World Journal of Agriculture and Forestry Sciences
ISSN: 2960-0227

RESEARCH ON THE ALLOCATION EVALUATION OF ROPICAL AGRICULTURAL SCIENCE AND TECHNOLOGY RESOURCES IN HAINAN PROVINCE

Wanchun Wang
College of Agriculture, Jiangxi Agricultural University, Nanchang 330045, Jiangxi, China.

Abstract: Exist "Fourteenth Five-Year Plan" Beginning with a solid analysis of the past the distribution of scientific and technological resources in tropical agriculture in Hainan Province in the past 10 years, and its impact on the high-efficiency tropical agriculture in China. It is of great significance to optimize the layout of agricultural production nationwide. This study uses DEA model with 2011-2020, 10 years Hainan farmer Based on the input-output data of industrial scientific and technological innovation, the comprehensive efficiency, pure technical efficiency and scale efficiency of Hainan's agricultural scientific and technological resource allocation efficiency are analyzed. result table It shows that in recent years, the overall allocation of agricultural science and technology resources in Hainan Province has been at a medium to high level, and the growth rate has basically remained flat. Combining Hainan's agricultural science and technology innovation.The current situation of development, and put forward policy suggestions for optimizing the allocation of agricultural science and technology resources in Hainan and improving the competitiveness of science and technology in the future: Strengthen Hainan's agricultural science and technology innovation talents team development; Guarantee the support of Hainan's agricultural science and technology research projects; Focus on promoting the construction of a technical system for the transformation of agricultural scientific and technological achievements in Hainan; Innovative Hainan Farmers Open the system and mechanism of the industry to the outside world, and build a global agricultural industry chain.
Keywords: Hainan Tropical Efficient Agriculture; Agricultural science and technology resource allocation; Data envelopment analysis

1. INTRODUCTION

As the southernmost province in my country, Hainan Province has extremely tropical features regional advantages, its total output value of tropical agriculture accounts for GDP The highest proportion in the country High [1]. Therefore, the future development of my country's tropical high-efficiency agriculture is largely It depends on the further development and progress of agricultural scientific research in Hainan Province. as One of the important core industries in Hainan Province, tropical characteristic high-efficiency agriculture is the An important part of the construction of the Southern Free Trade Port. Hainan will be built into a domestic and foreign The only one covering rural areas, agricultural people, agriculture in Inside the whole island type country occasional free trade Hong Kong [2]. As the core resource of agricultural science and technology innovation, agricultural science and technology resources Allocation directly affects the ability of agricultural science and technology innovation and the progress of agricultural modernization. Cheng [3]. exist " Fourteenth Five-Year Plan " start realistically and objectively summarize the past The input and output of tropical agricultural science and technology in Hainan Province in the past 10 years, and the analysis of resources The efficiency of resource allocation will contribute to the current development of Hainan's tropical characteristic high-efficiency agriculture, finally achieved " Two Hundred Years " The goal of struggle and the realization of the greatness of the Chinese nation The Chinese dream of great rejuvenation is of great significance data envelopment analysis (date Envelop ment Analysis,simple say DEA) It has been widely confirmed by domestic and foreign scholars that it is reasonable and feasible to target scientific An evaluation method for the efficiency of technical resource allocation. use DEA law can be effective Evaluate the allocation efficiency of relevant agricultural resources and obtain the key influencing factors Factors, put forward specific measures to improve the efficiency of resource allocation. For example, Yele- na wait to pass DEA method to measure technological innovation in the Kazakhstan region Efficiency, pointing out that the improvement of Kazakhstan's economic policy should focus on maximizing output and minimizing resource costs[4]; Cuitlahu ac wait for DEA method of measuring mexico Technological innovation relative to technology in 32 states Based on the technical efficiency, the total resources of the scientific and technological innovation system and its productivity efficiency are obtained The relationship between the rate [5]; Li Yonghui and others believe that the transformation of agricultural scientific and technological achievements and promotion need to be combined with market orientation and agricultural production demands [6]; horse Yanyan et al. found that the factors affecting the allocation efficiency of agricultural science and technology resources are not only Including the investment of innovative agricultural science and technology talents, as well as the investment in the science and technology market The degree of perfection [7]; Xiao Biyun In order to study my country's agricultural science and technology innovation resources Allocation efficiency, for our country The change trend of 31 provinces over the years using DEA conduct research and provide Optimize resource allocation countermeasures and Proposal [8]; Yang Chuanxi et al. used DEA. The super-efficiency model of the law measures the national The allocation efficiency of agricultural scientific research

