tool for the government to communicate with farmers using sensor data from agricultural production. The use of AWR is expected to provide improvements in production, ensuring that the quality produced is above average. Consequently, the use of AWR can meet the national food availability needs and cater to the global market.

In the context of marketing strategies, in this era of technology and digital information, significant changes are occurring in the agricultural sector. All sectors are transitioning from traditional methods to leveraging digital platforms, and agriculture is no exception. The increased use of e-commerce in agriculture is a result of the growing popularity of online purchases. The digital transformation in agriculture has also led to the development of new marketing channels for agricultural products [9].

The utilization of e-commerce and digital platforms has reshaped the agricultural industry, altering traditional marketing methods and enabling more efficient and cost-effective ways for farmers to market and sell their products. The integration of e-commerce with the marketing of agricultural products has gained significant traction in the digital era, transforming the way farmers and agribusinesses connect with customers and markets. As the industry evolves, new research patterns emerge, representing the dynamic nature of agricultural marketing in the digital age. The e-commerce environment strongly promotes rapidly developing agricultural products, thereby offering new opportunities for research and innovation [10].

The development of the 4.0 industrial revolution in the Indonesian agricultural industry can be utilized for both on-farm and off-farm activities. Through agricultural commodity information services, digital technology is utilized to expand farmers' access to agricultural commodity information. When farmers require rapid agricultural information, mobile-based information services are essential. In on-farm procedures, digital applications can be used to remotely manage crops, allowing for continuous monitoring and increasing crop yields by up to 100%. Meanwhile, digital technology can be employed for marketing and traceability in the distribution chain for off-farm procedures. The implementation of a traceability system will enhance transparency across the entire agricultural production chain, from upstream to downstream [11].

From the explanation of the on-farm and off-farm processes above, these processes in the field of agriculture have different benefits, yet both are equally important to support overall productivity and sustainability in farming. The on-farm process essentially aids in directly managing crops. Through the use of technologies such as smart irrigation systems, crop monitoring, and digital applications, farmers can optimize plant growth for better yields. Meanwhile, the off-farm process assists in marketing agricultural produce to consumers. This involves supply chain management, distribution, product promotion, and marketing strategies that support farmers in reaching a broader market. Both processes complement each other. The on-farm process provides a strong foundation for high-quality harvests, while the off-farm process helps farmers efficiently manage and market their agricultural produce. With the synergy of both, agriculture can become more efficient, productive, and sustainable.

The integration of Artificial Intelligence (AI) technology in agricultural marketing, distribution, and production procedures can provide significant benefits to farmers. The use of AI can assist in accurately monitoring crops, offering appropriate care recommendations, and enhancing productivity by utilizing data for smarter decision-making. Through data analysis, AI can help farmers efficiently manage inventory, predict needs, and reduce resource waste. With the collected data, farmers can plan more effective marketing strategies with better market segmentation and a deeper understanding of consumer preferences. Therefore, the use of AI technology in agriculture can enable farmers to improve yields, reduce costs, and minimize risks through a better understanding of soil conditions, weather, and other factors influencing crop outcomes.

V. CONCLUSION

It can be concluded that the development trend for agricultural product production and marketing information services will be intelligent marketing of agricultural products based on big data technology, which is a new generation of information technology that is developing quickly**.** Therefore, these techniques must be further refined. Agicultural product operators have begun incorporating artificial intelligence (AI) into their product development, marketing, and distribution processes. Opportunities for new research on the integration of AI in the agricultural sector are still wide open. A wide variety of AI systems can be used. Suggestions for continuing research are : use of appropriate and appropriate technology user needs so that technology developed can be beneficial for all stakeholders.

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