

# Research on Taiwan's Agricultural Industry Introducing E-Commerce Auction Trading System

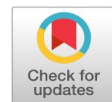
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**Abstract:** The main purpose of this study is to use information technology to promote the e-commerce auction trading mode of agricultural products, strengthen the supply and marketing order, ensure the trading information of agricultural products are transparent and opened, and improve the marketing system of agricultural products and expand the multiple marketing channels of agricultural products. The research method uses SWOT analysis and five-force analysis, and the secondary data collection method and literature exploration method in qualitative research are carried out. The research results show that: 1. By constructing a high-stability B2B e-commerce architecture, agricultural products can achieve good efficiency in transportation and sales; 2. An innovative agricultural product trading system can strengthen the agricultural economic system. In addition, in the research, the “business model innovation” that this study failed to mention is worthy of inclusion in continuous research to increase the contribution of research.

**Keywords:** Diamond theory, Agricultural value chain, SWOT analysis, Competitive five-force analysis, Information technology, e-commerce

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## INTRODUCTION

### Research motivation

In recent years, Taiwan's economic and trade market has gradually become internationalized, leading to very serious challenges to agriculture. Due to Taiwan's accession to the WTO and frequent cross-strait exchanges, facing the trend of global economic and trade liberalization, while Taiwan's agriculture is a small-scale farming system, agricultural production costs are generally higher than imported agricultural products, facing the pressure of international agricultural imports. Although Taiwan is surrounded by seas as an island-type country, the four seasons are suitable for crop growth, but because the domestic market is a “shallow-disc market”, market demand is limited, agricultural output is slightly increased or decreased, and prices immediately fall or rise sharply. Due to the imbalance between production and sales, the result is no return.

Taiwan's agricultural production and sales imbalances into inertia, in order to strengthen the agricultural production and marketing supply chain structure, enhance the competitiveness of agricultural products market, and innovative agricultural technology research and development is a top priority. This research is based on the principle of “agriculture-based”. It uses agricultural information technology to create the development of agricultural e-commerce, promote agricultural competitiveness and increase farmers' income. At the same time, by providing consumers with more fresh agricultural products, we will establish an efficient and orderly production and sales pipeline, grasp the pulse of production and sales accurately, regulate market supply and demand, stabilize the needs of people's livelihood, safeguard the income of farmers, and promote the sustainable development of Taiwan's agriculture.

### Research purpose

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This research is mainly based on the “Problems and challenges faced by Taiwan’s agriculture”. The main purpose is to explore how to use information technology to promote the e-commerce model of auction transactions, strengthen the supply and marketing order, and ensure the wholesale market of agricultural products from the two aspects of informationization and e-commerce. The informational transaction is transparent and open, and the agricultural product marketing system is improved. At the same time, the use of information technology to promote the e-commerce model of agricultural auction transactions, promote agricultural competitiveness, strengthen the supply and marketing order, and ensure that the informational transactions in the agricultural wholesale market is transparent and open. Ensuring the integration of e-commerce systems and physical channels, expanding the multiple marketing channels for agricultural products and enhancing the well-being of farmers are the targets.

## LITERATURE REVIEW

### The concept of agricultural development

Agriculture is an ancient and traditional industry. The Agricultural Development Regulations of Taiwan define agriculture and agricultural products as follows:

1. Agriculture refers to the use of natural resources, agricultural materials and technology to engage in the production, marketing and leisure of farming, forestry, aquaculture and animal husbandry.
2. Agricultural products refers to the products produced by agriculture.

The word “agriculture” is derived from Latin. The original meaning of Agri is the land; the original meaning of culture is cultivation. Modern agriculture is not only a production career, but also a way of life and a function of ecological conservation. Therefore, agriculture is a career of production enterprization, modernization of life, and ecological naturalization. As far as the importance of agriculture is concerned, agriculture is the focus of society, the foundation of the industry and commerce, and it is an important pillar of the economy.

