

Research Article

Agricultural Restructure Policy in Vietnam and Practical Application for Sustainable Development in Agriculture

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The Vietnam's agricultural sector had to challenge with its course and learned lessons of further development. Novel policy might be adopted to encourage the private investments and sectors in agriculture. Furthermore, an introduction of new models such as climate-smart or green agriculture and application of modern technology increased productivity at the same time and creating jobs for millions of agricultural workers and reversing the massive rural-urban migration flux. Vietnam's agricultural sector needs to maintain the reform momentum, particularly liberalization policy, and to boost up agricultural potential. Obstacles such as land limitation policy must be removed to enable large-scale production and encourage private investment in the agricultural sector. To avoid being trapped by its own success, Vietnam is now shifting the old development paradigm that focuses too much on the quantity to the quality of the agricultural production. The government makes major efforts to achieve at the same time agricultural growth, better livelihood of the farmer, and the development of the rural areas. However, Vietnam still needs to prepare a "transition strategy" to overcome the impact of the technological progress on the traditional agricultural workers.

1. Introduction

1.1. Application and Role of Nanotechnology in Agricultural Systems. Nanomaterials are typically two- or three-dimensional materials, of which at least one dimension is nanometers (nm). Thus, nanomaterials can exist in three states: solid, liquid, and gas, in which solid nanomaterials are being studied the most, especially in the field of application in the agricultural system of developing countries such as Vietnam [1–3]. The concept of nanotechnology was first introduced in 1959 by the famous physicist Richard Feynman. Nanotechnology is defined as the specialization of materials at atomic, molecular, and supramolecular sizes. A more specific definition of nanotechnology is given by the American Association of Nanotechnology, according to which nanotechnology is the specialization of materials with a minimum size of 1-100 nanometers (1 billion nanometers is equal to 1 m) [4–6]. Nanotechnology is one of the most

important tools in modern agricultural architecture. Nanotechnology in agriculture will become the economic engine of countries in the near future. Sustainable agrifood topics focus on sustainability and protection of agriculturally produced foods, including crops for human consumption and animal feed [7, 8]. Nanotechnology offers new chemical agents and new delivery mechanisms to improve crop yields. This promises to reduce the amount of pesticide use in agricultural production. Nanotechnology can boost agricultural production, and its broad applications include as can be seen in Figure 1 [9, 10]:

- (i) In agrochemicals for application in pesticides and fertilizers for crop improvement
- (ii) Application of nanotechnology in crop protection to identify diseases and residues of agrochemicals
- (iii) Means for genetic manipulation of plants

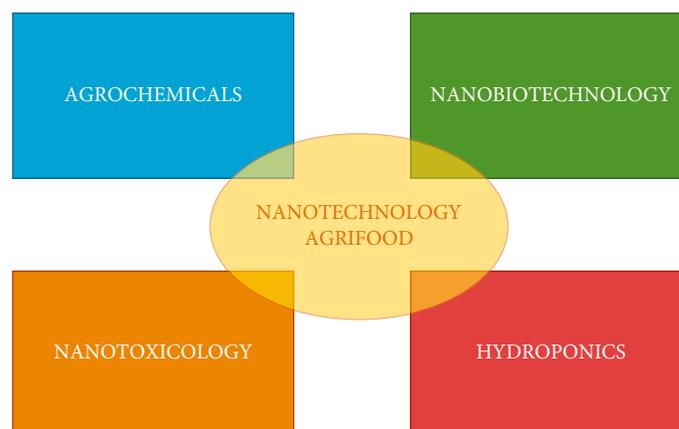


FIGURE 1: Nanotechnology in agricultural activities.

- (iv) Diagnosis of plant diseases
- (v) Animal health, animal husbandry, and poultry production
- (vi) Postharvest management

1.1.1. Nanotechnology and Nanomaterial in the Treatment of the Growing Environment. The overuse of pesticides, herbicides, and insecticides in crop production has resulted in an issue of uncontrolled treatment of unwanted solid toxic wastes in chemical herbicides and insecticides to human natural ecosystems. Nanomaterials were regarded as a promising material to enhance crop production and remediate soil and groundwater pollution. Through recent reports on the application of nanotechnology in agricultural environments, researches have indicated that the overuse of nanomaterials to improve the quality of the environment helps detect and remediates pollution in different areas [4].

1.1.2. Nanotechnology in Crop Yield and Quality of Agricultural Products. Pesticides, herbicides, and insecticides play a very important role in agricultural production and development. However, the abuse of their chemicals had caused serious consequences for the natural ecosystems, adversely affecting the water and soil, affecting the quality and safety of agricultural products, and affecting human health. Nanomaterials allowed us to create integrated nanoproducts that helped plants grow and well develop and improved yield and quality of agricultural products [11]. Additionally, their chemicals helped plants increase resistance, thereby significantly reducing the amount of chemical fertilizers and pesticides used in cultivation, reducing environmental pollution, and contributing to sustainable agricultural development.

1.2. Agricultural Development in Vietnam. For over the past 30 years of economic reforms (Doi Moi), Vietnam has gained major achievement in agricultural development. Thanks are due to the liberalization policy, from a net food-imported country [12]. Vietnam has become among the top exporters of many agricultural products such as rice, coffee, and pepper. Millions of people in the rural areas have

been lifted out of chronic poverty and hunger. The face of the rural areas has been progressively changed. Vietnam's successful efforts in hunger eradication and poverty alleviation were highly appreciated by the donor community, including the development organizations such as the World Bank, Asian Development Bank, and the United Nations Development Program [13–15]. Restructure is a major topic of agricultural policy research in Vietnam. Despite major achievement in the Doi Moi (renovation), Vietnamese agricultural has been facing prolonged bottlenecks that are not easily overcome in a short period of time. The XII National Party Congress has issued policy guidelines to promote the agricultural development, focusing on the restructure of the sector to achieve productivity, efficiency, and quality. This article provides initial analysis of the restructure program, identifies the development vision of Vietnam's agricultural sector, and points out the key measures to be taken in the coming years to accelerate the agricultural restructure process [16, 17].