institutions belonging to 32 provincial government departments, put forward The allocation of agricultural science and technology resources needs to be adjusted The structure of [9]; Wang Ziyan uses DEA Calculation of Fujian Province 39 counties in demand for agricultural science and technology resources The main influencing factors, it should be carried out in the allocation of agricultural science and technology resources adjust, give give Inside land Mountain district county Even many of capital source repair Charge [10]. Can See DEA The model can evaluate the efficiency of multiple inputs and multiple outputs Objectively and effectively analyze the efficiency of decision-making units.

The previous research on agricultural science and technology in Hainan is mainly based on the current status of agricultural science and technology. The problem is the starting point. Cai Donghong and others found that the supply of agricultural science and technology talents There are deficiencies, and it is proposed that the government should unite multiple forces to improve the modern agricultural talent education and training system, and implement diversified and differentiated incentive strategies to Improve the agricultural science and technology system [11]. Wu Sihao et al. out, Hainan Tropical High Effective modern agricultural development is inseparable from the development of agricultural mechanization, and put forward 14 strip Policy recommendations for the development of modern agriculture in Hainan [12]. Reference by Zhang Zhili Taiwan's agricultural science and technology support system, for Hainan " Save a plate "Chess " strategic goal, proposed to coordinate the province's agriculture-related scientific and technological resources, management System reform and other measures [13]. Dai Kunhao believes that Hainan's agricultural science and technology needs To make full use of the advantages of free trade port construction, With more open and more integrated From the perspective of building a national tropical modern agricultural base, deepening the reform of scientific and technological achievements Fruit transformation system and mechanism to help develop high-tech agriculture [14]. however hot The construction of high-efficiency agriculture with characteristics, and the construction of free trade ports with Chinese characteristics The agricultural science and technology innovation set up, and the allocation of agricultural science and technology resources for Hainan There are relatively few studies on the location, especially for the complete past 10 years cast Summarize and sort out the specific situation of input and output. Therefore, this study aims to Pass 2011 Input and output indicators related to Hainan's agricultural science and technology in 2020, use DEA The model evaluates the resource allocation efficiency of Hainan's agricultural science and technology. Comprehensive analysis and evaluation, and proposed measures to improve the efficiency of resource allocation apply. Actively explore and improve the allocation efficiency of agricultural science and technology resources in Hainan, by Provide support for Hainan's tropical characteristic agricultural science and technology innovation, and Hainan Under the background of free trade port construction, the strategy of accelerating rural revitalization plays a role.

2. DATA ACQUISITION AND RESEARCH METHODS

2.1 Data Source

This study involves data from since " National Science and Technology Statistical Yearbook " and " Hainan Science and Technology Statistical Yearbook " Open source statistics, such as tables 1. _ 1. 2 method

2.1.1 Dea resource evaluation model

DEA (DEA) yes Charnes a proposed, Non-parametric test method based on relative efficiency evaluation [15]. exist D EA middle, The unit or organization being assessed is called the decision-making unit (DMU). pass right DMU Multiple input and output data using linear programming to optimize input Construct a data envelope curve with output as the production frontier. This study assumes that the rules Modular rewards are variable, that is, Evaluated by the DEA method The BCC model mainly measures pure Technical efficiency is the ratio of technical efficiency to scale efficiency. Suppose there is n _ sample (DMU), which is measured by the input angle, that is, DMU i (i = 1, 2, …, n); Each sample has m inputs and q kinds of output, for x j (_ = 1, 2, …, m), the weight is recorded as V j (j = 1, 2, …, m); Produce output expressed as Y r (r = 1, 2, …, q), the output weight is denoted as U r (r = 1, 2, …, q), and then build a model:

$$\begin{cases} \min \theta \\ \text{st} \sum \lambda_i X_{ji} = \theta X_{jk} \\ \sum \lambda_i Y_{ji} = Y_{rk} \\ \sum \lambda_i = 1 \ (\text{lambda} = 0) \\ (\text{lambda} = 0) \\ \text{l } i = 1, 2, \ldots, \text{no}; j = 1, 2, \ldots, m; r = 1, 2, \ldots, q \end{cases}$$

In the formula, λ represents the linear combination coefficient of the decision-making unit; θ means Efficiency value, the smaller θ is, the lower its efficiency is. when θ = 1 when you can It shows that the decision-making unit under evaluation is a technical efficient; Conversely, when θ <1, indicating that the evaluated decision-making unit is technology invalid. obtained by the formula θ is the pure technical efficiency value, and by Compare Can by count Calculate out regulation mold effect Rate (SE), comprehensive combine technology surgery effect Rate (TE), pure

technical efficiency (PTE), From this, it can be judged that Hainan's agricultural The specific situation of scientific and technological input and output resource allocation.

Table1 2011—2020 Hainan Agricultural Science and Technology Resource Allocation Data

years / year	Agricultural Technology Program Number of items / indivual	total agricultural machinery Power /× 10 7 W	agricultural technician Quantity / people	support agriculture / agriculture and forestry water affairs / 100 million yuan	Agriculture , forestry, animal husbandry and fishery Gross output value / 100 million yuan	Unit output value of tropical fruits and vegetables / (kg·hm −2)	Number of patent authorizations / indivual
2011	229	404. 51	16575	105. 6282	1002. 35	21552. 17	765
2012	235	442. 81	10114	123. 624	1082. 15	22419. 15	1084
2013	327	491.99	9810	139.031	1144. 94	22756. 12	1331
2014	410	522. 84	9552	146. 3014	1252. 18	22856. 51	1597
2015	344	504. 22	8841	164. 2376	1294. 00	22482.01	2060
2016	263	516. 57	5728	179.0441	1433. 88	22296. 26	1938
2017	276	556. 86	4769	198.4157	1488. 86	22658. 74	2084
2018	238	561. 27	4180	227.711	1535. 73	22619. 17	3292
2019	266	558. 21	3304	251. 3993	1689. 4	23157. 25	4423
2020	283	615. 32	2580	268.5655	1821. 02	23350. 74	8578

2.2.2 Index selection

The set of elements that can promote social and economic development in agricultural science and technology innovation activities[16]. In order to analyze the allocation of agricultural science and technology input and output resources in Hainan, this study is based on At 2011— Hainan's agricultural science and technology investment and production in 2020 output data, in The main selection of investment indicators for agricultural science and technology innovation in 3 directions

4 indicators: Investment in material resources of science and technology, investment in human resources, investment in financial resources of science and technology; Among them, the number of agricultural science and technology projects (X 1) total power of agricultural machinery (X 2) As scientific and technological material resources, agricultural technicians member (X 3) Supporting agriculture / Agriculture, Forestry and Water Affairs funding (X 4) as a technological financial resource. Innovation outputs in agricultural technology The main selection of indicators in 2 directions 4 indicators: Technological Achievements resource element property output, economic benefits out; That Among them, the number of patents authorized (Y 2) as a technological achievement Resource elements, total output value of agriculture, forestry, animal husbandry and fishery (Y 1) and Tropical Fruit and Vegetable Yield Value (Y3) _ As an economic benefit evaluation index indicators, which respectively reflect the economic benefits brought about by agricultural technological innovation and the agricultural For the growth of technological efficiency, see the table 2.