There is a certain difficulty in the industry’s inability to clearly delineate the boundaries. The general disparity is mostly caused by different ranges, and the range differences include “horizontal range”, “vertical range”, and “geographical scope”. Porter (1985) proposed the diamond theory in 1990, pointing out that a country’s economy is composed of a variety of industries, and the environment or conditions required by each industry are also different, so the industry is the source of the country’s main competitive advantage. Therefore, we analyze the four environmental factors of a country’s competition, including “production factors”, “corporate strategies, structures and competitors”, “performance of related industries and supporting industries”, and “demand conditions”, putting in “opportunities” and “government” act as supporting factors to coordinate the relationship between the national environment and corporate competitiveness. In the diamond model, its characteristics are interactive between each key factor, and changes in the competitive advantage of the industry are made by changes in various factors.

### Agricultural value chain

Porter (1985) proposed the Value Chain Model, which considers activities with increased value inside and outside the company to be classified into “basic activities” and “support activities”. The basic activities involve production, sales, logistics, delivery logistics, and after-sales services; support activities include personnel, finance, planning, research and development, and procurement. Basic activities and support activities constitute the value chain of the company. These activities can contribute to the company’s advantages in terms of cost or differentiation, as shown in Figure 1

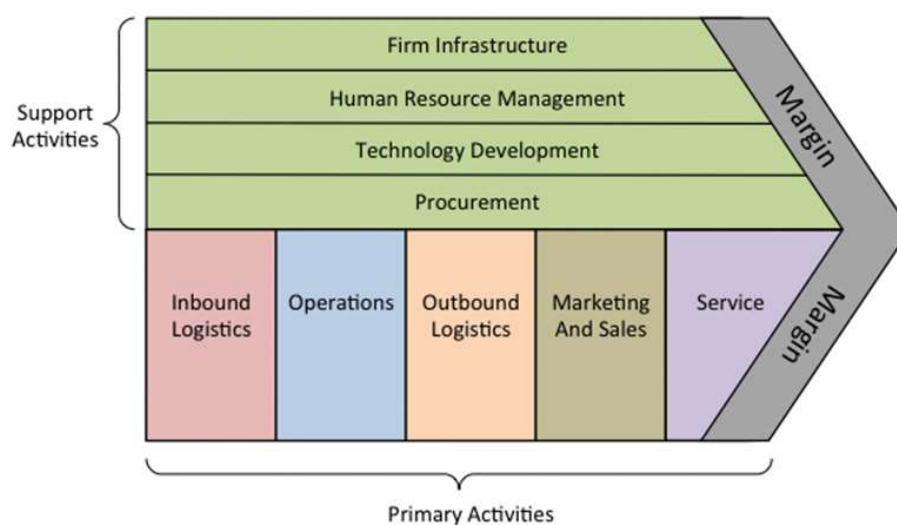


Figure 1. Value chain analysis model. Source: Michael Porter's Value Chain Model (Porter, 1985)

Porter (1985) further pointed out that in different types of organizations participating in value creation activities, not every link creates value. In fact, only certain value activities actually create value (Huang, 2007). The World Bank defines the agricultural value chain as a series of value-added activities (Webber & Labaste, 2010) from the raw material to the product. Since then, some developing countries have witnessed a new wave of agricultural value chains. It is hoped that the agricultural production and marketing system and the value of products will be improved by the continuous development of agricultural products from farm production to the establishment of a complete service chain for customers. Agriculture is the foundation for human beings to live on earth and create life civilization; the development of agriculture is linked to the four major issues of population, food, environment and energy (Garai-Fodor, 2019; Liao, 2006). Agriculture must create a stable and efficient agricultural commercial environment, establishing a safe and high-quality agricultural production and marketing system, integrate agricultural value chains, and increase the added value of agriculture.

### Agricultural information and e-commerce

A business model is a business method that a company relies on to survive, and the company creates profits through its position in the value chain. Porter advocates that the competitive advantage of enterprises comes from low cost and differentiation. Information technology can not only create competitive advantage by reducing costs but also increasing differentiation. This shows the importance of information technology to the competitive advantage of enterprises (Chang, 2003).