1.3. Role of Nanoparticles in Pesticides and Herbicides in Agricultural Activities. Nanotechnology is one of the most important tools of modern agricultural science, in which nanotechnology in the field of agrifood is predicted to become a driving force in the global economy in the future [3, 4, 18–22]. The rapid development of nanotechnology today is an objective process, reflecting the process of continuous improvement scientific and technical customs and changing technological habits. The advanced countries in recent decades in the field of trace fertilizers have made a technological leap: the traditional trace fertilizers have been replaced (rapidly) by new-generation preparations in the form of nanoparticles. Micronutrients ensure a high yield, while input costs are significantly reduced. It is known that in the US each year, the agricultural industry invests about 1 billion dollars in the application of nanotechnology in the cultivation, animal husbandry, and veterinary industries to earn nearly 20 billion dollars in profits from food production in nanoscale. Some countries in Europe and Asia also invest a lot of money in the nanoindustry.

Nanoparticles have a great potential for applications in agriculture with the following tasks:

- (i) Seed treatment improves germination and growth rate, quality, and yield of products
- (ii) Make foliar fertilizers including necessary trace elements in each stage of plant growth
- (iii) Improve the efficiency of fertilizer use by applying controlled slow-release fertilizers
- (iv) Improve use efficiency and reduce pesticide costs by developing methods of delivering nutrients and drugs to their destination

2. Vietnam's Agricultural Reforms since the Beginning of Doi Moi

Vietnam is located in the tropical region and has a huge potential for agricultural production. However, before the 1990s, the country used to face food shortages and food security was the major concern. There have been profound lessons learned from the past policy changes. In the period of 1953-1956, the state implemented land reforms, with the slogan "the plow has the land", by confiscating land of the landlords and dividing equally to farmers. In the period 1959-1960, to create agricultural cooperatives, the state then collected land of farming households and put it under the cooperatives to have a large field. These divisions and accumulations of land have created a great deal of disturbance in the way of organizing agricultural production and rural economy. The central planning mechanism, in particular, the model of agricultural cooperatives, a popular mode of farming production before Doi Moi, has not worked effectively because it eliminates the production motivation of farmers. The details of data and information are indicated in Tables 1 and 2.

2.1. Vietnam's Agricultural Reforms Have Undergone Three Major Stages of Development: "Crossing the Hunger" (1986-1988). Agriculture is known as the starting point of the economic reforms (Doi Moi) in the mid-1980s. Doi Moi in the agricultural sector has three main components [23]: (i) Farmers were given land use rights on the longer-term basis. In addition, they were also allowed to own other means of agricultural production. (ii) Farmer households became self-supporting economic units. Farmers were responsible for their production activities, from the cultivation to the sale of their products. (iii) The cooperatives served only as service providers (irrigation, electricity, and plant protection) and received fees from farmers who purchased those services.

In 1988, the Politburo promulgated Resolution 10 which is perceived today as the major breakthrough of land reform, initiating the institution of private property in agricultural and rural development. The resolution consisted of transferring control and cash-flow rights from the farming cooperative to the individual household. Land was allocated to households with 10-15 years of secure tenure. Farmers were given more power to manage the main inputs, make production decisions, and use their output. Nonetheless, the policy and institutional reforms in this period were pilot ones and focused only on production and distribution. These efforts

were just sufficient to transform a collective economy to a household economy. Agricultural market had not fully emerged because the government still monopolized foreign trade; private sectors were allowed develop, but critical industries were still controlled by the government. Without the possibility to trade land use rights, land market did not develop. Credit market for agricultural production did not form because there was still one-tier banking system. In 1987 and in 1988, there was still hyperinflation at a three-digit level and unfavorable weather caused harvest loss and a fall of food output, leading to continued food shortage.

2.2. Extensive Commercial and Export-Oriented Production (1989-2000). After 1988, there was a rapid transition from self-sufficient to commercial agriculture production. The reforms of foreign trade pushed the export-oriented activities, including the export of agriculture sector. In 1989, the banking reforms occurred to help channel credit to the rural market. The monobanking system was transformed into a two-tier banking system, providing a more level playing field for credit institutions, contributing the resources to the agricultural development. The monopoly of the foreign trade was gradually lifted. During the period 1995-1999, Vietnam had taken active regional and multilateral economic integration as well as bilateral economic ties to enlarge its foreign market [24]. As a result, agricultural exports and export price increased; import price decreased. In the 1990s, rice market was liberalized gradually. Private sector began to take part in both retail and wholesale distribution system. Import and export activities became more competitive. Since March 1997, quota allocation has been decentralized so that all individuals and private companies are able to participate in rice export. The 1993 land law granted five rights to the households that unleash the motivation of farmers: the right to transfer, exchange, inherit, rent, and mortgage. The law extended the lease term to 20 years for annual crop land and 50 years for perennial crop land and provided the land use certificates. The reform of cooperatives and agricultural cooperative groups in 1989-1995 focused on two aspects: (i) Collectivization of land and other basic production inputs was abrogated in conformity with Resolution 10 and Land Law 1993. (ii) Agricultural cooperatives were directed to transforming functions, tenor, and ways of operation. Many weak cooperatives were dissolved or transformed to other forms in line with the market-oriented economy.

The important role for the private sector was further recognized and this created a boost in agricultural investment. In 1990, the Private Enterprises Law provided a legal basis for the establishment of sole proprietorships and the Company Law opened up for the establishment of new forms of enterprises such as limited liability and joint-stock companies. In 1992, the new Constitution officially recognized the role of the private sector. The decade of 1990 was the critical period of agriculture development as the sector switched from self-sufficed to commodity production. In 1989, food output reached 21 million tons and this was also the first year that Vietnam exported rice after a long time of being net rice importer [25]. Food has been secured, and rice monoculture was broken. During 1989-1999, productivity

TABLE 1: GDP and structure of agriculture in the period 2006-2017 (actual prices).