Table 2 Description Of Agricultural Science And Technology Input And Output Indicators

Indicator type	index	Indicator description
Input indicators	X1	Number of Agricultural Science and Technology Program Projects
	X2	total power of agricultural machinery
	X3	Number of agricultural technicians
	X4	support agriculture / Agriculture, Forestry and Water Affairs
	Y1	Gross output value of agriculture, forestry, animal husbandry and fishery

output indicators	Y2	Unit output value of tropical fruits and vegetables
	Y3	Number of patent authorizations

3. STATISTICAL DESCRIPTIVE ANALYSIS OF INPUT AND OUTPUT INDEXES OF AGRICULTURAL SCIENCE AND TECHNOLOGY

3.1 Input Indicators

3.1.1 Agricultural science and technology input resources

The Hainan Agricultural Science and Technology Plan Project here refers to the support of the Hainan Provincial Department of Science and Technology Supported programs are used for scientific and technological research and development projects in agricultural production. each The number of annual agricultural science and technology plan projects reflects Hainan's commitment to agricultural Technology input and emphasis. 2011— Hainan Province in 2020 Agricultural Science and Technology Program Items The number of items showed a fluctuating upward trend as a whole. That Among them, in 2014, the agricultural scientific research project project approval peak Period, 2015— In 2018, there was a decreasing trend. Speculate with 2013— 2014 _ typhoon " Petrel " Severe natural disasters such as serious damage to Hainan's crops and natural disasters Natural resources have caused huge losses, urgently need to remedy and increase relevant scientific research efforts There is a direct relationship. Around 2016, Hainan launched global tourism, and Changjiang Nuclear Power Co., Ltd. The power station was fully completed and put into operation, the Wenchang rocket was launched, and the southwest high-speed railway line was opened to traffic and other major events, the focus of the province's work is on engineering and other related fields It is presumed that this is the main reason why there are fewer tropical agricultural projects around this year. because. After 2019, agricultural and rural reforms will be advocated domestically, with Hainan With the construction of the provincial international free trade port, Hainan's tropical and efficient agriculture has received more attention. More attention, coupled with the introduction of high-level talents in Hainan Province and the introduction of agricultural With the support of scientific research, tropical agriculture projects in Hainan are increasing year by year trend. It can be seen that the approval status of science and technology projects, the policy environment and social concerns close relationship.

The total power of agricultural machinery includes power machinery such as farming machinery, agricultural transport machinery, animal husbandry machinery, fishery machinery and other agricultural machinery, that is, the sum of the power of various power machinery mainly used in agriculture, forestry, animal husbandry and fishery, and its calculation should be Break down power into watts. From 2011 to 2020, the total power of agricultural machinery in Hainan showed a steady upward trend, from 404. 51×107 W in 2011 to 615.32×107 W in 2020, but the growth rate in 2014-2019 was relatively low. slow. From 2019 to 2020, the total power of agricultural machinery in Hainan showed explosive growth, from 558. 21× 107 W to 615. 32× 107 W in 2020. The level of investment in economy, technology and scientific research has increased significantly, and the investment in agricultural technology innovation has reached a new stage, effectively promoting the development of agricultural technology innovation in Hainan Province.

3.1.2 Agricultural science and technology human resources

Agricultural science and technology talents refer to those who have received professional education in the field of agriculture education, master relevant applied technologies, and specialize in agriculture-related research Study, technology surgery push wide, born produce, answer use wait of Specialize Industry technology surgery people [16] is an important carrier of agricultural science and technology. Technological talents cast Income will affect the level of scientific and technological innovation capabilities and their efficiency, and agricultural Product market demand, agricultural product market output and quality. by figure 3 can know, 2011— In 2020, the number of agricultural technicians in Hainan showed a downward trend as a whole. 16575 people reduced to 2580 people. According to different stage point analysis Can know, 2011— 2012 Year presented broken cliff Mode reduce less _ Depend on 2011 _16575 people reduced to 2012 _ 10114, reduce the number of people 6461 people, annual decrease 38. 98%. 2012— 2020 year showing a slight downward trend, Depend on 2012 _ 10114 people reduced to 2020 Year 2580 people, reduce the number 7534 people, annual decrease 8. 28%. cast The reduction of incoming talents will reduce the innovation ability and innovation efficiency of agricultural science and technology. few, The construction of the free trade port has given agricultural technical talents a greater platform, bringing More opportunities have come. With the support of the policy of free trade port construction, Hainan The province needs to grasp the advantages and opportunities of talent introduction and training, and timely adjust the investment mode of agricultural science and technology talents in order to effectively promote agricultural science and technology innovation.