Kalakota and Whinston (1997) believe that e-commerce is a modern enterprise business model. Enterprises can use computer network technology to collect information that supports decision-making so that enterprises can improve the quality of products and services and accelerate the speed of service delivery. It also saves costs. E-commerce is the product of the interaction between economy and information technology development. E-commerce business model is the way for enterprises to carry out e-commerce. It has undergone an evolving process in which enterprises continue to operate and obtain profits (Kao, 2017).

Agricultural e-commerce refers to the process of using the Internet to provide business operations for agricultural products in the agricultural sector, such as sales, purchases, and electronic payments for products or services. The development of Taiwan's agricultural e-commerce must clearly analyze the allocation of agricultural value chains before it can formulate strategies to intervene in value chain activities to create higher value and more unique competitive bases to form a unique competitive position in the global agricultural market. Due to the simplification of e-commerce production and sales structure, farmers' production profits have been relatively improved. It has become an inevitable trend to deliver agricultural products to consumers through the Internet directly. Agricultural e-commerce has become

the focus of attention and also affects the entire agricultural production and marketing chain. From the perspective of global agricultural development trends, the Internet and agriculture have begun to accelerate integration. The Internet is undergoing a comprehensive transformation of the agricultural industrial chain to improve planting efficiency and product quality, and to achieve high quality sales of agricultural products.

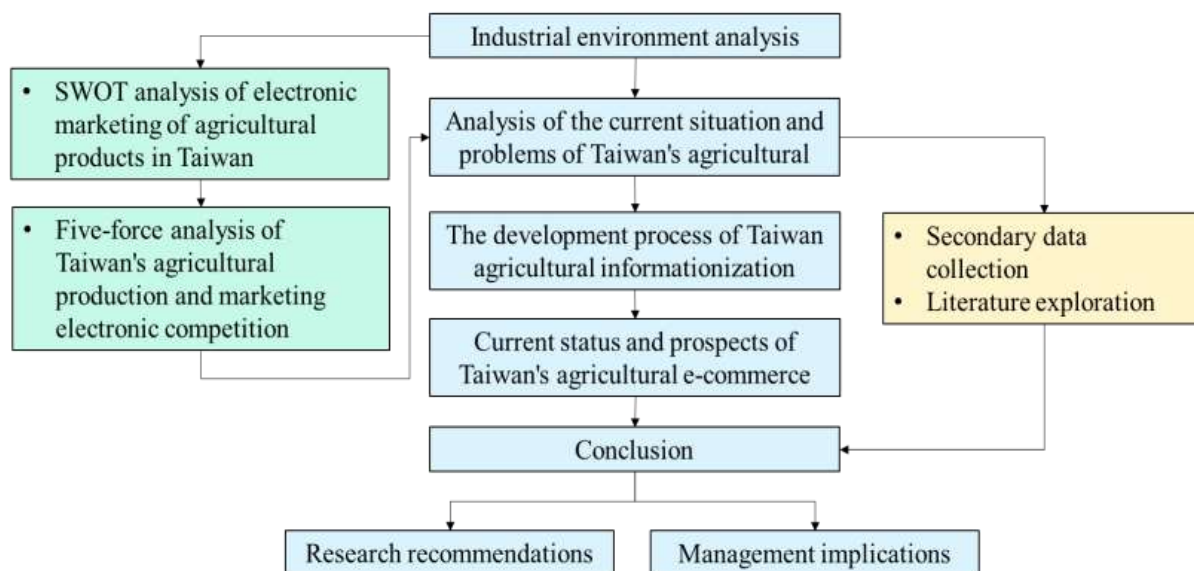


Figure 2. Research architecture and process chart

## RESEARCH METHODS

### Secondary Data Collection Method

The secondary data collection method is research obtained by using data collected from others. In contrast to the original data (or primary data), in the original study, the researcher must be responsible for the research design and information collection. Secondary data users only need to collect secondary data that suits their research purposes, and do not have to collect the original data in person. Relatively speaking, after the original materials are collected, they will soon become secondary materials of other researchers.