Year	Industry GDP (billion VND)	Net agricultural structure (%)	Structure of seafood (%)	Forestry structure (%)
2006	198.266	75.27	19.29	5.44
2007	232.188	74.97	19.83	5.20
2008	326.505	78.79	17.89	3.32
2009	346.786	78.54	17.81	3.65
2010	405.778	78.35	17.97	1.44
2011	558.284	79.09	17.81	3.10
2012	638.368	77.63	19.10	3.26
2013	658.779	76.44	19.92	3.64
2014	696.969	74.68	21.37	3.95
2015	712.460	74.90	20.76	4.34
2016	734.841	75.61	19.98	4.41
2017	768.212	72.86	22.32	4.82

TABLE 2: Comparison of labor productivity in the agricultural sector with other economic sectors (2001-2015) at comparative prices (2010).

Year	Agricultural labor productivity (million VND/labor)	Coefficient of agricultural labor productivity compared to other economic sectors (%)		
		Overall average	Construction industry	Service
2001	12.66	40.00	16.18	25.17
2002	13.20	40.33	17.18	26.07
2003	13.63	40.08	18.20	25.98
2004	14.11	39.70	18.27	26.36
2005	14.55	39.16	18.07	26.54
2006	15.24	38.56	18.36	25.97
2007	15.46	38.38	18.98	26.08
2008	15.95	38.53	19.73	25.93
2009	16.04	37.77	19.92	25.23
2010	16.33	37.13	24.21	22.17
2011	16.97	37.27	24.38	22.87
2012	17.47	37.23	23.75	23.81
2013	17.90	36.73	23.56	23.66
2014	18.50	36.20	23.19	23.48
2015	19.89	36.54	24.45	24.32

of many crops and animal husbandry increased [26]. The comprehensive and relatively development of the agricultural sector has raised the income of rural households, brought down the poverty rate in the rural areas [27], and contributed significantly to the development of household economy, farm economy, and private economy. The 8th National Party Congress in 1996 issued the guideline “developing rural industrialization and modernization” as to recognize the major achievement in the agricultural sector and rural economy.

2.3. Intensive Development (2000-2010). Since 2000, Vietnam’s agriculture has entered the new phase of shifting from extensive to intensive production, aiming at higher productivity and quality. This is also a new period of Vietnam’s international economic integration. On January 11th 2007, Vietnam officially became the WTO member [28]. Follow-

ing the WTO accession, the Vietnam-US Trade and Investment Framework Agreement (TIFA), signed on June 22, 2007, was regarded as the manifestation of the two countries’ successful cooperation. The Vietnam-Japan Economic Partnership Agreement (VJEPA) has also come into effect since October 1st 2009. The party and the government have issued several important guidelines and policies on agricultural development such as Resolution 09/NQ/CP of the Government about the agricultural production and consumption structure transference (15/06/2000), Resolution 03-NQ/CP of the Government about the farm economy (2/2/2000), and especially Party Central Committee’s Resolution 5 (2/3/2002) on hastening industrialization and modernization of agriculture and rural area in 2001-2010. Resolution 5 cleared the way for the establishment of various agricultural development programs in poverty alleviation, varieties, technological cooperation, clean water, and environmental

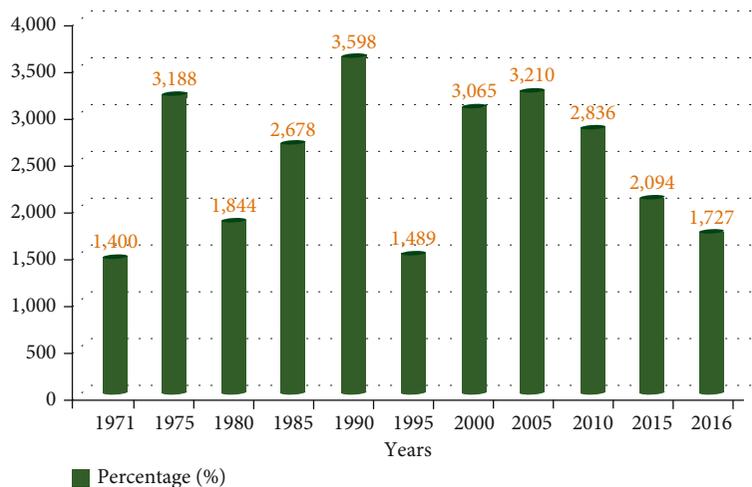


FIGURE 2: Growth rate of world agriculture in the period 1971-2016 (%).

safety [3, 29]. In 2008, the Central Party Committee issued Resolution No. 26 on “agriculture, farmers and rural area”, which again emphasizes the strategic role of “agriculture, farmers and rural area” in industrialization and modernization. As the result of liberalization, household economy has developed farm production and nonstate sectors account for 96 percent of agricultural GDP. Agricultural output has continuously expanded. Increasing competition especially in the export market has made product quality greatly improved, leading to the increase of export value. In the Mekong Delta, the main rice basket of Vietnam, about 80 percent of the rice planting area is grown from high-quality seeds [30]. In the context of policy and market changes, there are profound transformations in role and development of farming households, state-owned enterprises, private enterprises, and cooperatives which are major stakeholders in agriculture production. Before Doi Moi, cooperatives and state-owned enterprises had controlled agriculture production and rural livelihood. The reforms of the agricultural sector have made farming households the main stakeholder in rural area. Private enterprises and enterprises with foreign investment have developed and found their position in the market.

