State Management of High-Tech Development: International Experiences and Lessons for Vietnam

Khanh Cuong Le and Manh Hai Nguyen

Abstract The study clarified a number of theoretical issues of high-tech agriculture and clarified the content and theoretical framework of state management on the development of high-tech agriculture in Vietnam (program development, planning; implementation of policies; organization of implementation, and inspection and supervision). The study also emphasized the role of the state in the development of high-tech agriculture, programs, mechanisms, and policies to encourage the development of high-tech agriculture through the study of experiences in state management of developing high-tech agriculture in some countries around the world such as China, Israel, Indonesia, and Thailand, thereby drawing lessons for Vietnam in the state management of high-tech agriculture, contributing to promoting high-tech agricultural production in the coming years.

Keywords Economic management · High-tech agriculture · Agriculture · Revolution 4.0

1 Introduction

In the national economy, agriculture plays a very important role. Developing high-tech agriculture associated with sustainable development is Vietnam's top priority. In recent years, agricultural development in general and high-tech agriculture in particular has been a matter of particular concern of the country's Communist Party and State because high-tech agriculture brings about high productivity and good product quality, meeting the increasing demands of domestic consumers as well as the increasing demands for export, contributing to the sustainable development of agriculture. In order to develop a high-tech agriculture, special attention must be paid to the state management of technological agricultural development. Recently, the state

K. C. Le (✉) · M. H. Nguyen
VNU University of Economics and Business, Hanoi, Vietnam
e-mail: cuonglk@vnu.edu.vn

M. H. Nguyen
e-mail: nguyenmanhhai@vnu.edu.vn

A. T. Nguyen et al. (eds.), *Contemporary Economic Issues in Asian Countries: Proceeding of CEIAC 2022, Volume 2*, https://doi.org/10.1007/978-981-99-0490-7_7

management of high-tech agriculture development has achieved many successes, but the state management of high-tech agriculture development still faces many difficulties and inadequacies in terms of policies, human resources, organizational structure, etc. This research aimed to study the state management experiences in high-tech agriculture development in a number of countries in the world such as China, Israel, Indonesia, and Thailand. Based on that, the study provided lessons for Vietnam to improve the state management of high-tech agriculture development in the coming years.

2 Theoretical Basis

2.1 High-Tech Agriculture and the Connotation of High-Tech Agriculture Development

According to the Vietnam Agricultural Encyclopedia, agriculture is a production activity of humans to create food, clothing (cotton, yarn, etc.), and housing (wood, litter, leaves, etc.). According to different bases, agriculture is classified differently. On the sector basis, agriculture is divided into the fields of (1) crops; (2) livestock; and (3) aquaculture. According to the mode of production, agriculture is divided into (1) traditional agriculture or subsistence agriculture and (2) agricultural commodity production.

In addition to the above classification, in recent years, the term high-tech agriculture has appeared. According to the concept of developed countries, high-tech agriculture is an advanced, modernized, and mechanized agriculture on the basis of applying achievements of biotechnology, ecology, and environment. According to the Department of Science and Technology, Ministry of Agriculture and Rural Development, high-tech agriculture is the agriculture that applies new and advanced technologies in all stages of the production process to improve efficiency and create breakthrough in productivity and quality of agricultural products, satisfying the increasing demands of society, bringing high profits to producers, and ensuring sustainable agricultural development (Pham, 2014).

In Vietnam, "High-tech agriculture is defined as agriculture in which new technologies are applied to production, including agricultural industrialization, automation, information technology, material technology new technologies, biotechnology, and high-yielding and high-quality plant and animal varieties, achieving high economic efficiency per unit area and sustainable development on the basis of organic farming" (Pham, 2014).

Thus, the ultimate goal of high-tech agriculture is to solve the contradiction between productivity, low quality, high labor investment but low economic efficiency, and the application of science and technology for agricultural production to increase productivity, output, and efficiency, and to achieve high quality. According to experts' point of view, high-tech agriculture in Vietnam currently includes the following

contents: (1) Selecting the most advanced technologies and techniques in varieties, cultivation, animal husbandry, and irrigation technology, post-harvest—preservation—processing to apply in each field of agricultural production. To promote the application of information technology in management, brand building, and market promotion; (2) High-tech agricultural products are commodity products with characteristics of different ecological and soil regions, high productivity and high economic efficiency, high competitiveness, and ability to increase their production scale and output; (3) High-tech agricultural production creates products that must follow a closed process in the production to ensure overcoming the risk factors of nature and limiting the risks of the market; and (4) High-tech agriculture is developed according to different periods, stages, and levels and the specific situation of each place, but must achieve the basic characteristic that is to create much greater efficiency than normal production.