3.1.3 Financial resources of agricultural science and technology

Agriculture or Expenditures on agriculture, forestry and water affairs mainly include agriculture, forestry, water Expenditures such as profit and comprehensive agricultural development. Its investment scale is very important for agricultural technology Innovative resource allocation plays a promoting role, which can reflect the government's support for agriculture The input of financial expenditure. by figure 4 known, 2011— 2020 sea South for supporting agriculture or Spending on agriculture, forestry and water affairs maintained a steady growth, It can be seen that for

supporting agriculture or Continuous investment in changes in agriculture, forestry and water affairs Income will give full support and guarantee to agricultural science and technology innovation in Hainan Province.

3.2 Output Indicators

3.2.1 Agricultural science and technology achievements

The number of agricultural scientific and technological achievements can directly reflect the national or regional agricultural The level of scientific and technological output. This study analyzes the overall technological innovation level through the number of patent authorizations. 2011— Patent authorization in Hainan Province in 2019 number quantity increase long trend Potential compare for stable Certainly, 2019— In 2020, the number of patent authorizations will increase significantly, Depend on 2019 Year 4423 grew to 2020 's 8578. _ Explain Hainan's technological innovation The number of achievements and intellectual property management are constantly improving, which also shows that Hainan under the free trade port has seized the opportunity, and agricultural innovation has achieved good results.

3.2.2 Agricultural science and technology economic benefit index

The total output value of agriculture, forestry, animal husbandry and fishery and the unit output value of tropical fruits and vegetables can reflect the achievements and scale of agricultural production. 2011— In 2020, the total output value of agriculture, forestry, animal husbandry and fishery in Hainan will show a slow growth trend. Tropical fruits and vegetables are the most characteristic products of tropical agriculture in Hainan, including melons Vegetables, vegetables and garden fruits etc. 2011— 2020 Hainan Tropical Fruits and Vegetables The output value per unit showed a rising trend. 2011—Increase rate in 2012 maximum, by 21552. 17kg·hm $^{-2}$ increase to 22419. 15kg hm -2, Although there was a decline afterwards, it showed an overall upward trend, which shows that Hainan's agricultural The industry's scientific and technological innovation output is in a good state, and it should be included in the policy dividend Next, seize the opportunity to achieve further optimization.

4. DEMONSTRATION RESULTS AND ANALYSIS

Use DEA middle BBC model pair 2011— 2020 Hainan Farmers Analyze the output and input data of industrial science and technology, and analyze the output and input data of each year Describe the efficiency of resource allocation and analyze the differences in each stage in detail.

Table 2 Hainan Agricultural Science and Technology Resource Allocation DEA analysis results

year / Year	overall efficiency	pure technical efficiency	Scale efficiency
2011	1. 000	1. 000	1. 000
2012	0.983	0. 986	0. 997
2013	1. 000	1. 000	1. 000
2014	1. 000	1. 000	1. 000
2015	0.911	0.957	0.952
2016	0. 838	0.949	0. 883
2017	0. 870	1. 000	0. 870
2018	0. 851	0.992	0. 857
2019	0. 769	0.966	0. 796
2020	0. 786	1. 000	0. 786
average	0.901	0.985	0. 914