3. Results and Discussions

3.1. Overviews in the Current Situation of World Agricultural Development. As shown in Figure 2, the growth rate of world agriculture was clearly displayed. The strong development of modern agriculture in the world has raised the question: Is agriculture only a faint role in development? Even at the extreme that, if food security is no longer a serious national problem, poverty is no longer a serious problem of rural areas, the industrialization strategy and priority thinking for agricultural development will need to change.

3.2. Overview of Vietnamese Agricultural Development. The reforms with market orientation have unleashed a great development potential and brought positive changes of the agricultural sector. There is a shift from a closed agriculture

and a backward, self-sufficient production mode to commodity production agriculture, operating under market mechanisms and international integration. From a net food-imported country, Vietnam now exports every year about 7-8 million tons of food. The country has become among the top world exporters of many agricultural products such as rice, coffee, pepper, rubber, cashew nuts, shrimp, and fish. The prolonged system of subsistent agriculture has been shifted to a market mindset, which seeks to deeply regional and international economic integration. The reforms on the basis of ownership and motivation for producers, along with the industrialization process, have created breakthroughs in agricultural development. For example, the recognition of farmer household as an autonomous economic unit has removed the strict binding of the old mechanism and created a big push for agricultural development in the early period of Doi Moi. Rural economy, especially agricultural production, has rapidly moved from a self-sufficient nature to commodity production for the market at home and abroad.

As shown in Figure 3, GDP growth of the agricultural sectors has changed from a low and unstable growth trend, initially to recovery. In the period 2006-2013, the growth rate of the agricultural sector was not stable. Agricultural growth in 2005 reached 3.8%, then peaked in 2008 (reaching 4.69%) and dropped sharply to 0.49% in 2010, recovering in 2011 (reaching 4.23%) and fell sharply in 2012, 2013. GDP growth of the agricultural sector increased again in 2014 (3.44%) but then tended to decrease sharply, and in 2016, the growth rate of the agricultural sector industry is only 1.36%.

In addition to the thriving agricultural households, private and foreign-invested enterprises have begun to pay attention to investing in agriculture. In particular, a number of enterprises have pioneered the application of high technology, modern techniques, and advanced management models to agricultural production. The reforms have brought down the number of cooperatives while improving their quality and efficiency of operations. From focusing solely on agricultural production, the rural economic structure has been

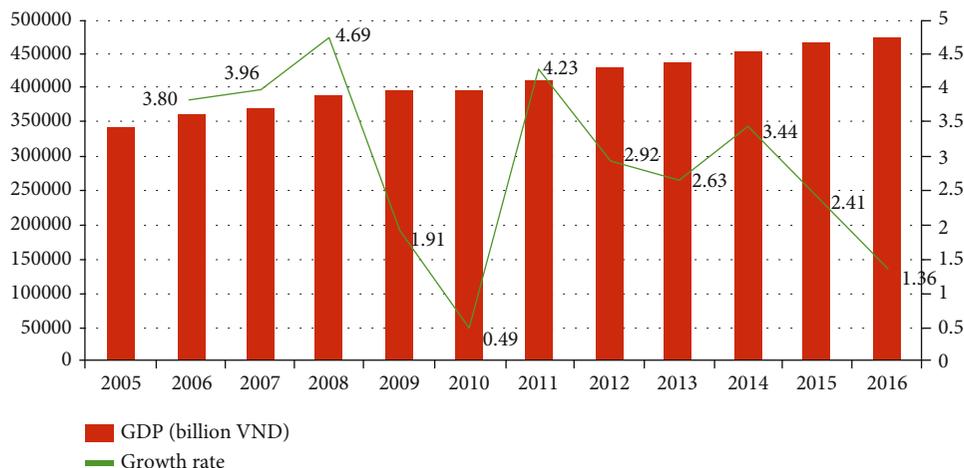


FIGURE 3: GDP growth of the whole agricultural sectors 2006–2016.

diversified and shifted towards increasing the proportion of service and handicraft industries. Agricultural production planning has been carried out, including the planning and construction of high-tech agricultural zones and agricultural processing industries. With the implementation of the new rural program, the face of rural infrastructure has made remarkable changes. Millions of people in the rural areas have been lifted out of chronic poverty and hunger. The face of the rural areas has been progressively changed, especially with the recent implementation of new rural program. Vietnam's successful efforts in hunger eradication and poverty alleviation were highly appreciated by the international community, including the development organizations such as the World Bank (WB), Asian Development Bank (ADB), Food and Agriculture Organization (FAO), and the United Nations Development Program (UNDP). The material and spiritual life of farmers has been improved. The sociopolitical situation in rural areas is stable. After almost 35 years of Doi Moi, the proportion of the agricultural sector in the GDP of the economy has decreased, from about 35% in 1986 to 15% in 2018. The proportion of labor in agriculture has dropped from over 70% before the 1990s to about 38% in 2018. In fact, agricultural development proves to be a shining spot recently. In 2018, the GDP growth rate of the agricultural sector has reached 3.76%. This is the highest increase in the past 7 years, showing the great efforts in all fields and production fronts. In 2018, for the first time, the agricultural export value reached \$40.02 billion. In particular, the export of key agricultural products reached \$19.51 billion, of which aquatic products alone are at \$9.01 billion and wooden products and forest products are at \$9.34 billion (as shown in Figure 4).