In Vietnam, the types of agriculture applying high technology can be divided as follows:

- High-tech agricultural zones: (i) For developed countries, the high-tech agricultural zone has the following two main functions: development of tourism, sightseeing, and landscape enjoyment; and enhancement of people's awareness and changes in the method of resting; and (ii) for developing countries, the main objective of high-tech agricultural zones is to produce goods, where people display and demonstrate high-value agricultural products and apply high-tech scientific equipment, and perform the function of training and transferring technology and techniques. In Vietnam, the high-tech agricultural zone is a closed area from production—processing to consumption of agricultural products; and is one of the new forms of agricultural territorial organization; playing the role as the nucleus of agricultural development in the direction of high technology, a model of agricultural organization in the direction of sustainable development, supporting, leading and orienting investors, cooperatives, and individual farmers to be able to learn and apply research results into production.
- *High-tech agricultural production models*: Production models that apply high technology and techniques in agriculture but mainly focus on production.
- *High-tech agricultural production areas*: High-tech agricultural production areas are the concentrated agricultural production areas that apply achievements of science, technology, and high-tech techniques into the agricultural production to produce one or a few commodity agricultural products and strategic export commodities based on the results of selection, breeding, and cultivation for high yield and quality; with disease prevention and control; with the cultivation and animal husbandry that achieve high economic value and efficiency; they are the production areas that use modern agricultural materials, machines, and equipment; high-tech preservation and processing of agricultural products and services in agricultural production, in order to create a large and concentrated amount of agricultural products.
- High-tech agricultural projects: A high-tech-applied agricultural project is a production and business project or plan that must simultaneously satisfy the

following criteria, specifically as follows: (i) The technology applied in the production and business project or plan has clear origins issued in Decision No. 66/2014/QD-TTg dated November 25, 2014, and Decision No. 13/2017/QD-TTg dated April 28, 2017, of the Prime Minister; (ii) products are in accordance with national or international quality standards; (iii) products are certified or committed to announce the application of the quality management system in the production and business plan applying high technology according to the TCVN ISO 9001:2015, GAP, or GMP standards or equivalent international standards in terms of product quality management; and (iv) the project or plan must meet national standards and technical regulations on environment; in case there are no applicable national technical standards and regulations, it must comply with the provisions of the law on environmental protection.

Development is the result of a gradual change in quantity leading to a change in quality, so the development of high-tech agriculture is an increase in agricultural production scale and output with the application of high technologies to bring about changes in productivity, quality, structure, and value of agricultural products.

The development of agriculture applying high technologies is considered an inevitable trend to help agricultural production develop dramatically, thereby changing the agricultural image of all countries.

The development of high-tech agriculture according to the approach of this study is the result of the development of various types of agriculture applying science and technology to production, first of all, is reflected in the growth of the agricultural sector and changes in the basic structure and proportion of the agricultural sector, with emphasis on (i) the increase of high-tech agricultural projects and models; (ii) the increase of high-tech agricultural areas/zones; and (iii) the changes of agricultural production methods and agricultural production structure through the proportion of output value of high-tech agriculture of the provinces/cities during the study period.

2.2 Contents of State Management of High-Tech Agricultural Development

The content of state management on the development of high-tech agriculture is the totality of activities and works that the government must do to develop high-tech agriculture in accordance with the goals and expectations set out in each certain period. Such tasks include: (i) formulating, promulgating, and disseminating planning, programs, mechanisms, and policies for the development of high-tech agriculture; (ii) organizing the implementation of programs and policies for the development of high-tech agriculture in the area; and (iii) regulations to overcome market failures to develop high-tech agriculture under the authorization of provincial/city authorities.

2.2.1 Promulgating and Disseminating Planning, Programs, Mechanisms, and Policies

According to Article 3 of the Law on Planning No. 21/2017/QH14 dated November 24, 2017, "planning is the arrangement and spatial distribution of socio-economic, security and defense activities in association with the development of infrastructure, use of resources and protection of the environment in a defined territory in order to effectively use the country's resources, serving the goal of sustainable development for a defined period. Types and levels of planning must be related to each other and compatible with each other, provincial/city planning must be consistent with regional and national planning."

Program is understood as all activities planned to be carried out in a certain order and in a certain period of time, showing the objectives, targets, measures, and things to do, as well as the work aspects related to the development of a certain field in a certain sequence and a certain period. The planning is long term, oriented with a forecasting purpose, while the program is more specific, in a shorter period, and feasible, and will be implemented as soon as it is approved.

When performing the state management function on the development of high-tech agriculture, it is important to develop a comprehensive and synchronous plan for high-tech agricultural development from the central to local levels. In the master plan, it is clear that the views and orientations for the development of high-tech agriculture of the locality are clearly indicated, and the high-tech agricultural areas and zones, and key agricultural products to promote the strengths of the locality are also clearly identified. The local high-tech agricultural development planning in particular must be consistent with the agricultural development plan in the area approved by the government and consistent with the local master plan, not in conflict with the agricultural development planning. Provincial/city People's Councils are responsible for approving and reporting to competent authorities for approval of planning for high-tech agriculture development in the provinces/cities.

On the basis of the approved high-tech agricultural development planning, localities will develop strategies and programs to develop high-tech agriculture in each period in order to promote the advantages of the locality and form high-tech agricultural areas and zones through the periods in order to achieve the objectives set out in the master plan. The strategies and programs for the development of high-tech agriculture of the localities must not conflict with the programs of high-tech agricultural development of the whole country and must match the specific conditions of each locality.

The policy mechanism is a management tool of the state, used by the state to: (1) Encourage the production and ensure public goods and services for the entire economy; and (2) effectively and efficiently manage public resources, ensuring comprehensive practicality in all economic, political, social, and environmental fields, both in the short run and in the long run. In other words, public policy is one of the bases for the examination, evaluation, and determination of the responsibilities in the use of public resources such as state budget, public property, and national resources.