### Literature exploration

The historical literature exploration is a systematic collection and objective evaluation of past facts. It can test the causality, effectiveness or trend of the event in order to understand the present and the past and predict the future. Therefore, like other research methods, it is necessary to explore the facts of the past through rigorous analysis. The historical literature exploration can be regarded as scientific research on the past activities of human beings. On the one hand, the evolutionary process of human society is learned from the success and failure experience of the predecessors, and on the other hand, the gains and losses of the predecessors can create the future.

### Research architecture and process

This study uses the secondary data collection method, in conjunction with literature discussion and analysis, to explore the introduction of Taiwan's agricultural import e-commerce auction trading system. Research architecture and process are shown in Figure 2.

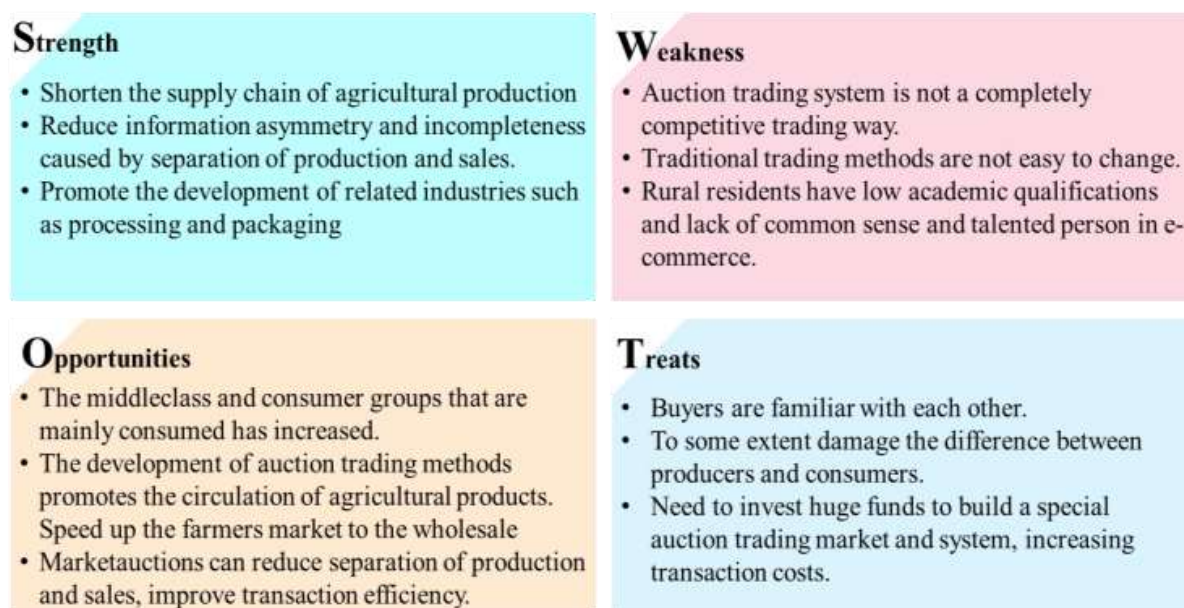


Figure 3. SWOT analysis of Taiwan's agricultural e-commerce

## RESULTS

### SWOT analysis and five-force analysis of Taiwan's agricultural e-commerce

This study uses the SWOT method developed by Ken Andrew to analyze and judge the advantages and disadvantages of Taiwan's agricultural production and marketing, as well as the opportunities and threats of the external environment, so as to observe the development direction of Taiwan's agricultural resources and external environment, as shown in Figure 3.

Furthermore, integrating the three key areas of industrial structure analysis, competitor analysis and industrial evolution analysis, proposed by Michael Porter, and from the contradictory situation extended by a system in which five forces work together leads to deepen and construct the e-commerce of Taiwan's agricultural products. The five-force analysis model of industrial competition is shown in Figure 4.