Ten commodity groups had an export turnover of over \$1 billion, of which 5 items had a turnover of over \$3 billion (including wood and wood products, shrimp, vegetables, coffee, and cashews) [32]. Although the agriculture undoubtedly strengthens the position of Vietnamese economy in the upcoming period, it has revealed major weakness that can be aggravated by the emerging factors. In general, the process of industrialization and modernization

of agriculture in Vietnam is still slow compared to the countries at the same stage of development. Vietnam's agriculture is still a latecomer with many underdeveloped characteristics: traditional production organization; small-scale production, mainly household economy; and weak link between agricultural sector with industry and services. The agricultural labor productivity of Vietnam as compared with some countries is also displayed in Table 3. The quality and added value of most agricultural products are not high. Many advantages of tropical agriculture have not been exploited, strengthened, and developed. The share of agriculture in GDP has decreased sharply but is still quite high compared to the criteria of an industrialized country. Especially, in the last 10 years, restructuring of economic sector has not positively changed the movement of population and labor between urban and rural areas or from agricultural labor to industrial and service labor. The main reason is that industry and services are not developing fast enough to attract labor from agriculture. Moreover, unemployment in rural areas is increasing rapidly due to the acquisition of agricultural land for urbanization. This is a huge challenge that hinders the improvement of labor productivity in the agricultural sector. Laborers working in agricultural sector are still overcrowded and at low quality. Most agricultural workers are still untrained. The skills of these workers are mainly formed from practical experience and low access to science and technology (S&T). Therefore, the agricultural and rural labor force faces barriers to access new occupations in urban and industrial areas, meaning that it is difficult to change agricultural jobs into nonagricultural jobs.

The gap in living standards between rural and urban areas tends to widen recently. The life of people in the mountainous and rural areas is still very difficult, often facing with natural disasters while the coverage and quality of the social security system are limited. Although the productivity and output of agricultural products have increased rapidly, the income of farmers is slowly improving; meanwhile, nonagricultural jobs provide higher incomes, causing many farmers to abandon their lands. This shows that the achievements of industrialization and modernization in



FIGURE 4: Vietnam's agricultural sectors *via* GDP and labor (%) (data in 2005-2015) [31].

TABLE 3: Agricultural labor productivity of Vietnam compared to some countries.

Year	Cambodia	China	Indonesia	Laos	Philippines	Unit: USD in PPP2010	
						Thailand	Vietnam
2001	568.15	793.59	1592.80	850.49	1501.87	1482.44	587.09
2005	651.60	929.84	1776.92	868.87	1713.98	1642.66	660.66
2006	677.93	975.76	1859.22	883.82	1774.47	1724.67	676.56
2010	766.92	1160.30	2124.26	937.27	1833.65	1860.01	719.06
2011	780.33	1214.09	2209.18	920.08	1871.67	1998.43	741.95
2012	804.33	1275.31	2312.70	924.07	1914.42	2089.97	756.67
2013	808.52	1332.56	2413.40	957.80	1925.30	2123.39	770.31
2014	802.99	1397.39	2520.65	1013.96	1946.35	2157.12	791.30
2015	797.71	1464.94	2628.63	1000.53	1941.33	2197.40	805.73

recent years have not been evenly distributed among groups of people, economic sectors, and regions. Farmers and rural population are the key force contributing to the socioeconomic development in rural areas but have not yet benefited adequately from such development. The socioeconomic infrastructure in rural areas is still inadequate of low quality and ineffectiveness. Rural infrastructure development is uneven, especially in mountainous provinces and the Mekong Delta. The rural economy has dealt with the issue of sustainable development. In the pursuit of immediate profits, agricultural production activities appear to damage the environment. Rural industry has grown at the expense of environmental pollution [1, 33]. The policy of agricultural industrialization and modernization has been set early but implemented very slowly. Research and development of scientific and technical progress is still limited because of insufficient coordination and synchronization. Export of agricultural products has driven the sector restructuring. However, Vietnam mainly exports raw and semiprocessed agricultural products. The added value is always low compared to other countries. The establishment and promotion of brands of agricultural, forestry, and aquatic products has not functioned effectively. Vietnam's agricultural products have not been able to participate in the value chains of large corporations, and it is difficult to gain access to the developed markets.

The speedy international integration also exposes Vietnam to various challenges in unpredictably changing world. Vietnamese agricultural products still face with fierce competition with many other countries, especially in terms of quality. Service and manufacture have not been developed to compete in terms of brand, food safety, and quality with agricultural products from Thailand, China, and other countries. Enhancing brand image and increasing added value in production are regarded a knotty issue for Vietnamese agriculturists. At present, the positive effects of many "untied" policies in agriculture and rural areas (e.g., Resolution 10 and Land Law) seem to be due, even some of them hinder the development of agriculture and rural areas and fail to solve essential problems the farmers are facing. The household economy once exerted a positive effect as a strong motivation to help farmers actively work on their assigned land, but it now no longer adapts to the requirement of applying new technology, specialization and increasing demands on greater quantity, higher quality, lower cost, and shorter time of supply. Agricultural growth is still based on the expansion of arable lands and use of resources and low level of science and technology. Vietnam's agriculture is still heavy on pure agriculture (cultivation and animal husbandry), but it has not exploited the natural advantages of forests, forest land, river, lake, and sea surfaces to strongly develop forestry specialties. The forestry sector, in particular, is currently using

the largest land bank, but its value is the lowest. Overall investment in agriculture has increased, but the ability to attract private and foreign direct investment in agricultural production is still limited. The rate of investment for an agricultural worker is too low. In addition, the efficiency of investment capital decreases, leading to the unsustainable investment situation in agriculture.

For decades, Vietnam's agricultural production has a prolonged weakness, due to scattered farming, low productivity, heavy use of fertilizers, and reliance on manual labor. The fourth industrial revolution requires fundamental changes in the farming method with the application of modern technology. It exposes a basic contradiction of Vietnam's agricultural restructure policy: the requirement of agricultural modernization and employment protection of agricultural workers. The global climate change that causes the sea level rise and extreme weather incidents to occur more frequently heavily pressurize Vietnam's agricultural production. It is exceedingly burdensome for the sustainable development of Vietnamese agriculture given that the farming methods have not been adapted to environmental problems [18, 34]. In addition, there are many major institutional bottlenecks, related to land, credit, infrastructure, and organization model such as cooperatives and food safety control, which need to be overcome. Disadvantages in agricultural production contribute to an immense gap between rural and urban areas in numerous aspects: incomes, health, education, entertainment, and quality of public services, which became dominant in the implementation of new rural program.

