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Overview of the Impact of Scientific Research on Agriculture and Rural Development in Vietnam

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INTRODUCTION

Vietnam's agriculture develops comprehensively, and it is shifting towards producing commodities with increasing productivity and quality, developing industries and products with competitive advantages, and ensuring national food and nutrition security. The development of agriculture contributes to sustainable poverty reduction, especially in difficult economic times. In a period of 10 years (2008 - 2017), the GDP growth rate of agriculture reached 2.66% per year, while the growth rate of production value reached 3.9% per year. The GDP of the agriculture in 2017 was 1.25 times higher than that in 2008. In 2018, GDP growth rate of agriculture is estimated at 3.4%. Despite facing many difficulties and challenges, agriculture still maintains a growth rate of 2.55% per year for 2013 to 2017 period to achieve the economic goals for 2020 (the annual GDP growth rate of agriculture is 3% per year), export turnover will achieve $157.07 billion, equivalent to $31.5 billion per year and increases by 51.2% compared to the average of the previous five years. In terms of social goals, along with ensuring national food security, nutritional security, restructuring agriculture has contributed to increasing production efficiency and income, reducing rural poverty rate of 1.5% per year. Regarding environmental objectives, by the end of 2017, the forest canopy rate will reach 41.45%. Agricultural products market has recently achieved new development; many Vietnamese agricultural products have a high position in the international market. The total export turnover of 10 years (2008 - 2017) is $261.28 billion with an average increase of 9.24% per year, and it is expected to $40 billion in 2018. There are 10 agricultural commodities with export turnover of $1 billion or more, of which five agricultural commodities including fruits, cashews, coffee, shrimp, wooden products have an export turnover of over US $3 billion. In 2008, there were only five items with export turnover of $ 1.0 billion or more and two items with export turnover of $ 3 billion. Vietnam's agricultural products are present in more than 180 countries and territories; including major markets such as China, the United States, Japan, and the EU. Vietnam's agricultural exports are ranked second in the Southeast Asia and 15th in the world [1].

Science and technology play a crucial role in agriculture and rural development. In particular, the state research investments through the Ministry of Science and Technology for the Vietnam Academy of Agricultural Sciences have significantly contributed to the achievement of agricultural growth over the past 10 years. In the context of this paper, we will mention the situation, orientation and solutions to promote the role of science and technology in the development of agriculture and rural development in general as well as the contributions of science and technology research investment for agricultural development of the Ministry of Science and Technology for Vietnam Academy of Agricultural Sciences in the past 10 years.

STATE INVESTIMENT IN SCIENTIFIC RESEARCH ON AGRICULTURAL ON AGRICULTURAL DEVELOPMENT

Over the past decade, state investment in agricultural technology research and development has reached a number of achievements.

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- *Investment in agricultural scientific research in general (including technology transfer)*: In the 2005-2015 period, about 2.3% of the total investment capital for the whole agriculture and rural development sector was equivalent to 13% of the total budget for scientific research of the whole country. On average, the amount of investment capital for science and technology activities was VND 410 billion per year for the 2005-2010 period and VND 760 billion per year for the 2011-2015 period.
- *Investment of the Ministry of Science and Technology for Vietnam Academy of Agricultural Sciences*, the leading agricultural research institutions in the period 2010-2019, was mainly through State-level research missions. During this period, the Vietnam Academy of Agricultural Sciences has implemented 19 tasks on the Plant Genes Fund to conserve and develop precious native plant species. In the 2016-2019 period, the Vietnam Academy of Agricultural Sciences has also implemented 16 state-level independent tasks on crop science and biotechnology. In addition, a number of missions through the Protocol have been implemented.
- *Investment in technology transfer:*
  - From the central budget for scientific and technological transfer activities in agriculture. This is mainly implemented through the State extension system. In 10 years (2005-2015) this source increased an average of 8.5% per year. In the 2011-2015 period, the state budget for agricultural extension was on averages of 240 billion VND per year.
  - From the local budget, which was directly allocated by provinces and cities. This budget is increasing, but it still did not meet the demand for research on agricultural and rural development. In the period 2008–2013, each province allocated about 3 billion VND per year for extension activities from the local budget. The level of investment among localities is quite different among regions, the highest investment is the Red River Delta region, an annual budget for each province was over 6 billion VND, while budget in provinces of the Northern Midlands and Mountains, Central Coast, Central Highlands and Mekong River Delta was only VND 2 billion per year.