The mechanisms and policies of the central government are nationwide in scope and are of the most general nature. The content of a policy should be constitutional and legal, contain specific objects, scope, and content, and specify resources to implement those mechanisms and policies, and, at the same time, must be assigned to an agency acting as the focal point to organize the implementation of mechanisms and policies to obtain a basis for the inspection and supervision of the organization of the implementation.

2.2.2 Organizing the Implementation of Plans, Programs, and Policies

Organizing the implementation is the process of developing the plans and organizing the implementation of the plans to achieve the set goals. On the basis of the central planning, programs, and economic development mechanisms and policies, the resolutions of the People's Council of the province/city and the People's Committee of the province/city shall develop a plan to implement such master plans, programs, and policy mechanisms.

Planning is the process of determining an organization's goals and the way to achieve them within a given period of time. Provincial/city People's Committees must develop long-term, medium-term, or short-term plans with specific and detailed goals and targets in each period to implement programs and master plans with the promulgated mechanisms and policies. Provincial/city People's Committees assign specialized departments to act as standing agencies to advise on the development and promulgation of the schedules to implement programs, master plans, mechanisms, and policies that have been approved by the People's Council of the province/city. The plan clearly specifies the objectives, targets, required purposes, implementation content, the lead unit, and the coordinating units to organize the implementation. The high-tech agriculture development plan will be organized and implemented by the Department of Agriculture and Rural Development who takes the lead in organizing the implementation and coordinates with other departments, branches, and People's Committees of districts to organize the implementation of that plan. The Provincial Department of Agriculture and Rural Development plays the role of guiding the implementation of the plans, organizing the implementation of the plans, programs, mechanisms, and policies for the development of high-tech agriculture, and, at the same time, has the responsibility to urge and inspect the implementation of the plans through specialized inspection and examination in the process of organizing the implementation of the plans.

People's Committees at different levels are the agencies that are assigned by the provincial/municipal authorities to organize the implementation of local planning, programs, and policies; to coordinate with provincial departments and branches to organize the implementation and be provided with professional guidance of specialized departments. They also play an important role in achieving the desired goals and targets.

The implementation of the policy is of great significance. It is a component of the policy cycle; without this stage, the policy cycle cannot exist because it is the core

that connects different stages of the policy cycle into a system. In order to know if the promulgated policy is feasible and practical, the implementation of the policy is the stage of realizing such policy into production and social life.

It can be seen that the development of a good policy is extremely difficult and must go through many stages. But no matter how good the policy is, if it is not properly organized or implemented, it will not be effective, thereby not achieving the set goals, and also reducing the prestige of the government. And the goals of the policy can only be achieved through the implementation of the policy, and, at the same time, the objectives of the policy not only are related to but also affect the overall socio-economic development goals.

To evaluate the implementation of the policies, it is necessary to clarify how the programs and policies have been enacted, disseminated, and are being implemented, whether they have achieved the expected results or not, the opinions of the stakeholders about the appropriateness of that policy toward the goal of developing high-tech agriculture. The assessment of implementation of the policies for high-tech agriculture development can be performed according to the output results shown through three aspects, namely the policy awareness, the access to the policy, and the degree of suitability of each specific policy such as infrastructure construction support policies, credit and loan incentives support policies, land support policies, and policies to support human resource training in high-tech agriculture development programs.

2.2.3 Monitoring and Inspection to Promptly Correct Market Failures During the Implementation of Planning, Programs, and Policies

Monitoring and inspection (according to Vietnamese dictionary) is to examine the actual situation to evaluate and comment. Inspection is a function of state management, which helps to provide feedback to the management procedure. Through examination, monitoring, and inspection, state management agencies are able to analyze, evaluate, and monitor the implementation of the set management objectives and tasks.

The objective of monitoring and inspection is to ensure that the plans, programs, and policies for high-tech agricultural development are properly implemented and all resources are effectively used. The supervision enables the authorities to understand how far the planning, programs, and policies issued by the central government as well as those issued by the People's Councils at the provincial/municipal levels have been implemented, and what the results and difficulties are, thereby recommendations and measures can be proposed to accelerate the implementation of the policies.

Monitoring and inspection also help the provincial/city authorities to recognize their limitations to timely make additional adjustments and improvements to enhance the effectiveness of policies and to promptly overcome market failures so as to achieve the stated goal. For provincial/city authorities, the inspection is carried out in many forms with the coordination of many agencies and departments in order to promptly overcome market failures to achieve the set goals of high-tech agriculture

development. In order to achieve the goal of timely overcoming market failures, the provincial authorities must promptly reform administrative procedures and have relevant policies such as investment promotion policies to resolve difficulties and attract stakeholders to invest in high-tech agriculture. These policies are implemented differently depending on the specific conditions of each locality during the development process.

Depending on different monitoring objectives, there are different tools for monitoring and correcting market failures. If it is only an administrative goal of the nature to urge and supervise the plans, documents can be used to urge and remind, and the surveys and inspections can be carried out to find out the violations; then, the punishments will be given to the violations, while the rewards will be granted for the good compliance. However, if the goal is to develop, it is, on the other hand, important to emphasize the creation of a favorable environment so that policies can be deployed smoothly to overcome market failures.