4.1 Comprehensive Efficiency Analysis

Comprehensive efficiency refers to resource allocation capabilities, resource use efficiency, etc. A comprehensive measure and evaluation index of overall efficiency. pure technical efficiency It reflects the production efficiency of the enterprise due to factors such as management and technology. Scale efficiency reflects the gap between the actual scale and the optimal production scale. The closer the comprehensive efficiency value is to 1. 000, representing the input - output of the decision-making unit Comprehensive Heyue have efficiency Effect beneficial and economies of scale also apply [17]. by table 3 It can be seen that in 2011— 2020 Hainan Province The average comprehensive efficiency of agricultural science and technology resource allocation is 0.901, the mean value of pure technical efficiency reaches 0.985, and the mean scale efficiency is 0. 914, indicating that the overall allocation efficiency of agricultural science and technology resources in Hainan is at a medium to high level. 2011— In 2014, the comprehensive technical

efficiency of agricultural science and technology input and output reached a relatively high value, which shows that this Over the past four years, the allocation of agricultural technology resources in Hainan has been relatively scientific, reasonable and relatively sustainable status. since The efficiency values after 2015 are all lower than the average value, and the lowest comprehensive efficiency value is 2019 year and 2020 years, only 0. 769 and 0.786, This shows that near The allocation of agricultural science and technology resources in Hainan in 2 years is in an ineffective state, and the reason for this is 2019— 2020 Year The investment in agricultural science and technology talents in Hainan has decreased significantly compared with before, resulting in unreasonable allocation of agricultural science and technology resources in Hainan, and talents are the number one priority. 1 Resources, increasing the input of agricultural science and technology talents plays an important role in improving the level of agricultural science and technology and realizing the steady development of agriculture.

4.2 Pure Technical Efficiency Analysis

Pure technical efficiency is not 1 there are 5 years, respectively yes 2012 year, 2015 year, 2016 year, 2018 Year and 2019 Year, It shows that the input and allocation scale of Hainan's scientific and technological resources in these years is uneven balance, the utilization rate of invested scientific and technological resources is not high, some adjustments are needed In order to realize the efficient allocation of agricultural science and technology resources. other years of pure technical efficiency is achieved 1. 000, indicating that the utilization of agricultural science and technology resources in Hainan It is more reasonable, with a good combination of industry, education and research. On this basis, the sea The agricultural scientific and technological achievements in South China have made remarkable progress.

4.3 Scale Efficiency and Scale Benefit Analysis

2011— Changes in scale efficiency of Hainan's agricultural science and technology in 2020, 2011— 2014 In addition to the input-output efficiency of agricultural science and technology projects in Hainan Province 2012 for 0. 997, all other years reached 1. 000, indicating that this The 4 -year report is relatively stable, which also shows that in Under the active guidance of national policies, the agricultural science and technology projects in Hainan Province have more reasonable development. 2015— 2020 shows overall scale In the form of diminishing efficiency, it shows that the resource investment in agricultural science and technology innovation in these years Insufficient scale allocation of investment should be made to agricultural science and technology innovation resources Adjust the scale of input and output to improve its allocation efficiency.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

This study uses DEA Model Analysis Hainan 2011— 202 0 Annual farmers The allocation efficiency of industrial science and technology resources, and find out the allocation efficiency of agricultural science and technology resources Generally at a medium to high level, and in Slow down after 2015 There is a certain degree of insufficient output, and certain adjustments should be made Measures to ensure the efficient allocation of tropical high-efficiency agricultural science and technology resources in Hainan in the future Therefore, the following policy recommendations are put forward.

