

# Evaluation of the Current Situation of Agricultural Production and Study on Technology Orientations in Agriculture for the North-Central Region-Vietnam in the Climate Change Background

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Received: 11 Nov 2020; Received in revised form: 13 Dec 2020; Accepted: 20 Dec 2020; Available online: 31 Dec 2020

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**Abstract**— The North Central Coast (NCC) is one of seven economic regions with a master plan for socio-economic development. North Central region, Vietnam is one of seven economic regions assigned by the Government of Vietnam to make a master plan for socio-economic. Due to the geographical feature of the territory stretching, narrow and wide, sandwiched between the East Sea and the Truong Son Range, the protected area is greatly affected strongly by climate change. Extreme weather conditions (droughts, floods, etc.) occur in a short time, leading to the production of agricultural strengths of the region such as food crops (rice, maize, cassava) and cattle herds (buffaloes, cows) and industrial crops (sugarcane, tea, rubber, pepper) all fell sharply. Moreover, the application of technology to agricultural production in the region is generally not commensurate with the potential. Facing the new context of climate change and its consequences, the application of high technology of agriculture is more complicated, requiring us to choose the appropriate technology orientation. Therefore, the evaluation of the status of agricultural production and the study of priority technology orientations in agriculture in the northern central region in the context of climate change are meaningful and practical for managers in local. Research in the North Central Coast region is also an initial proposal, promising to be a premise for application of research in other localities across the country.

**Keywords**— North Central region, agricultural production, science and technology.

## I. INTRODUCTION

The global community has shown great interest in technology orientations in the context of climate change with typical international studies such as John Smithers et al. (2001) who studied technology innovation as a strategy for climate adaptation in agriculture. Travis Lybbert and Daniel Sumner (2010) conducted technology research in climate

change agriculture and their application in developing countries including policy options for creativity and diffusion technology. Rebecca Clements et al. (2011) have studied technology for climate change adaptation such as the agricultural part, similar to the author T.A. Crane et al. (2011) have studied on the importance of understanding agricultural performance. In Vietnam, there have been several studies focusing on climate change issues in

agriculture, such as: Tran Thi Minh Ha, (2011) have studied on climate change and international support for coping in the field of natural resources and environment. Some of conference in Vietnam that focus on the global climate change of Vietnam's solutions such as the second conference on global climate change of Vietnam's solutions, the draft national strategy on climate change of the Prime Minister (2011), the second seminar on global climate change adaptation solutions of Vietnam, Bui Thi Phuong Loan, (2015). The conference topic on study and develop technical process of cultivating and protecting land for major crops in the plains under the influence of climate change.

However, until now there are still not have much research on the goal of technology orientation in the field of agriculture in the North Central, Vietnam one of the agricultural countries on the world specially for the situation of climate change. Therefore, the research on the the priority technology orientations in agriculture in the North Central region, Vietnam in the situation of climate change that could be desired to contribute to making policy recommendations that the Government and regional management agencies. can be applied to change the orientation of technology development in resluting promote regional agriculture, and ensure adaptation to climate change.

## II. RESEARCH METHOD

### 2.1. Research area

The North Central Region, Vietnam is one of eight socio-economic regions of Vietnam including 6 provinces: Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri and Thua Thien Hue with a natural area of over 50,000 km<sup>2</sup>. The population of about 10 million people, nearly 6 million people of working age, is considered as a region in Vietnam with a rich potential economy.

### 2.2. Research method

In this work, a multi-dimensional approach was used, combining sociological surveys, field surveys with analysis, synthesizing documents, between local analysis and inter-regional analysis. In particular, the study uses two approaches: (1) systematic, inter-regional and inter-sectoral approach; (2) participatory approach. For the research methods, the method of document analysis are used to review the previous research situation related to our research as well as build a theoretical basis related to climate change and green growth for sustainable development.

## III. RESULTS AND DISCUSSION

### 3.1. Rationale for prioritizing technology orientation and agricultural production in the situation of climate change.