### Analysis of the current situation and problems of Taiwan's agricultural development

The global population is estimated to be 7.5-10.5 billion in 2050, and food demand will face increasing pressure. In addition to the challenges of global warming, population growth and globalization, global agriculture is also facing the impact of factors such as population ageing, agricultural population reduction, limited arable land, and high food prices (Hsu, Lin, Syong, Syu, & Chen, 2011). Taiwan is also facing similar problems. It is limited by the natural environment, the shortage of cultivated land, the small-scale farming system, the aging of the rural population and the declining birthrate. The agricultural manpower is in short supply, and agricultural productivity is quite impacted. The main problems in analyzing Taiwan's agricultural development are as follows:

1. Affected by topography, climate, location and market, it often leads to price changes of agricultural products, causing heavy losses for farmers, and also leading to rising prices of agricultural products in the market.
2. Agricultural products often have excessive or too little production, and there is usually no way to reach a balance point.
3. The traditional agricultural product auction market and the transportation and supply chain process are complicated, resulting in different price of agricultural products. The long supply chain process causes the price difference to be too high, and the transaction information is opaque and easy to be manipulated.
4. The high cost of agricultural production and the long product passage between producers and consumers often result in the exploitation of producers' profits by middlemen.

- The competitive trend of global economic and trade liberalization and the changing market environment are irreversible trends, which have a great impact on Taiwan's agricultural economics market and industry.

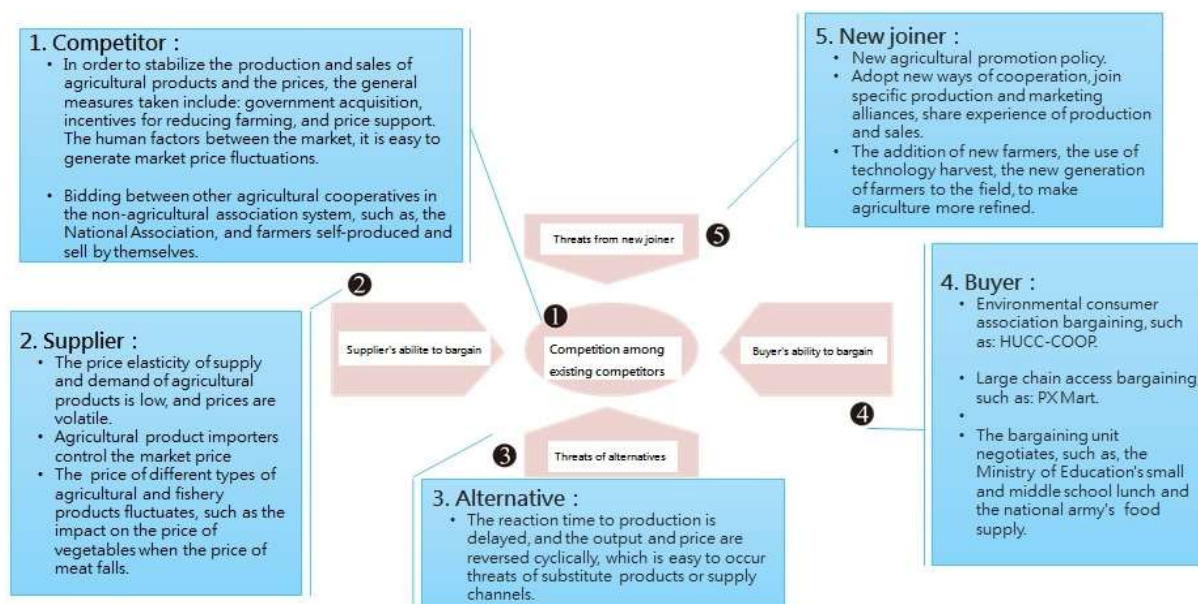


Figure 4. Five-force analysis of Taiwan's agricultural e-commerce

### The development process of Taiwan's agricultural Informationization

The informationization of agricultural production and marketing is to comprehensively develop and apply modern information technology in the agricultural field, so that it can penetrate all aspects of agricultural production, distribution, consumption, consumption, rural society and economic analysis, thereby improving the whole process of agricultural efficiency and agricultural productivity. Agricultural informationization is a necessary measure for agricultural modernization. Looking at the development process of Taiwan's agricultural production and marketing information in the past, it can be summarized into three periods (Lin, 2006):