5.1 Strengthening the Training of Hainan Agricultural Science and Technology Innovation Talents

The research shows that the decline in the overall efficiency and scale efficiency of Hainan's agricultural science and technology resources allocation is mainly due to the year-on-year decrease in the investment in technical personnel. As a carrier, agricultural science and technology talents are one of the fundamental factors to improve the efficiency of agricultural science and technology resource allocation. Cultivating high-quality agricultural technical talents in Hainan is the guarantee of scientific and technological innovation. At present, Hainan's agricultural science and technology talents are decreasing year by year. The reduction of agricultural science and technology talents is not conducive to the development of scientific and technological innovation. plan, Adhere to the strategy of multiple strategies, personnel integration, and classified advancement to create an innovative, professional, and industry-leading agricultural science and technology talent team, and then maximize and optimize the efficiency of agricultural science and technology. At the same time, according to the development needs of Hainan's tropical agricultural advantages, gradually optimize the management mechanism for scientific research personnel and stimulate their enthusiasm for scientific and technological innovation. In terms of capital investment and talent introduction, it is necessary to go hand in hand. Through the implementation of classified guidance, cultivate suitable production and management, professional service and professional skills talents, give full play to the internal power of scientific and technological innovation, and further deepen the role of agricultural science and technology in the development of agricultural modernization. effect.

5.2 Guarantee The Support Of Hainan's Agricultural Science And Technology Research Projects

Hainan agricultural science and technology research project support is the root of scientific research This, from the current investment analysis, the investment in scientific research and technology in Hainan Province It has obvious policy-oriented and hot-spot-oriented trends. And for tropical farmers As far as industrial research is concerned, the

output of scientific research results benefits from years of investment, active Accumulation and monitoring, involving animal and plant growth cycles and related experiments open development cannot be achieved overnight. Therefore, it is necessary to guide the overall strategy, Taking into account hotspot-related, policy-oriented projects and long-term arduous research projects support. Hot projects must be worthy of attention, In this way, we can keep up with domestic and foreign The situation develops and changes, and conforms to the needs of the social economy at this stage. But at the same time Nor can we ignore those long-term and arduous sciences with long research cycles and high investment research project. The development of such scientific research projects requires more Research management support and advocacy. Researchers should be encouraged to feel at ease Do a good job in scientific research in a down-to-earth manner, To ensure my country's tropical high-efficiency agricultural long-term sustainable development of the industry. and there should be a reasonable balance among agricultural research Category Item Assignment ratio. Conform to the balance of germplasm resources of southern breeding in Hainan Taijian set up, focus on biological breeding and other related research, and ensure the protection of biological Breeding, smart agriculture, green agriculture and other fields have developed and progressed together.

5.3 Focus On Promoting The Construction Of a Technical System For The Transformation Of Agricultural Scientific And Technological Achievements In Hainan

The number of patents for agricultural scientific and technological achievements in Hainan is 2019 The transformation of Hainan's agricultural scientific and technological achievements is related to many aspects of application in agricultural development. In the future, we should take advantage of the convenience of the construction of Hainan International Free Trade Port to focus on the construction of the technological system for the transformation of achievements. Specifically, it includes creation of tropical animal and plant germplasm resources, Seed and Seedling Breeding and Marketing; Efficient and safe planting of crops and large-scale breeding technology of livestock and poultry; Production technology and products of high-efficiency plant regulators, environmentally friendly mulch, new pesticides, water-saving irrigation, high-efficiency and environmentally friendly fertilizers, and ecological cultivation substrates; Agricultural intelligent information technology and service network construction; Animal and plant disease prevention and control technology and agricultural natural disaster prevention and control technology; System design and policy research on the transformation of agricultural scientific and technological achievements.

5.4 Innovate The System And Mechanism Of Hainan's Agricultural Opening To The Outside World, And Build a Global Global Agricultural Industry Chain

This study focuses on the Hainan Province 10 -year technology input and output efficiency Internal comparative analysis of, while for " Fourteenth Five-Year Plan " At the beginning, focus on the As far as Hainan Island, an international free trade port, is concerned, the tropical high-efficiency agriculture Development should give full play to Hainan's advantages in focusing on internationalization and relying on the global Transit base for the introduction of animal and plant germplasm resources, National Southern Breeding Research and Breeding Foundation land, National Tropical Agricultural Science Center, etc., behind the construction of the International Free Trade Port In this context, strengthen cooperation in international agricultural science and technology. Improve agriculture in the region The depth of exchanges in scientific and technological innovation, the development of Hainan's agricultural technology and products in the country The international market, strengthening the core competitive advantage of Hainan's agricultural science and technology. should be committed to to build Hainan Island into a To the global agricultural industry chain middle important one environment, intensifying work on the agro-industrial sector in trade policymaking to improve enhance its discourse power, and then make agricultural trade policy consistent with domestic, international agriculture Development policies are coordinated and unified.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