3 Experiences in State Management of High-Tech Agricultural Development in Some Countries Around the World

3.1 China's Experience

The Chinese government has developed and implemented many models of high-tech agricultural development at both central and local (provincial) levels, such as:

Firstly, the enterprise-led model is a type of production run by nuclear enterprises (it is called "dragon-headed enterprises" in China), which connects production facilities and farmers in the production, and connects domestic and foreign markets. These enterprises have the ability to grasp and forecast the situation of domestic and foreign markets, and, at the same time, based on the advantages of their production scale, import high technologies, new varieties, new equipment, etc. They also have the ability to cooperate, through contracts, in the form of shares to link different types of interests and put these technologies into production, thereby implementing and developing the scale of their high-tech agricultural product production (Tseng & Zebregs, 2002).

Secondly, the high-tech agricultural development model which is chaired by research institutions. It is the model chaired by research institutions, with the goal of putting their research results into production to create their own products, being conducted in two forms: (i) The research institutions establish enterprises to transform and apply their research results to production; and (ii) the research institutions contribute capital to jointly develop and produce high-tech agricultural products on the basis of their own research results (Tseng & Zebregs, 2002).

Thirdly, the high-tech agricultural development model that is directed by the government. It is a model which is implemented in accordance with the general development plan for the purpose of improving the scientific and technical content in agriculture, and the government uses financial and administrative measures and forms to support the enhancement of the rate of goods production (JSTPM, 2014).

Fourthly, the modern agricultural zone development model. This is a model of joint organization between the government, businesses, associations, and farmers working together to build on an area with relatively good foundations and conditions for agricultural development to form a high-tech agricultural zone, through propaganda, to attract institutions or businesses having the capacity to work in the zone, using business-style operation; through the demonstration, guidance, introduction, and training to put scientific and technological achievements into production and then spread out and expand. Some models of high-tech agricultural zones in China have brought outstanding achievements such as in Yunnan, Hong Ha hi-tech agricultural park established in 2002 is a national zone in China. In Shaanxi, Duong Tuan National High-Tech Agricultural Park chose to build a model combining production, learning, and research to create a suitable business environment for the development stages of science and technology enterprises in order to enhance the attractiveness of the zone. Accordingly, the zone has attracted universities and research institutes to use technology research results to contribute capital (shares) and cooperate with organizations and individuals to build science and technology companies, combined into a community corporation and create connections between research institutions and the corporation. Experiences from development models in Yunnan and Shaanxi, etc., show that, for the high-tech agricultural zone to be effective, the role of the government is to improve the infrastructure conditions of the zones, promoting the influence of modern technologies; to attract and foster a series of new product lines; to improve and perfect the operation mechanism of the zones; and to promote the advantages of the key products of each region (Tseng & Zebregs, 2002).

The role of the Chinese government is the key to the development of various high-tech agricultural models.

Although there are still many issues which need to be continued to improve, high-tech agriculture in China has basically contributed to improving the level and quality of skills and technology, meeting a part of agricultural products need for the society in terms of both quality and quantity, and some lessons can be initially drawn as follows:

- Completing the organizational structure of the high-tech agricultural zone. The establishment and development process of the high-tech agricultural zones is also the completion process of the organizational structure of the zone. Currently, the organizational structure of a state-owned high-tech agricultural zone in China usually includes a central or nuclear area, a demonstration area, and a spillover area.
- The nuclear area is the core of the high-tech agricultural zone, where the integration happens (technology, talent, information, business incubation, research result dissemination, technical training, and socialization services are integrated).

- The demonstration area is the demonstration production area for agricultural products of the zone, a place for agricultural science and technology research result experiments and for the transformation of scientific and technological results through absorbing the results of new technologies and new varieties and through carrying out standardized and normalized business production.
- The spillover area is where the production of goods takes place mainly so that new techniques and new technologies from the nuclear area and the demonstration area spread to surrounding farmers and areas. New techniques and technologies will diffuse from the center to the performance area and the diffusion area sequentially. It can be said that the spillover area is the main place to conduct the production of high-tech agricultural products, a place for businesses to organize farmers to promote commodity-oriented agricultural production, and a place for training and fostering the science and technology capacity, the production management capacity, and the organizational capacity in the direction of industrialization for farmers (Duong, 2011).
- Issuing and implementing preferential policies for Chinese farmers and high-tech agricultural enterprises, realizing that to meet the demand for food for a population equaling to 22% of the world population with an area of arable land equaling to only 7% of the world's arable land, the application of high technology in agricultural production to rapidly increase the output of agricultural products, satisfy the demand for food for more than 1.3 billion people, ensuring stability for society, creating export products, increasing income for farmers, narrowing the gap between rich and poor between urban and rural areas is an inevitable trend. Therefore, the Chinese government has issued many policies and measures to create favorable conditions for enterprises and farmers to participate in agricultural production and apply high technology to production, such as increasing investment in the research and popularization of science and technology, well carrying out the planning for agricultural production, building infrastructure for agricultural production (especially infrastructure for irrigation, plant and livestock varieties, building facilities to inspect and test the quality of agricultural products, and incentives and support for farmers to access agricultural mechanization machines, etc.), creating conditions for information and legislation to exploit the market for agricultural products, directly investing in encouraging farmers to develop agricultural production according to the number of cattle or the cultivated area, etc. High-tech agricultural zone models have been applied and deployed in almost all provinces/cities in China. Successful models are those that benefit both producers (farmers) and businesses. The model development must be based on the demand and follow the principle that "Government directs, enterprises operate, brokerage agencies participate, and farmers benefit." It can be seen that the agricultural models applying high technology in China are relatively close to the models that are forming and developing in Vietnam. The experience in linking as well as the participation of the state's public service providers in the high-tech agricultural zone models in Yunnan and Shaanxi, etc., is a good lesson for shaping, multiplying, and developing high-tech agricultural zone models in Vietnam.