In general, investment in scientific research and technology transfer in Vietnam is still low and has not approached the benchmark of the world, so it has not been able to create breakthrough in science and technology products. Compared to international investment, the International Rice Research Institute (IRRI) invested 57 million US$ in 2010, while the total investment for science and technology of the Ministry of Agriculture and Rural Development is 839,890 billion VND [2]. If including the expenses for agricultural extension (about 240 billion VND per year) and development investment (about 160 billion VND/year), the total investment for scientific research, technology transfer and development investment is nearly VND 1,250 billion per year (equivalent to more than US$54 million), which is lower than the investment for IRRI in 2010; According to the World Bank, Vietnam has invested in agricultural research and development equivalent to only 0.2% of agricultural GDP, while investment for agricultural research in Brazil and China is 1.8% and 0,5%, respectively [3].

Remarkable results of agricultural science and technology in 2005 – 2015

- *Regarding agricultural varieties, forestry and aquatic animal breeds*

In cultivation, over the past 10 years (2005-2015), there have been researches to select and create 428 plant varieties recognized as new varieties and varieties for trial production by the Ministry of Agriculture and Rural Development, of which 97 are officially recognized (65 rice varieties, 25 corn varieties, 32 bean varieties, 14 tuber plant varieties, 21 vegetable varieties, 31 fruit varieties, 6 tea varieties, 6 coffee varieties, 14 sugarcane varieties, 2 rubber varieties, 8 flower varieties, 2 hybrid mulberry varieties, 7 other plant varieties) and 175 plant varieties were recognized for trial production [4].

The new crop varieties are mostly more productive than the demonstration varieties that are produced commonly in the fields or have valuable traits such as high quality, pest resistance, or adaptation to unfavourable climate conditions. This contributes to the development of production and increased efficiency in agricultural production.

- *The results of research on technical process contribute to reducing input costs, using the potential productivity, improve quality and value of agricultural products in agricultural production.*

In 2005-2015, 39 technical processes were researched and transferred in crop cultivation; 48 technical processes on animal husbandry; Many technical processes in the forestry sector, such as intensive forest planting, tending and protecting forests, have also been studied and applied effectively in production. Until now, the application of good agricultural production (VietGAP) has been expanded and effectively produced safe and high-quality products to serve the needs of the market. The technical process of raising/cultivating in net houses and greenhouses is also widely applied in agriculture, forestry and fishery, especially in Lam Dong, Thua Thien - Hue, Da Nang, Hanoi and Ho Chi Minh City. In 2016, the whole country had 5,897.5 hectares of net houses, greenhouses, plastic houses, distributed in 327 communes. There are 2,144.6 ha of vegetable, accounting for 36.4%; 2,854.3 ha of flower, accounting for 48.4%; 661.1 hectares of plant seedlings, accounting for 11.2%; and 237.5 hectares of aquaculture, accounting for 4.0% of the total area.

The expansion of the application of technical advances into production associated with the results of evaluation research, drawing experiences, guiding the implementation of the large field model has facilitated the process of accumulating agricultural land, establishing large fields, linking agricultural production and markets. Large field model appeared more and more commonly. By 2016, there are 2,262 large fields in the whole country with a total area of 579,300 hectares, of which, there are 1,661 rice fields (516,900 hectares); 162 vegetable fields (17,000 hectares); 95 sugar cane fields (14,000 hectares); 50 maize fields (3,500 hectares); 38 tea fields (7,600 hectares) and 256 large fields planted with other crops (20,400 hectares).

- *Post-harvest research results initially create new values for agricultural products*

New value of some agricultural products such as fresh flower, fruit and vegetables has been created by preservation technology for fresh consumption. The technological advances including technology and equipment for producing film-making products for the preservation of fresh fruits and vegetables have been introduced recently; Retain bioproduct processing technology in the pre-harvest and post-harvest stages to keep fruit on the tree longer and extend storage time for some fruits; samples of cold storage in different sizes to preserve fresh vegetables, tubers, fruits, flowers, etc. are also standardized for practical application. These results contributed to the export of fruits and vegetables from over US$800 million in 2013 to US$3.45 billion in 2017, increasing by 40.5% compared to fruit and vegetable export value in 2016 and exceeding the rice export turnover of $2.6 billion.