[1] Zhang Haidong, Wang Junfeng, Yin Feng, Huang Yan. The Development of High-efficiency Agriculture with Tropical Characteristics in Hainan The way out. Contemporary Rural Finance, 2022 (01): 40-44.

[2] Wang Huiyuan. Research on the Communication Strategy of Hainan Agricultural Science and Technology Periodicals from the Perspective of New Media — by "Tropical Agricultural Science" as an example. Anhui Agricultural Sciences, 2020, 48 (01): 238-240.

[3] He Qiong, Chen Super, Wang welcome spring. farming Industry division technology capital Review and Prospect of Source Allocation Research. Agricultural Technology Management, 2021, 40 (06): 25-29.

[4] Yelena V, Yelena P, Stanislav B. Evaluation of regional in- innovation systems performance using Data Envelopment Analysis (DEA). Entrepreneurship and Sustainability Is sues, 2019.

[5] Cuitlahuac V, Jorge Ines Leon B. Efficiency of Mexico's regional innovation systems: an evaluation a applying data environment analyzes is (DEA). African Journal of science, Technology, Innova the action and Development, 2015, 7 (1).

[6] Li Yonghui, Bai Lipeng. Allocation Efficiency and Influencing Factors of Agricultural Science and Technology Innovation Resources in Yunnan Province element research. China Agricultural Resources and Regionalization, 2019, 40 (06): 63-69.

[7] Ma Yanyan, Tai Yibo, Lu Jiaying. based on DEA Model Ningxia Agricultural Science and Technology Resources Source allocation efficiency evaluation. Jiangsu Agricultural Science, 2021, 49 (03): 224 -231.

[8] Xiao Biyun. based on DEA Research on resource allocation efficiency of my country's agricultural science and technology innovation based on model study. Journal of Jilin Institute of Agricultural Science and Technology, 2016, 25 (04): 6 2-65.

[9] Wang Ziyan. Research on the demand of county-level agricultural science and technology resources in Fujian Province. Fuzhou: Fujian Agriculture and Forestry University, 2011.

[10] Yang Chuanxi, Wang Yameng. Agricultural Science and Technology Resources Based on the Second National Resource Inventory Configuration Efficiency Analysis. Agricultural resources and regionalization in China, 2017, 38 (07): 126-134.

[11] Cai Donghong, Liu Feifei. The Construction of Hainan International Tourism Island and the Support of Modern Agricultural Talents System Construction. South China Sea Journal, 2015, 1 (02): 105-110.

[12] Wu Sihao, Cao Jianhua, Zheng Yong, Wang Lingling, Huang Chang. Agricultural mechanization promotes Hainan Research on the Development of Modern Agriculture. Tropical Agricultural Engineering, 2017, 41 (03): 34 - 37.

[13] Zhang Zhili. Taiwan District agricultural science and technology support body The Enlightenment and Suggestions of the Department of Hainan. Hainan Today, 2019 (07): 52-54.

[14] Dai Kunhao. Research on innovation of tropical agricultural development model in Hainan from the perspective of free trade port. Haikou: Hainan University, 2021.

[15] Charnes A., Cooper W, Rhodes E. Measuring the efficiency of decision making units. Euro pean Journal of Operational Research, 1979, 3 (4): 339.

[16] Liu Lingli. Research on the Theory and Efficiency of Allocation of Science and Technology Resources. Changchun: lucky Lin University, 2007.

[17] Lu Jian. Research on the sharing strategy of agricultural science and technology talents in school and land under the background of rural revitalization. Zhenjiang: Jiangsu University, 2020.