3.3. Agricultural Restructure Policy. To deal with the above weakness, Vietnam needs another phase (the 4th phase) of agricultural reforms—agricultural restructure which started in 2013. On June 10, 2013, the Prime Minister issued Decision No. 899/QD-TTg approving the scheme on restructuring the agricultural sector in the direction of increasing added value and sustainable development. There are 5 policy viewpoints about restructuring agriculture. Firstly, restructuring agriculture is a component of the overall restructuring of the national economy, consistent with the national socioeconomic development strategy and plan, associating with socioeconomic development and environmental protection to ensure sustainable development. Sustainable development is both a process and an objective of the agricultural development. Secondly, implementing the agricultural restructuring in line with market mechanism; ensuring the welfare of farmers and consumers; shifting from quantity-focused development to improve quality and efficiency, expressed in value and profit; and focusing on meeting social requirements are important. Thirdly, the state plays a supporting role, creating a favorable environment for activities of all economic sectors; supporting research and development, transfer of science and technology, market development, and infrastructure supply; and providing information and services. However, strengthening the participation of all economic and social sectors from the central to local levels in the process of agricultural restructuring promote the public-private partnerships (PPP), comanagement mecha-

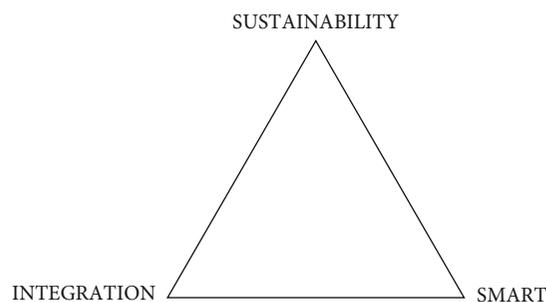


FIGURE 5: Three pillars of Vietnamese agricultural development.

nisms, and the role of community organizations. Farmers and businesses directly invest in renewing production processes, technologies, and equipment to improve production and business efficiency and use resources more efficiently. Furthermore, restructuring is a complex, difficult, and long-term process that needs to be regularly evaluated, learned from experience to adjust to reality based on building a monitoring system and review and feedback from stakeholders. The agricultural restructuring scheme has three main objectives accordingly:

- (i) Maintain growth; improve efficiency and competitiveness through increasing productivity, quality, and added value; better meet the needs and tastes of domestic consumers; and boost exports. Strive to achieve an average GDP growth rate of 2.6% -3.0%/year in the 2011-2015 period and 3.5-4.0%/year in the 2016-2020 period
- (ii) Improve income and living standards for rural residents and ensure food security (including nutritional security), contributing to poverty reduction. By 2020, rural household income will increase by 2.5 times compared to 2008; the number of communes meeting new rural criteria will be 20% by 2015 and 50% by 2020
- (iii) Strengthen management of natural resources, reduce greenhouse gas emissions and other negative impacts on the environment, make good use of environmental benefits, and improve capacity of risk management and natural disaster prevention, raising the national forest coverage to 42-43% in 2015 and 45% in 2020, contributing to the implementation of the national green growth strategy [35]

In addition to the agricultural restructuring scheme, there are a number of policies and plans to accelerate the reforms of the agricultural sector such as the agricultural restructure plan for the period 2017-2020 and the restructure plans of individual subsectors as can be seen in Figure 5. Despite recently recorded achievements in agricultural development, the current agricultural restructure efforts have seemed inadequate to address the key problems of the agricultural sector. The reasons are linked to the nature of the scheme instead of the specific measures and

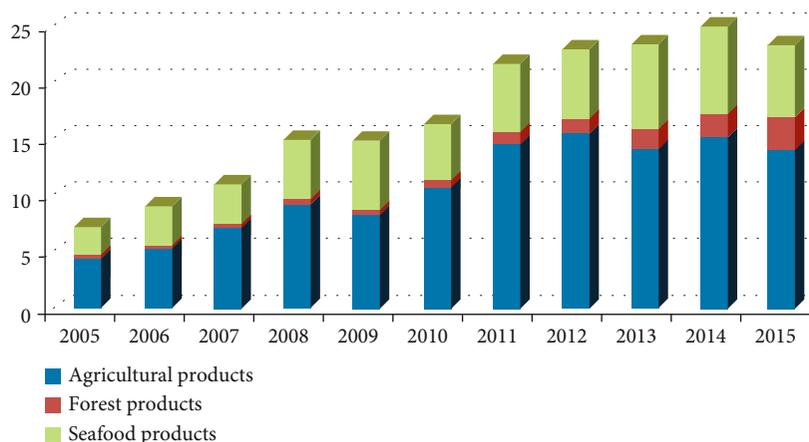


FIGURE 6: Export turnover of agricultural products (unit: billion USD).

guidelines. Current agricultural restructure scheme proposes the implementation timeline to 2020, despite the fact that the restructuring program for the period 2017–2020 has just been approved by the government. Because of time constraint, many objectives set in scheme may not be achieved by 2020. As a result, a number of agriculture reform measures may not be fully implemented by 2020. For example, issues of land accumulation and concentration, cooperative reforms, agricultural credits, etc. need to be experimented and gradually improved. The specific objective sets in the agricultural restructuring scheme are limited to produce major changes of Vietnam's agriculture by 2020. In fact, the restructuring program needs to be regarded in a broader sense as a comprehensive agricultural reform process that must be carried out over a longer period of time to bring significant changes. The implementation of the scheme was even delayed even when the scheme timeline was set only to 2020. Slow progress is due to various institutional barriers, limited resources, and inherent weaknesses of Vietnamese agriculture. There has not been a substantive effort to boost productivity, increase competitiveness, and restructure the agricultural workforce. Vietnam thus will need a long-term agricultural reform program to overcome the current weakness and bottleneck in agricultural development. As part of this program, we propose the model of Vietnam's agricultural development based on three key pillars: (i) sustainability, (ii) smart, and (iii) integration. On that basis, the objective of Vietnam's agricultural development to 2030 vision 2045 is to build a sustainable, smart, and integrated agriculture that firmly assures food safety, brings prosperity to rural areas, improves farmers' living standards, and accelerates Vietnamese industrialization and modernization.