3.2 Israel's Experience

As a country with the world's leading high-tech applied and most developed agriculture, Israel has had valuable experiences in state management of high-tech agricultural development, especially policies to attract business investment in high-tech agriculture, specifically as follows:

Firstly, the factor that is considered to be the decisive factor for the success of high-tech agricultural development is to promote investment in the field of research and development of new agricultural technologies. Currently, Israel has about 300 transnational enterprises focusing on research and technology development and 10 large agricultural research institutions; typically, the Agricultural Research Organization (ARO) and the Agricultural Research Organization (also known as the Volcani Center) are both affiliated with the Ministry of Agriculture and Rural Development. The main objectives of ARO's institutes, centers, and research institutes focus on the following main tasks: (1) accelerating agricultural investment, research, and development in arid conditions; (2) in border areas; (3) drip irrigation and desalination irrigation technologies; (4) cultivation in the condition of environmental protection; (5) raising clean water fish in water shortage conditions; (6) using insect control and post-harvest preservation methods to minimize loss of agricultural products; and (7) carrying out crop cultivation and animal husbandry which are well adapted to different geographical conditions (Hoa, 2017).

The Israeli government always focuses on investing in research and development (R&D) activities, researching modern technologies for agricultural production. According to a report by Deloitte, in the first six months of 2017 alone, US$80 million was invested in technology development to improve agricultural production efficiency. In absolute terms, the investment level for research activities on modern technologies for agricultural production is nearly 100 million USD per year, accounting for more than 3% of the total value of national agricultural output. Most of these studies are conducted by companies producing input products, such as irrigation systems, fertilizers, and greenhouses. It is this coordination that ensures the combination between business and research, ensuring that scientists attain more incomes to maximize their professional capacity. With the Israeli government's focus on investing in the development of new technologies applied in agriculture, it has completely changed the agricultural picture of this country and created a great attraction for regional and international investors.

Secondly, the government focuses on promoting the cooperation between supporting industries such as transportation, mechanical engineering, and even defense industry to create a foundation for infrastructure development for high-tech agriculture. In addition, the government also always implements policies to strengthen the coordination among the 5 parties, including the State, the Scientists, the Entrepreneurs, the Consultants, and the Farmers. Modern supporting infrastructure along with the coordination from the State to farmers are good conditions for businesses to trust and feel secure to invest in high-tech agriculture (Hoa, 2017).

Thirdly, paying attention to the training of high-quality human resources. In Israel, the government has developed a policy to send the youngest and most intelligent human resources to study and research in the army, this is the place with the best conditions for research in science and technology. And after being demobilized, the State allows these veterans to apply their knowledge, technological know-how, and especially teamwork to start a business in the civilian fields, including high-tech agriculture. When there is a high-quality labor force, FDI enterprises will not hesitate to invest in high-tech agriculture (Hoa, 2017).

Fourthly, the government has always placed its trust in and values the agricultural sector and determined that agriculture can bring opportunities for sustainable growth to the country. In Israel, people have always rekindled the spirit of appreciating the contribution of agriculture in the whole society by propagating and constantly replicating local success stories. It is the propaganda and replication of successful results of high-tech agricultural projects that have encouraged the inspiration of students, FDI enterprises, and young entrepreneurs who are willing to invest and succeed in high-tech agriculture (Hoa, 2017).

3.3 Indonesia's Experience

According to the research by Minh (2017), Indonesia leads the ASEAN region in attracting FDI into agriculture for three consecutive years from 2013 to 2015 with the total capital reaching over 1.61 million USD, over 2.23 million, and 2.14 million USD, respectively. To increase FDI attraction in the agricultural sector, Indonesia has issued a series of preferential policies for foreign investors. The legal basis for regulating foreign investment activities is Investment Law No. 25 2007. Accordingly, FDI companies are allowed to operate within 30 years from the date of establishment. The operating time will be increased by 30 years if the investor commits to increase their capital. The law also does not limit the percentage of ownership shares for investors and the minimum investment capital for 100% foreign-owned companies. After 15 years of operation, the company must sell at least 5% of its shares to the Indonesian side.

In addition, Indonesia reduces annual corporate income tax equivalent to 5% of the total investment value for a period of 6 years. For example, the tax that a company with a total investment of 1 billion USD has to pay will be reduced by 50 million USD/year (5% $\times$ 1 billion USD) when calculating taxable income. The loss is carried forward to the next period but not exceeding 10 years. Import tax on goods and raw materials for production may be reduced by up to 5% if these goods are subject to a tax rate of more than 5%. In addition, FDI projects are not restricted in accessing capital from credit institutions.