- The infancy of the 1970s: mainly based on batch processing data of mainframes.
- Development period in the 1980s: The three types of application systems, such as agricultural science and technology, agricultural statistics and business management, are the main development types.
- The control period from the 1990s to the present: an information system developed independently for the purpose of decision-making in the agricultural sector.

The application of information technology in agricultural production and marketing is also quite extensive. The application in agricultural management, such as the "construction of a complete agricultural information system" planned by the Executive Yuan's COA, includes production surveys, market transactions, marketing services, agricultural trade, production and sales analysis, business guidance, agricultural environment, and agricultural production and marketing information system (Lin, 2006), as shown in Figure 5. Focusing on the integration of production and marketing information systems using Internet technology and mobile communications, from the provision of agricultural production and sales information, collection and information services to the guidance of farmers, production and marketing, farmers' associations to develop agricultural products for e-commerce applications.

### Current status and prospects of Taiwan's agricultural e-commerce

In 2000, when Porter came to Taiwan, he pointed out that information technology is an important tool that runs through the value chain of the industry (Lin, 2006). The application of information technology in the agricultural value chain not only provides opportunities for improving the efficiency of

production and sales activities, but also stimulates the research and development, design and innovation of new products, marketing, and the value of agricultural products can be improved. This is sufficient to explain the agricultural informatization of Taiwan's agricultural economy can have a huge boost and impact.