As can be seen in Figure 6, in 2013, the export of agricultural, forestry, and fishery products reached 23.2 billion USD, accounting for 17.6% of the total export turnover of goods of Vietnam. In which, the export of agricultural and forestry products accounted for 71.1% and the export of aquatic products accounted for 28.9%. By the end of 2015, the total export turnover of agricultural, forestry, and fishery products reached 23,569 billion USD (agroforestry products accounted for 72.1% and fishery products accounted for

27.9%), equaling 14.5% of total export turnover country. In 2017, the export of agricultural, forestry, and fishery products reached 28.2 billion USD, accounting for 13.2% of the total export turnover of goods. In which, export turnover of agricultural and forestry products reached 19.8 billion USD, up 9% compared to 2016; seafood products reached 8.4 billion USD, up 18.5% compared to 2016.

3.4. Sustainable Agriculture. Based on the concept of sustainable development, sustainable agricultural development refers to the development of agriculture but does not harm the environment and ensures that no part of society is marginalized from agricultural development activities. For agriculture in developing countries, the requirements for sustainable development are increasingly pressing due to the intensification of production which leads to serious environmental degradation. For example, the indiscriminate use of chemical fertilizers pollutes the soil and the water. Meanwhile, the lives of farmers have not improved due to low agricultural productivity. The quality, added value, and competitiveness of products are low. The situation of "good harvest, devaluation" often takes place. To implement sustainable agricultural development, it is necessary to take measures of the government and the private sector to develop agriculture in the direction of ensuring the balance of all three objectives: agricultural growth (with the growth in production, ensuring food security), ensuring social justice (through farmers' income-ensuring mechanisms, distribution mechanisms, and reasonable price management), and protecting the environment (through solutions to develop green agriculture, smart agriculture, application of high-tech science instead of resource exploitation, protection land, water source, etc.).

3.5. Smart Agriculture. "Smart agriculture" or "climate-smart agriculture" is a new approach to agricultural development in the context of global climate change, to ensure food security, implementation of green growth, and sustainable development. According to the Food and Agriculture Organization of the United Nations (FAO), smart agriculture is "a way to achieve priorities in agricultural development both in the

short and long term along with other development priorities” [12]. Smart agriculture development is based on three pillars: (i) increasing the productivity of agricultural production in a sustainable way, thereby helping farmers increase income equitably, ensure food security, and promote development; (ii) improving the adaptive capacity and resilience to climate change of agricultural production systems at different levels; and (iii) reducing and eliminating greenhouse gas emissions from agricultural production [36]. Smart agriculture development is not only to ensure food security and increase agricultural output but also to a greater goal of improving the quality of life, ensuring social justice and human development. It also shows the multifunction and multipurpose nature of modern agricultural production, which is carried out in a synchronized and coherent manner. Therefore, smart agricultural development should be based on a combination of science with production policies and practices to identify priorities and effectively resolve conflicts between development goals, establishing appropriate institutions to help promote and nurture creativity, dissemination of good practice, and effectively use investment resources from both the private and public sectors. For backward agriculture, the application of science and technology to agricultural production is an indispensable direction to improve productivity, quality, efficiency, and the added value. In addition, developing agriculture in later economies requires changing many backward production practices and habits, lack of credit capital for farmers and high technology applications enterprises, fragmented land conditions, small-scale production that are difficult to facilitate mechanization, etc. Smart agriculture is a development approach that has a global mindset but is specifically developed to suit the specific conditions of each community, country, and region. The deployment of smart agriculture does not entirely depend on the level of development of the local economy. In fact, many smart agricultural models have been implemented simply and effectively in many developing and underdeveloped countries, from Latin America to Southeast Asia, South Asia, and Africa.

3.6. Integrated Agriculture. Liberalization is often seen as the starting point to build an integrated agriculture, opening up and participating in the world markets. Measures to liberalize the agricultural sector began in the 1980s within the framework of the structural adjustment program (SAP) of the IMF and the World Bank [37], for example, (i) taking austerity measures and reducing government spending to reduce budget deficits, including reducing subsidies for farmers and subsidizing food and foodstuffs; (ii) privatization of state-owned manufacturing to increase revenue and increase the efficiency of this sector. In many economies transitioning from central planning to a market mechanism, the consequence of this is the reform of agricultural cooperatives with the aim of increasing efficiency and profitability. But this also led to the dissolution of many cooperatives; and (iii) reducing market control to encourage competition and removal of tax barriers and protection of domestic agriculture. In fact, even in developed countries, the opening of agricultural markets is still very cautious, but this is inevita-

ble under the pressure of joining free trade agreements. For developing economies with agricultural potential like Vietnam, participation in FTAs is expected to help promote exports, diversify markets, create job opportunities, and increase income for farmers. However, FTAs themselves are not sufficient to help Vietnam realize its agricultural development goals. Despite helping to gain access to partners’ markets and increasing trade and investment volumes in the short term, FTAs do not guarantee that the Vietnamese economy can overcome the low segment of the global value chain or more productive jobs because these are largely dependent on the pace of domestic reforms. Moreover, with the application of new technologies in agricultural production activities, high-tech countries will have many advantages to develop a modern agriculture and export agricultural products back to Vietnam. If this challenge cannot be solved, new-generation FTAs become an “integration trap” for Vietnam’s development process in the coming time.