3.4 Thailand's Experience

The long-term strategic "vision" of the government should not be left out when considering the current development of agriculture in Thailand in general and the development of the country's high-tech agriculture in particular. More than 30 years ago, when the agricultural land area was still large, the human resources were abundant, and Thai policymakers considered agriculture to be the vital force for national economic development, Thailand was destined to be named as the "rice cooker" of the world with 9 million tons of rice exported, earning 3.5 billion USD in 2007. But due to the impact of the industrialization trend, the arable land was lost due to soil erosion or salinization (22 million ha in 2008), farmers did not directly benefit from rising global food prices, etc., but the agricultural policy of the Thai government has made timely adjustments when realizing potential risks and, more importantly, those policies have "corrected the disease" of the agricultural situation. Specifically:

(1) *Agricultural product subsidy policy*

The Thai government applies a purchasing policy with major agricultural products such as rice, cassava, red garlic, and some fruits. In addition to spending the budget on agricultural products at preferential prices, the government also provides incentives for farmers such as buying fertilizers at low prices, free transportation of fertilizers, being provided with new high-yielding varieties, and receiving low-interest loans from agricultural banks.

(2) *Promoting the application of science and technology in agriculture*

The Thai government has encouraged and focused on applying modern and advanced technologies such as gene transfer techniques and breeding techniques. Genetic engineering and tissue culture technology have produced superior varieties such as rice with high salt tolerance, suitable for growing in the Northeast, where the arable land is seriously salinized and farmers are struggling to quit farming and move to the city to earn a living.

(3) *Promoting technology transfer to farmers*

The Thai government pay much attention to technical training to raise public awareness. The universities (such as Chulalongkorn and Chiangmai universities) and agricultural research institutes (Phuphan Research and Development Center) are allowed to invest in facilities, invite agricultural research experts from abroad, and provide remuneration for young researchers who graduate from prestigious universities in the US or Japan, etc. Many universities, colleges, and vocational training schools offer on-the-job training courses on farming techniques and technology transfer to improve the quality of human resources.

In fact, advanced science and technology have been very effectively applied by Thai farmers and gradually become popular. Thai farmers have organized agricultural land by using organic fertilizers, micro-organisms, and, especially, biological pesticides to improve degraded soil and improve soil fertility. This not only enables effective use of the land fund and reduces fertilizer imports, but also enhances the

export of clean organic agricultural products and mechanizes production stages. The involvement of the government and the encouragement and support of Thai scientists help to improve the efficiency of biotechnology application in agricultural production activities of the farmers.

(4) *Rural industrial policy*

The core of this policy is to focus on developing the food processing industry and producing agricultural and aquatic products for export. The Thai government believes that the more diversified and quality the sources of agricultural raw materials are, the more the food processing and export industries will develop. Therefore, Thailand has implemented the program "One village, one product" (One tambon, one product), with the aim of encouraging farmers in each region to produce products with special characteristics and high quality. In addition, the program "Thailand is the kitchen of the world" was implemented to encourage farmers and processors to comply with standards of food hygiene and safety, helping to control the quality of agricultural products.

(5) *Infrastructure upgrade*

The government built and distributed irrigation works reasonably. The irrigation system must ensure sufficient water supply for the entire agricultural land across the country. In addition, hydropower plants were also built, contributing to regulating water between the dry and rainy seasons and providing electricity for production, harvesting, and preservation activities, helping to speed up the agricultural mechanization process.

(6) *Contract farming and business association*

Contract farming is a model where agricultural products are brought to the market through an agreement between buyers and farmers. These agreements also establish the conditions of the product and the market for that product. Typically, farmers agree to supply a quantity of produce based on the standards set by the buyer. The buyer will pay for that product, maybe even support the production process such as providing inputs, providing land, or technical supervision. This model helps to ensure stability, specifically: Farmers have a guaranteed market output and enjoy lower price risks while the purchasing enterprises have a supply of goods that ensure quality, quantity, and time standards.

In Thailand, there are four main contract models currently in use. Each type of goods will have a contract developed according to the appropriate model. With goods such as sugar cane in a centralized model, small farmers and large farmers supply sugarcane to intermediaries; these intermediaries supply products to the factory under a quota set for such factory. Development organizations and the government will regulate the relationship between farmers and factories, avoiding the case of intermediaries operating only for their own profit, causing damage to farmers. As for goods with high requirements such as grilled meat, pork, and eggs, a pilot model will be applied. The contractor will pilot the production first and then impart technology and know-how to farmers so that production can be replicated in many different places.

There are also intermediate and multilateral models. These models include many parties such as processing companies, farmers, farmer groups, extension officers, and academics. The fourth model is the formal model in which farmers will produce goods to provide them to the intermediaries, these intermediaries will supply part of the goods to the direct retail market at a price which is higher than the price for the enterprises until the market price drops, and they will then sell the remaining to the enterprises at the price in the contract.

(7) *Agricultural trade policy*

In order to find export markets, the Thai government directly negotiates with other governments to gain competitive advantages.

As for attracting investors, the Thai government has applied a policy to encourage preferential import tax for enterprises making foreign direct investments in the agricultural sector. For FDI projects in agriculture, the government allows an import tax exemption of up to 50% of the import tax on machinery and equipment to implement the project with the type of equipment that is encouraged for investment and certified by the competent authority. For investment projects in areas with special difficulties and with agricultural products for export, they will be completely exempted from corporate income tax for 5 years.

(8) *Applying and creating agricultural models*

In agricultural production, having good models is extremely important, directly affecting the success of farmers. Thai farmers, in addition to improving their knowledge of crop and livestock care, enhancing farming skills, and applying new technologies into production, also actively explore, apply, and create new advanced agricultural models. The first special model is the combined farm model that supports knowledge transfer. The support for knowledge transfer contributes to reducing farming practices that adversely affect the quality of agricultural products and pollute the environment, such as applying chemical fertilizer, to convert to organic farming, bringing safety to the producers and protecting the environment. The most typical model of farm-based tourism services is Chokchai farm located in Pak Chong district of Nakhon Ratchasima province, 159 km away from Bangkok.