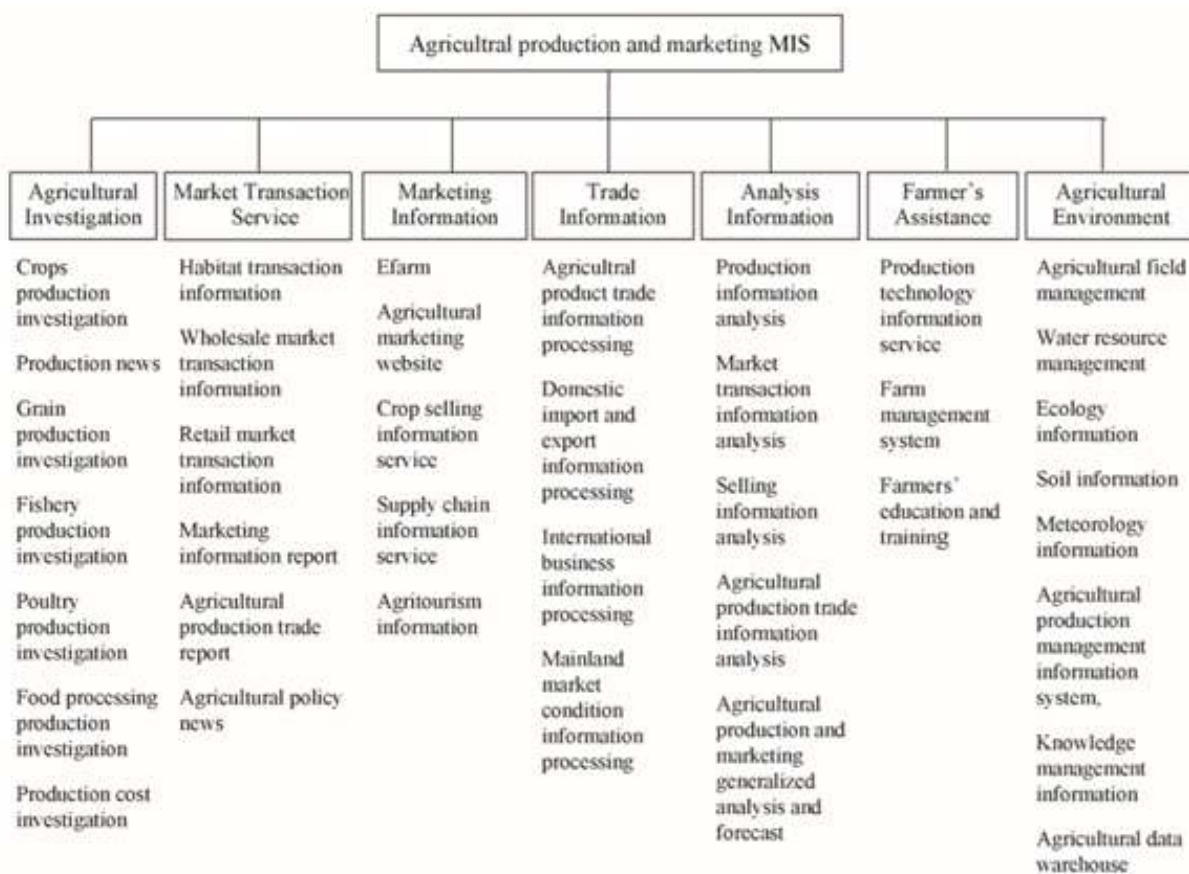


Figure 5. Taiwan agricultural information application mechanism and production and marketing information system

Lee (n.d.) believes that the business opportunities in the electronic trading market for agricultural products are very large, but there is no company is willing to invest time, manpower and resources in cultivating this agricultural market. Agricultural products are the livelihood of every individual, but compared with other industries in Taiwan, agricultural wisdom and informatization seem to be strengthened. The informatization of agricultural product supply chain management is also an indispensable application of agricultural products e-commerce. If it can be ordered online and bidded or auctioned in the future, it can provide a faster and more efficient trading mechanism and reduce the manpower of the wholesale market. In addition to the cost of management, and through the network without borders characteristics towards the forward trading model, and then join the international market (Lin, 2006). The construction of the electronic organization model of agricultural products and sales is carried out from the various electronic and networked operations of various operations and management processes within the individual organizations to the various units of the agricultural production and marketing organization system using the Internet as a tool to do horizontal and vertical interaction between organizations, as shown in Figure 6. The main goal of electronic marketing of agricultural products is to reduce the transaction cost of agricultural products, create geographical restrictions and 24-hour trading opportunities, strengthen the precise management of customers and transaction information, improve the quality of decision-making, and improve the efficiency of transportation and sales to create a new image of the company. The agricultural trading platform is a platform that hopes to establish a balance between agricultural product

marketing and production. In addition to providing trading services, it can provide information to the consumer about agricultural products (Hsu et al., 2011).

Taiwan's annual food consumption is about 1.5 trillion. Estimated by the fact that domestic agricultural products online shopping accounts for about 1% of food consumption, Taiwan's agricultural products e-commerce output is around 15 billion. The e-commerce platform for sales is roughly divided into two types: integrated e-commerce platform and vertical e-commerce platform. In addition to selling Taiwanese agricultural products through e-commerce platforms, it also sells through other e-commerce channels, such as social media LINE, Facebook, and WeChat, and even uses multi-flash cross-border marketing and sales. With the improvement of Taiwan's network construction, the opening of third-party payment and the rapid development of logistics, agricultural e-commerce is poised for growth, but it is difficult to manage compared with other industries. There are still many problems including talents, environment, and marketing. In order to accelerate the vigorous development of Taiwan's agricultural products e-commerce, the Executive Yuan's COA has actively planned solutions to the above problems, including: 1. strengthening agricultural talents to establish e-commerce agricultural product supply systems, 2. Matching electricity farmers and agricultural power Business cooperation, 3. Promoting the transparency of production information, 4. Optimizing the production supply chain of agricultural products. E-commerce has been widely used in agricultural production, distribution management, marketing, and can provide more information on production and marketing to local farmers (Kao, 2017). There are indeed many challenges in the development of e-commerce in Taiwan's agricultural products. The government will strive to create an environment suitable for the development of e-commerce for agricultural products in the future. Combine the power of the farmers of e-commerce, and use various new online marketing methods to attract consumers to use more networks. Purchasing domestically produced agricultural products, in order to achieve the three-win goal of e-commerce, farmers, and consumers, promoting the internationalization goal of Taiwan's agricultural products e-commerce ultimately toward global development.