The added value of many agricultural products is enhanced through processing. Among the technical advances, the post-harvest technology transferred into recent production has synchronous technology for processing high quality crop seeds; small to large agricultural grain dryers; fruit and vegetable dryers with the cost of only 50 - 60% compared to imported, saving drying cost by using available and cheap materials; heat pump drying technology and equipment; technology and equipment for preserving agricultural seeds ...

- *Integrated research results contribute to environmental protection in agricultural production and rural area*

Most of the research projects and technical advances applied in practice have accompanied environmental protection and ecosystems. In addition, there are many scientific and technological projects specializing in the environment, agricultural ecosystems, and rural areas, such as the biogas production program to contribute to the treatment of wastes in livestock (nearly 10% of farmer households use biogas to serve their daily needs and contributes to reducing environmental pollution); research topics to promulgate legal documents, environmental standards, and produce safe products based on VietGAP [4].

- *Research results of agricultural production and market linkage along the value chain*

The value chains of agricultural products in Vietnam are still limited and inefficient. According to the Ministry of Agriculture and Rural Development in 2018, Vietnam has about 818 value chains certified as safe agricultural supply chains, but only about 50% of the supply chains operate effectively. Low efficiency of agricultural chains is due to high transaction costs, lack of close linkage between entities, low post-harvest and processing technologies, and not applying scientific and technological advances to production as well as limited cooperation in production. In addition, the biggest difficulty in developing the agricultural value chains is to select and find leading enterprises and businesses accompanying with farmers, especially poor and small-scale farmers in the remote areas. Besides, the awareness of people about the chain is also limited, while there is lack of guidance and consultancy services. The application of technology in food supply chains has been recognized but the result is still limited. According to Cel Consulting 2018, the post-harvest loss rate is still very high, 32% vegetables, 18% meat and 12% seafood. In particular, the logistics system for agricultural value chains is also ineffective because logistics cost is account for 21-25% of annual GDP (it is 6% higher than Thailand, 12% Malaysia and 300% Singapore). According to ABA 2018, the application of synchronous cold storage technology to develop the cold chains is the trend of the world, but the level of cold technology application in food chains is quite low except for aquatic chains with 95%, while it is only 33% for milk, 12% for new meat, 7% for vegetables and 6% for fruits. To improve this current problem, the state needs to have a strategy to attract private investment in value chain services and support information to connect centralized commodity production areas with logistic services.

The role of science and technology in improving production efficiency and income for farmer

This analysis is based on a few specific agricultural commodity chains:

- Rice: Vietnam cultivates about 7.7 million ha of rice every year. About 80% of rice varieties were selected and created by Vietnam (equivalent to 6.2 million ha).
  - *In the northern region:* Some new rice varieties such as BC15, TBR225, PC6, Gia Loc 105, AC5, LTH31, sticky rice N87, N98 ... have been transferred to produce and cultivate in a large area of 1.5 million ha per year. The output of rice increases by 0.7 million tons per year as a result of increasing in yield by 0.5 tons per ha, with an average selling price of VND 6,000/kg. The increase in rice yield creates profit of 4,200 billion VND per year in rice production.
  - *In the Mekong river delta:* Rice varieties created by Vietnam such as OM5451, OM6976, OM4218, OM4900, OM6976, ST have been transferred and cultivated in an area of 4.2 million hectares in the

Mekong river delta. It is estimated that when new rice varieties are applied in production, it increases the yield by 10%, so the annual increase in output is 2.43 million tons. With the rice price of about VND 6,000 per kg, new rice varieties benefit production of VND 14,580 billion every year. Technical processes such as "3 decrease 3 increase", "1 must 5 reduction" are applied for 35% of the rice area in the Mekong river delta (equivalent to 1.1 million ha), which create profit of 1.617 billion per year.