4 Lessons for Vietnam in the State Management of High-Tech Agricultural Development

On the basis of studying the experience of state management in the development of high-tech agriculture of some countries above, the author can draw some experiences for Vietnam in the state management of high-tech agriculture development as follows:

Firstly, from Thailand's state management experience, it is extremely important to develop a centralized, unified, and realistic policy. The Thai government focuses on developing the processing industry—due to the identification of the role of this

industry in promoting production and supplying products for this industry's competitive market. Policies to attract and support foreign direct investment in agricultural production and, especially, in the processing industry are implemented simultaneously. Besides, it is also essential to focus on upgrading infrastructure, which not only provides support to the production but also increases the ability to attract investment. In addition, it is necessary to well carry out the planning and developing high-tech agricultural development programs. It can be seen that through analyzing the experience of developing high-tech agriculture of countries around the world, especially for China and Vietnam, the lesson learnt is that in an attempt to promote the development of high-tech agriculture, it is important to pay attention to the planning of the development of high-tech agricultural zones; to classify the zones to focus resources, mechanisms, and policies; to develop and apply technology to spread to farmers; and to build a relatively complete network of high-tech agriculture systems nationwide with different investors, scales, scopes, and production objects depending on the specific conditions.

Secondly, it is important to focus on developing policies to encourage the development of high-tech agriculture. The experiences of China or Israel show that the governments of these countries have developed and promulgated many mechanisms and policies to promote the development of high-tech agriculture. Specifically, the Chinese government has issued many policies and measures to increase investment in research and popularization of science and technology, policies to do well in planning agricultural production, building infrastructure for agricultural production, infrastructure for irrigation, plant varieties and livestock, construction of facilities to inspect and test the quality of agricultural products, and incentives and support for farmers to gain access to agricultural mechanization machines, etc.; in Israel, there has been the policy for promoting investment and attracting science and technology into production; 5-parties linkage policy, etc. A centralized and unified policy, which matches the reality, has been developed and strictly implemented, providing support to farmers in developing their own knowledge and skills. Our country has truly entered the door of integration, hence, whether Vietnamese agriculture takes advantage of this opportunity to develop and expand the market or not requires various efforts from both the government and Vietnamese farmers themselves as in Thailand. And finally, human resources need to be paid attention to, while the training of high-quality human resources in the field of agriculture needs to be concerned and supported. In fact, this high-quality human resource has brought real benefits to agriculture thanks to the improvement and expansion of arable land. These are some good experiences that Vietnam can study and apply to develop the country's high-tech agriculture.

Thirdly, it is necessary to be drastic in organizing the implementation of the planning, programs, and policies. In the implementation, we can see that for Israel, a separate ministry has been established to focus on developing high-tech agriculture, solving problems in the process of implementing the planning, mechanisms, and policies for high-tech agricultural development. For Vietnam, this task is currently assigned to

the Ministry of Agriculture and Rural Development to direct and guide the implementation of agricultural development in general, to the People's Committees of provinces/cities and the Provincial Departments of Agriculture and Rural Developments to carry out the implementation in the provinces/cities. However, it is also necessary to consider establishing an in-depth department which is specialized in the development of high-tech agriculture. It is important to focus on deploying, replicating, and training people's knowledge and skills; although the farmers' knowledge and skills have been gradually improved, outdated production methods of mechanisms and policies implementation are still applied in many places. The decisive factor to the effectiveness of a policy depends not only on the policy itself, but also on the consistency of its implementation. To create that unity, the Thai government has set common goals in product quality—by introducing ThaiGAP standards, diversifying products—launching the movement "One village, one product" and the criteria for applying advanced technology to agricultural production everywhere. Each policy has multi-faceted support, especially the budget for implementation, not just only the encouraging and campaigning effects. Besides, Thailand's experience in disseminating knowledge, skills, and applying technology to farmers appears to be very useful to Vietnam.

Fourthly, it is essential to strengthen the control, assessment, and adjustment of plans, programs, and policies on high-tech agricultural development to match the reality. It can be seen that in the models of China and Israel, mechanisms and policies are built, promulgated, and continuously updated and adjusted, which means that during implementation process, plans, programs, mechanisms, and policies are always guided, deployed, and regularly monitored, especially with evaluation to adjust to the development practice. On the other hand, the government of any country must also carry out its state management and inspect and supervise the implementation of such policies. In Israel, a specialized ministry is assigned to carry out this task; in China, in addition to the control of the government, the task is also assigned to local authorities. Vietnam can apply both of these models and in Vietnam, such task is currently carried out by the Department of Agriculture and Rural Development and People's Committees at all levels.

5 Conclusions

High-tech agricultural development is becoming an inevitable trend. High-tech agriculture plays a very important role for sustainable agricultural development in the long run. In fact, in order to develop high-tech agriculture, the role of state management is very important; specifically, it orients, plans, and supports so as to promote high-tech agricultural production.