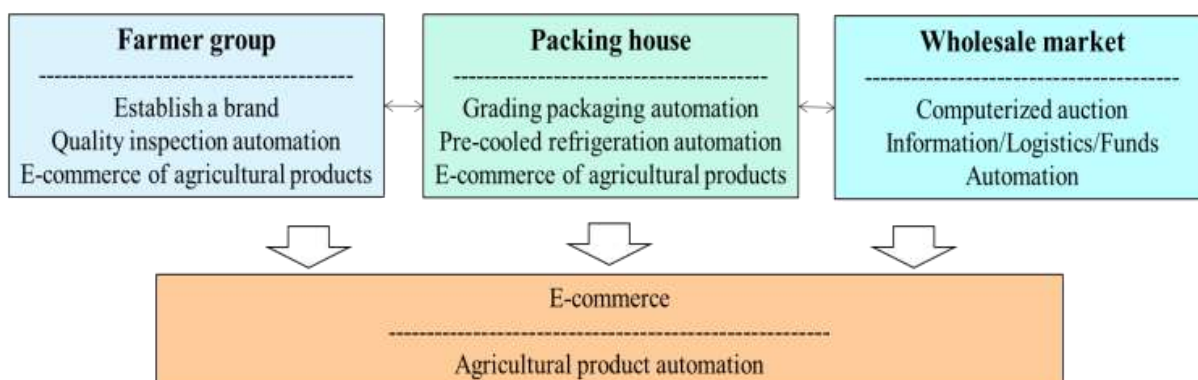


Figure 6. Automation and electronic marketing of agricultural products

## CONCLUSION

In the complete agricultural information system, agriculture can also stimulate innovation through rapid integration and sharing of knowledge, and continuously promote development into a knowledge industry.

## Research recommendations

In response to the impact and trend of the agricultural industry, combined with the improvement of the traditional agricultural industry auction transaction mode, the establishment of an agricultural economic system with efficient production, in the entire transportation process, can shorten the time and achieve good efficiency with innovative transactions. The system strengthens the order of supply and marketing. This study provides e-commerce auction transaction system architecture with flexibility, scalability, interoperability and high stability:



1. Applying the concept of e-commerce, aiming at the demand of the impact and trend of the agricultural industry, combining and improving the traditional agricultural industry transaction model, proposing a rapid response model for agricultural industry operations and transactions based on e-commerce architecture.
2. The results of the introduction of e-commerce transportation channels in the agricultural industry can shorten the access between the traditional traders and vendors, and shorten the time and achieve good efficiency throughout the transportation process.
3. The entire transaction and distribution process is carried out through the transaction, warehousing and distribution center of the e-commerce market, replacing the traditional wholesale market, supply and marketing centers and supermarkets.

### Management implications

E-commerce will affect the entire agricultural production and marketing chain. Through this high-efficiency direct sales channel, the relationship between agricultural producers and consumers will be closer, which will indirectly drive rural development, and at the same time increase farmers' income and promote the refined production of agricultural products. Information technology can be used to promote the e-commerce model of smart agricultural transactions, strengthen the supply and marketing order, ensure the transparent and open trade of agricultural products, achieve the wisdom of modern agriculture, enhance agricultural competitiveness, enhance the well-being of farmers, and promote the sustainable development of Taiwan's agriculture.

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