- Maize: In recent years, the average maize area of Vietnam has reached about million hectares, maize seed demand is about 20,000 tons. Vietnam has researched and bred dozens of high-yield and high-quality maize varieties for production. Maize seed market share of 9 major maize varieties (LVN99, LVN61, VN8960, LVN885, LVN17, VN5885, LVN092, A380 and VN5885) and four food-maize varieties (Hybrid sticky corn No. 5, Glutinous hybrid VN556, Hybrid sugar 20 and LVN23 vegetable corn) are account for 30%, equivalent to 6,000 tons of seeds per year. Maize varieties created by Vietnam are not inferior in terms of yield and quality compared to those of foreign companies imported into Vietnam, but the price is about 1/3 cheaper. Estimated annual savings for production is about 300 billion VND from the purchase of seeds.
- Cassava: The total planted area of the whole country is about 570,000 ha per year. The average yield of cassava is 19.1 tons per ha and the production output is 10,931 million tons. The varieties that are actively bred by Vietnam are mainly transferred to the Northern mountainous provinces, Nghe An province, the Central Highlands and provinces in the southeast region. Among the varieties that have been researched, selected and transferred to production, KM94 accounts for 60% of the country's cassava area; The remaining area uses 7 other varieties (KM98-7; KM21-12; KM419; KM140; Sa06; NA-1, BK, S10 and S11) accounted for 10% of the area. Cassava varieties created by Vietnam are planted with a total area of 399,000 ha, accounting for 70% of the cassava area in Vietnam, with an average yield higher than the old variety of 3.82 tons per ha, the production output increased by 1.52 million tons per year. With an average selling price of VND 1.5 million per ton, the profit created by using new varieties is VND 2,286 billion per year.
- Potato: The total cultivated area of the whole country is 35,000 ha, the average yield is 15 tons per ha with the total production output is 525,000 tons. The area of key varieties researched and created by Vietnam (KT2, KT3, KT1, KT5, Marabel and Solara) is 5,200 ha, accounting for 15% of total potato area in Vietnam. New varieties have an average yield of 3.5 tons per ha higher than the old varieties, the annual production output increases by 18,200 tons per year. With the selling price of VND 8.0 million per ton, the added value is estimated at VND 145.6 billion per year. At the same time, due to the application of new integrated pest management (IPM) techniques, input costs have been reduced by VND 2 million per ha on a total area of 5,200 hectares, increasing the value of VND 104.0 billion. Thus, thanks to new varieties and advanced farming techniques, it has benefited production of about 249.6 billion per year.
- Coffee: In the past 10 years, there are 10 varieties of Robusta coffee that Vietnam has created and transferred to production. In which, 5 main varieties (TR4, TR6, TR9, TR11 and TRS1) have yield from 4-7 tons per ha, the proportion of R1-type varietyy accounts for 70-90%, double that of the existing varieties. By the end of 2017, the cultivated area of new coffee varieties in Vietnam was 130 thousand hectares, accounting for 21% of the total coffee area of Viet Nam, accounting for 100% of the replanted area. These new varieties have higher yield and quality than the old ones. It contributes to increasing the income by 30% compared to the mass production, equivalent to 40 million VND per ha and VND 5,200 billion per year.
- Cashew: There is 290,000 ha of cashew in Vietnam. Before 2010, the average yield of cashew of the whole country was 0.93 tons per ha. In recent years, thanks to the application of intensive pruning, watering, fertilizing techniques, reasonable pesticides and improving cashew nut growing in the gardens, old cashew garden was renovated by grafting techniques and using new varieties has generated the average yield of 1.26 tons per ha. Currently, the area of re-cultivated and grafted cashew is 120,000 ha, accounting for 40% of the total area of cashew. In particular, the area of replanting and grafting cashew with 3 new varieties (PN1, AB05-08 and AB29) created by Vietnam accounts for ½ of the total area (60,000ha). Accordingly, due to the application of new varieties and farming techniques, cashew production output has increased 99,000 tons of raw cashew compared to before 2010. With an average price of 48 million VND per ton, income for cashew growers increased by 4,752 billion VND per year.
- Tea: The current tea area of the whole country is 130,000 ha. In recent years, 10 new tea varieties have been created and transferred to production (PH1, TRI.777, LDP1, LDP2, Phuc Van Tien, Kim Tuyen, Thuy Ngoc, PH8, PH10 and PH11). The total area of new tea created by VAAS is about 74 thousand hectares, accounting for nearly 57%. Particularly, 4 main varieties LDP1, LDP2, PH8 and Kim Tuyen reached 65,000 ha, accounting for 50% of the total tea area in the whole country. Thanks to the new variety combined with the application of advanced intensive process, the tea yield has increased by 2.1 tons per ha per year (from 6.9 tons per ha in 2014, increased to 9.0 tons per ha per year in 2017). At the same time, due to the improved tea quality, the selling price was VND 7,000 per kg, it is 20% higher than that of the old varieties. The added value created by applying new varieties and technical factors is nearly 1,800 billion VND per year.
- Fruit: The area of fruit trees in the country is nearly 924,000 ha, many new varieties and intensive technical process have been researched and transferred to production by Vietnamese scientists. This contributes significantly to fruit export turnover of the whole country. Total fruit export turnover was $3.45 billion and $3.52 billion in 2017 and 2018, respectively. Some remarkable achievements in fruit research are as follows:

- *Dragon fruit:* the area of dragon fruit of the whole country is about 44,200 ha with total output of 819,000 tons per year. There are two varieties including LD1 and LD5 (currently copyrighted by two companies: Hoang Phat Fruit Company Limited and Hoang Hau Dragon Fruit Company Limited) accounting for 20,000 ha (45.2% of the area), giving an average yield of 40-50 tons per ha, an increase by 74.5% compared to the old varieties. This created a profit of about VND 13,000 billion per year (estimated by the average selling price of VND 25 million per ton).
- *Citrus fruit:* The total area of pomelo in the country is about 60,000 ha. Da Xanh grapefruit varieties created by the Institute through the Da Xanh pomelo selection contest in 1999. This variety was planted on 36,000 ha (accounting for 60% of the total an area of pomelo in the whole country). Thanks to good quality, the average selling price is 11 million per ton higher than the ordinary pomelos (46.0 million per ton compared with 35.0 million per ton). Every year, with an average yield of 25 tons per ha, the added value of pomelo production is VND 9,900 billion per year.
- *Mango:* Hoa Loc mango variety was selected in 1997. The planting area of this variety occupies 20% of the total mango area of the whole country (17,000 ha out of a total area of 85,000 ha). With an average yield of 10 tons per ha and the selling price of 35 million VND per ton, there is an increase of 17 million VND per ton compared to the old varieties (the old variety of mango price is VND 18 million per ton). Selected mango varieties have generated a profit of about VND 2,890 billion per year.
- *Longan:* The total planted area is about 97,300 ha with 54,000 ha in the north and 43,300 ha in the south. In the North, the group of early ripening longan varieties (PHS1 and PHS2) and late ripening (PH-M99-1.1; PH-M99-2.1, HTM-1 and HTM-2), which were created by Vietnam, has developed in production with an area of about 24,000 ha, accounting for 44.5% of the Northern longan area. Including about 5,000 hectares of grafting longan mainly cultivated in Son La. New longan varieties have an average yield of 16-17 tons per ha (increased by 38% compared to those grown in large varieties). With the selling price of VND 15.0 million per ton, benefiting the production of about VND 900 billion per year. In the South, yellow flesh longan varieties selected by the Southern Fruit Institute were transferred in production with an area of 14,660 ha (accounting for 33.8% of the total area). The yield of this variety is equivalent to that of ordinary varieties, but the selling price for this variety is VND 21 million dong per ton, compared to only VND 6 million per ton for ordinary varieties, created a profit of 1,319 billion dong per year. The benefits of the new longan variety to farmers in the whole country are VND 2,219 billion per year.
- *Lychee:* The area of early ripening litchi varieties of Binh Khe, Phuc Hoa selected by Vietnam is over 2,000 ha. Litchi is produced mainly in Bac Giang, Hai Duong and Quang Ninh provinces. The output of early ripening lychee varieties is estimated at 15,000 tons and the annual added value is about VND 150 billion compared to that of the main season. The technical process of preventing stem borer is the result of the research that has been widely applied in production in the concentrated lychee growing provinces in the North of Viet Nam. This technical process contributes to improving quality, increasing the proportion of exported lychee, and increasing economic efficiency, especially for the late litchi season [5].

Conclusion and recommendations on science and technology for agriculture development after 2020

Increasing investment in scientific research and technology transfer

Increase investment in the system of research units in the field of agriculture and rural development of Vietnam to approach the level equivalent to other countries in the region (0.5% of agricultural GDP). Iinvestment in agricultural science and technology can be implemented by proposing to the Government a deduction of 0.5% of export turnover to reinvest in science and technology. Thus, with over $40 billions of agricultural exports in 2018, we have about US $ 200 million invested in scientific research and technology transfer, which is 4 times more than the current investment of state for the Ministry of Agriculture and Rural Development. If this proposal is approved, there will be more resources to invest in science and technology in aagriculture and rural development.