4. Policy Recommendations

As part of the reform strategy, agricultural industrialization and modernization shall be a key factor in the next stage of Vietnam’s agricultural development. This process can be shortened given the advantage of the follower by learning the best development practices in the world, applying modern technology and advanced management model for continuous breakthrough improvement of productivity, quality, and efficiency of agricultural production. As an essential change in the approach, Vietnam’s agricultural production should give priority to quality instead of quantity development. The emphasis is on the added value of the production and market price of agricultural products. In the era of industry 4.0 and agriculture 4.0, synchronizing the application of advanced technology, including information technology, biotechnology, food processing, and preservation technology with green technology, must be considered as the core content of agricultural industrialization and modernization to improve labor efficiency as well as enhance the brand image and competitiveness of agricultural products [38]. There is a need for transformation from a fragmented agricultural production centralizing at household scale to extensive enterprise-based activities to develop a large-scale agriculture. There should be a close cooperation among government (especially the local authorities) with enterprises, scientists, and farmers to help handle the problems of output and input markets, application of modern technology, and other issues related to lands, credit, and marketing. Vietnam’s agricultural structure is currently relatively simple, focusing mostly on areas with low productivity and added value. Targets should be aimed at the advancement of agricultural supporting industries and services. In particular, investment in food processing industries in rural areas plays an essential role in diversifying processed commodities. At present, the insignificant growth rate of agricultural supporting industries and services puts barrier to the increase of the added value and quality of crops, gives rise to imports of production inputs, such as agricultural

machinery, seeds, breeds, and fertilizers, and drives agricultural products with export advantage (fish sauce, cashew nuts, tea, etc.) to use foreign brand names. Priority should be given to the development of industries and services to boost both domestic consumption and export. Moreover, to maximize the aggregate value, it is suggested to combine agriculture with other services such as tourism to create new forms such as ecotourism or agriculture-based tourism. The traditional renovation model emphasizes on the development of a few prioritized competitive commodities in the international market (e.g., focus on the export of only key products such as rice, coffee, and some kinds of fruits). However, this bias gives rise to financial constraints for Vietnamese agriculture due to the precarious price of products in the world market and the emergence and fierce competition of other exporters, leaving negative impact on the environment for intensive farming of crops (for example, mass planting of rubber plantations and aquaculture). Consequently, sustainable development policies now focus on diversifying the structure of the agriculture and establishing common foundations for enhancing competitiveness and productivity, on which a basis of a few solid export-oriented agricultural sectors should be formed. The concept of local economic enhancement program in Vietnam has changed significantly. Many provinces have recognized the potential of local agricultural development as a leading industry that should be prioritized. However, the capacity of the support services in rural areas is yet limited, and for that reason, entrepreneurs face innumerable difficulties. Localities should develop a systematic agricultural growth strategy in alignment with the socioeconomic development plan and key investment programs besides promoting market expansion, tackling land, and infrastructure management bottlenecks in pursuance of achievement.

SMEs play an essential part in helping farmers deal effectively with market inputs and outputs for agricultural production. It is essential to promote agricultural and rural startup. Setting ecosystems of startup in agriculture and rural areas should concentrate on the role of community groups, associations, credit institutions, and local governments. Review and replication of the successful experiences of community cooperation models makes a huge contribution to agriculture. For example, in Dong Thap, the farmer organizations have been successfully built. This is a voluntary association supporting farmers where they “listen and talk” about production and business. It acts not only as a communication channel among farmers and between farmers and local authorities but also as a link between farmers and enterprises purchasing processed crops. Other initiatives include computerized solutions that help connect farmers with one another as well as with other enterprises and keep them up with the trends of the current market. It is also essential to build websites with the purpose of promoting agricultural brands and products. A more liberal mechanism for the accumulation of land is needed to facilitate the development of a large-scale, high-yielding agriculture. The accumulation and concentration of land should be implemented under the market mechanism. Land consolidation should be linked to the lives of farmers. This require-

ment is to handle the harmonious relationship between economic efficiency (accumulation and concentration of land) and social efficiency (securing employment, income for farmers, and sociopolitical environment in rural areas). The speed and scale of accumulation and concentration of land should be in line with the pace of economic and labor restructuring. It is a matter of skill training for agricultural workforce. Vietnam needs to improve land governance as the process through which decisions are made about the use of and control over land, the manner in which the decisions are implemented and enforced, and the way that competing interests in land are managed [38]. The governance approach not only focuses on the act of land reforms but also on the reforming process; as in reality, a number of sound policies and technical measures have been implemented, yet not fully or effectively. Governance is not just proposing “sound” policies on paper, but more importantly how to implement them.

5. Conclusion

To overcome the credit barriers, besides amending and supplementing existing regulations (for example, allowing agricultural land to be used as collateral), the state, especially local authorities, associations, and community organizations, needs to make a more active intervention to assist farmers in obtaining loans on a case-by-case basis, even issuing guarantee if necessary and requiring credit institutions to increase the loan limits as well as the value of the loan compared to the value of the collateral. Besides continuously making efforts to develop infrastructure, especially transport infrastructure in agricultural areas, it is also necessary to learn and apply some localities’ innovative ways of implementing public-private partnerships in this field. To attract private investment, it is necessary to have appropriate incentive policies (on tax, land, financing, or credit) that at the same time can both build capacity and raise awareness of PPP for different stakeholders. It is necessary to develop a set of standardized and reasonable contracts that guarantee benefit for all stakeholders, as well as build capacity and raise awareness of PPP so that each enterprise has the ability to self-assess their pros and cons before making decisions. Moreover, in case the government fails to arrange the budget to pay for investors, favorable incentive-based policies (such as exchanging land for infrastructure or projects for infrastructure) will be a critical solution to magnetize private investors.

Data Availability

All the data and supporting materials are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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