This research has clarified the theoretical issues of high-tech agriculture and clarified the content and theoretical framework of state management on the development

of high-tech agriculture in Vietnam (program development, planning; implementation of policies; organization of implementation and inspection and supervision). The study has emphasized the role of the state in the development of high-tech agriculture, programs, mechanisms, and policies to encourage the development of high-tech agriculture in some countries in the world, from which the lessons for Vietnam in the state management of high-tech agriculture have been drawn, thereby contributing to promoting high-tech agricultural production in the years to come. In particular, the study emphasizes the lessons of state management on planning, building mechanisms and policies, attracting and investing in science and technology; training to improve the capacity of staff working in the fields of agriculture and high-tech agriculture; and solutions on policy implementation and overcoming market failures, etc.

References

Andersson, L., Bengtsson, J., Dahlén, L., Ekelund Axelsson, L., Eriksson, C., Fedrowitz, K., Fischer, K., Friberg, H., Hallin, S., Hunter, E., Jansson, T., Johnsson, P., Mobjörk, M., Oskarsson, D., Patel, M., Rydhmer, L., Räty, R., Röös, E., Slätmo, E., … Wikman Svahn, P. (2017). *Agriculture in 2030—Stories of the future.* Swedish University of Agricultural Sciences.

Banerjee, B., Martin, S., Roberts, R., Larson, J., Paxton, K., English, B., Mara, M., & Reeves, J. (2008), A Binary logit estimation of factors affecting adoption of GPS guidance systems by cotton producers. *Journal of Agricultural and Applied Economics*, 345–355.

Barbara, C. (2009). The problems of agriculture and rural areas in the process of European integration. *Journal of International Studies, 2*(1), 127–132.

Bonabana-Wabbi, J. (2002). Assessing factors affecting adoption of agricultural technologies: The case of integrated pest management (IPM) in Kumi District, M.Sc. Thesis. Eastern UgandaChalla.

Communist Party of Vietnam. (2016). Document of the 12th National Congress of Deputies, National Political Publishing House.

Dan Senor–Saul singer. (2008). In the national work of startups, the story of Israel's miracle economy, World Publishing House.

FAO. (2006). Rapid growth of selected Asian economies lessons and implications for agriculture and food security China and India.

Hallam, D. (2011). International investment in developing country agriculture—Issue and challenges. *Food Security, 3*(Suppl 1), S91–S98.

Hai, D. P. (2016). On the policy of developing high-tech agriculture in our country. *Communist Journal, 881*, 50–53.

Heringa, P. W., Van der Heideb, C. M., & Heijman, W. J. M. (2013, September). The economic impact of multifunctional agriculture in Dutch regions: An input-output model. *Njas–Wageningen Joural of Life Sciences, 64–65*, 59–66.

Hoa, T. T. V. (2017). Experience in developing high-tech agriculture in Israel and lessons for Vietnam. In *Proceedings of the national scientific conference on effective investment in high-tech agriculture development towards industrialization.* National Economics University, Hanoi, pp. 171–182.

JSTPM. (2014) 3(1), 53.

Julian, M. A. (2014). *Agriculture in the global economy*, University of California.

Lai, C. S. K., & Pires, G. (2010). Testing of a model evaluating e-government portal acceptance and satisfaction. *The Electronic Journal Information Systems Evaluation, 13*(1), 35–46.

Magoutas, B., & Mentzas, G. (2010). SALT: A semantic adaptive framework for monitoring citizen satisfaction from e-government services. *Expert Systems with Applications, 37*(6), 4292–4300.

Mikkola. (2008). Coordinative structures and development of food supply chains. *British Food Journal, 110*(2), 189–205.
Modal, P., & Basu, M. (2009). Adoption of agriculture technologies in India and in some developing countries: Scope, present status and strategies. *Progress in Natural Science, 19*, 659–666.
Meera, S. N., Jhamtani, A., & Rao, D. U. M. (2004). *Information and communication technology in agricultural development: A comparative analysis of three projects from India, Agricultural Research & Extension Network*. Network Paper No. 135.
Pham, S. (2014). High-tech agriculture is an indispensable requirement for international integration, Science and Technology Publishing House.
Phong, N. A., & Ha P. T. T. (2017). Investment in the development of high-tech agriculture: challenges and solutions. In *Proceedings of the national scientific conference on investment and development of high-tech agriculture efficiency in the direction of industrialization.* National Economics University, Hanoi, pp. 113–128.
Prime Minister. (2010). Project on developing hi-tech agriculture until 2020. Hanoi.
Prime Minister. (2012). High-tech agricultural development program under the national high-tech development program until 2020. Hanoi.
Prime Minister. (2015). Master plan for hi-tech agricultural zones and regions to 2020, orientation to 2030. Hanoi.
Quang, T. T. (2016). Developing hi-tech agriculture in our country. *Communist Journal, No. 884*, 83–88.
Tseng, W., & Zebregs, H. (2002). *Foreign direct investment in china: some lessons for other countries.* IMF Policy Discussion Paper, Asia and Pacific Department.
Truong , D. X. (2017). Developing hi-tech agriculture: Difficult for enterprises to access preferential policies. *Economic and Forecasting Journal*.
Vietnam Cooperative Alliance. (2017). Sharing high-tech applications in agriculture, accessed April 1, 2018, from http://www.vca.org.vn
Wang, Z. J. J., & Li, C. (2010). Problems and countermeasures on the development of presicion agriculture in Heilongjiang province. *International Federation for Information Processing, 317*, 461–465.