Enhancing the quality of human resources for scientific research and transfer and technology:

i) Human resources for scientific research: At present, there are 8,000 people in institutes and schools, but we still lack leading staff, staff doing basic research and in-depth research. Moreover, the senior researcher is aging, while the next generation has not adequately qualified. At the same time, a large number of researchers leaving the institutes or universities to work for businesses sector with higher remuneration;

ii) Human resources for technology transfer (agricultural extension): Most of them are not well-trained and updated on scientific and technological knowledge. In addition, agricultural extension staff at the grassroots level (commune level) and part-time (village/hamlet) has low remuneration so they are not assured of effective work. Therefore, human resources for scientific research and technology transfer (extension) need to be trained and re-trained to update knowledge and improve professional quality to meet increasing requirements for research and technology transfer (especially high technology and smart agriculture resilient to climate change, ecological and

organic agriculture). On the other hand, it is necessary to consider the remuneration regime in order to avoid brain drain for researchers and for extension workers to be assured that their work is effective.

Continue to renovate the system of scientific research and technology transfer organizations

The scientific research system should continue to be organized and avoid overlapping. In particular, implement the mechanism of autonomy and self-responsibility. The National Extension Center must be the agency that helps the Ministry of Agriculture and Rural Development in state management of agriculture promotion and does not directly implement the current agricultural extension works. An annual proportion of agricultural extension funding should be balanced for provinces to increase the professional connection between central and local levels, making the extension system a unified organisation. Agricultural extension tasks include Ministry-level agricultural extension tasks (assigned to competent institutes, universities and enterprises); Local-level tasks are carried out by the Provincial Agricultural Extension Centre and district extension centres, using annual funding from the central level through the National Agricultural Extension Centre; and contingency agricultural extension tasks assigned by the Ministry when there are natural disasters, epidemics ...

Continuing to renovate the science and technology management mechanism:

Continue to complete synchronous mechanisms and renewal policies to promote science and technology activities in agriculture and rural areas. The government should create favourable conditions for organizations and individuals doing science and technology to maximize creativity, initiative and sense of responsibility for the final result. Shifting the focus from input management to output management and the effectiveness of science and technology products applied to production. Implementing more thoroughly the financial contracting mechanisms in science and technology. Improving procedures, not moving science and technology people into administrative staff, who have to cope with cumbersome procedures, especially financial regulations.

Socialization of scientific research and technology transfer

1. *Regarding scientific research*: Encouraging and creating favourable conditions for non-public actors to participate more and more in research and development of priority fields, such as research on plant breeding that creates high value and adapts to climate change, advanced technologies applied to hi-tech agriculture, agriculture 4.0, and organic agriculture. Some real forms that can be applied in the coming period are: Enterprises set up affiliated research units; Enterprises collaborated with scientists to propose and implement science and technology tasks, the State provided funding; and Enterprises order scientists on a specific product, research funding can be invested 100% or 50% by the government.
2. *Regarding technology transfer:* Enterprises need to develop material production areas on an industrial scale and may invest in hiring technology transfer services (agricultural extension). Thus, technology transfer is considered as a service that is accounted for input costs in agricultural production. This has been effectively implemented by developed countries.

Developing science and technology market

The development of the science and technology market is now institutionalized with legal frameworks such as the Law on Science and Technology, the Law on Intellectual Property, the Law on Technology Transfer, etc., with management organisations and specific regulations. In past 10 years (2005-2015), only about 50 new plant varieties selected by institutes and universities were transferred to enterprises. However, in general, the transfer of technology copyright is still underdeveloped, other fields such as technological processes in production, processing of agricultural, forestry and fishery products, drawings, design of agricultural machines ... are almost not transferred in the science and technology market. In order for science and technology products to enter the market, such science and technology products need to satisfy the condition as follows: i) High quality and high content of “grey matter”; ii) Meeting production and business requirements, being capable of being applied to large-scale production; and iii) Creating profits to production and business. The procedures of the science and technology market also need to be reformed, facilitating quick and convenient access for the parties. Some of the current problems need to be addressed immediately, such as the simplification of the procedure for copyright registration; It is also necessary to have a policy of copyright protection for scientific and technological products and inventions to ensure the rights of inventors and researchers. At the same time, it is necessary to have support policies to support and continue developing and perfecting research products to become transferable goods for technical advances with great demand and capable of creating high efficiency.

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