Technological orientation is defined as theories and management theory that promote the development of goods or services based on the technological potential of an individual or a collective instead of on demand. Almost every groundbreaking innovation is based on appropriate technology orientation. Most of the research to identify technology orientations, identify priority technology directions, select appropriate technologies, exploit technologies, develop technologies, apply technologies, etc. are issues that are of great interest to strategic planners, researchers, managers at all levels from national macro to regional, local, and even within an organization. At the national level, the results of researches show that countries always make a national technology strategy suitable for each stage of development such as Korea, China with the strategy of importing, adapting, imitating and mastering technology first. This is until the current technology creation strategy. In the process of developing technology strategies, the appropriateness of technology with the conditions of population, natural resources, economy, technology level, habitat, culture, and social development, politics, law, international relations always much consider and attention. In general, it could be understood that technology must be appropriate to the context of technology application.

Previous studies have proposed a number of appropriate technology-oriented grounds that we can refer to [1]:

#### *Technology orientation according to the level of technology*

In this direction, it is assumed that a wide range of technologies is available, we can select the appropriate technology according to usage needs. Technologies range from primitive or manual to advanced as well modern. This type of technology has an intermediate level between primitive technology and advanced technology.

#### *Technology orientation based on target groups*

The technology development target is the basis for selection. These target groups are arranged in order of priority, which is the basis for selecting the appropriate technology in each stage. The target group includes: (1) satisfying the smallest needs, creating jobs and enhancing living standards simultaneously; (2) increase production efficiency and

competitiveness and (3) technology independence and self-reliance.

#### *Technology orientation based on limited resources*

Resources are understood the total geographical location, natural resources, the national property system, human resources, policy lines, capital and markets ... both at local and abroad can be exploited for the economic development of a territory. Resources are not immutable. It changes with time and space.

#### *Technology orientation according to harmony*

The orientation towards harmony is the desire to have technological progress through development, not revolution, which means there must be a harmony between use, adaptation, improvement, and innovation. This development needs to be sequential, no force, no pollution, no ecological imbalance, natural harmony; know how to combine domestic and imported technologies, create a fast and sustainable development, do not conflict between the country and the locality, and harmonize traditional and modern technologies, etc.

### **3.2. Current situation of agricultural production and technology application in agricultural production in the North Central region, Vietnam.**

Regarding to analyzing the previous works, we have studied and focused on that the natural conditions as well as the socio-economic status of the coastal zone, the specific analysis of the current status of crop production in the period 2010-2015. The situation of technology application with advantages and disadvantages have been analyzed in this part.

In the 5-year period from 2010 to 2015, agricultural production in the Central Coast region, Vietnam has to face many difficulties and challenges, especially climate change causing many extreme and unusual weather phenomena. Typically, the Central Coast suffered two extremely unusual natural disasters in 2010 such as a drought lasting from June to July caused a loss of 30,000 hectares of summer-autumn rice crop and 2 strong floods next month in October, 2010 that devastated and caused heavy damage to many provinces in the region. We have found that droughts, hot weather, severe cold, damaging cold, heavy rain, tropical storms as

well as warm winters, heavy rain and floods have a great impact on agricultural production as well as the lives of people in the coastal areas. The export market for agricultural products faces many difficulties due to the demand and prices for key agricultural export products of the region have decreased. In addition, epidemics on crops and animals still occur in some places, high prices of inputs, fertilizers ... have a strong effect on activity and implementation of agricultural production plans.

In the period 2010 - 2015 under the direction of the Party Central Committee and the Government, the Central Coast region- Vietnam has implemented many guidelines and policies to arrange suitable production structure, labor between regions, ensuring food improving and enhancing people's lives, restructuring crops towards industrialization, modernization however, these solutions need to be forward to protection of ecological environment, while coping with climate change is increasing and affecting daily a strong up climate region. [3-5]

#### *3.2.1 Current situation of agricultural production and technology application in agricultural production in the North Central region*

By analyzing the available documents with the arguments from these data, we have shown: firstly, the natural conditions as well as the socio-economic status of the coastal zone; The second is the specific analysis on the current status of crop production in the period 2010-2015; On that basis, thirdly, I present the situation of technology application, both done and not done in the locality, from which shortcomings and basic solutions are drawn.

In the 5-year period from 2010 to 2015, agricultural production in the Central Highlands has to face with many difficulties and challenges, especially climate change causing many extreme and unusual weather phenomena. Typically in 2010, the Central Coast suffered two extremely unusual natural disasters: a drought lasting from June to July caused a loss of 30,000 hectares of summer-autumn rice crop and 2 strong floods next month in October devastated and caused heavy damage to many provinces in the region. [4-5]

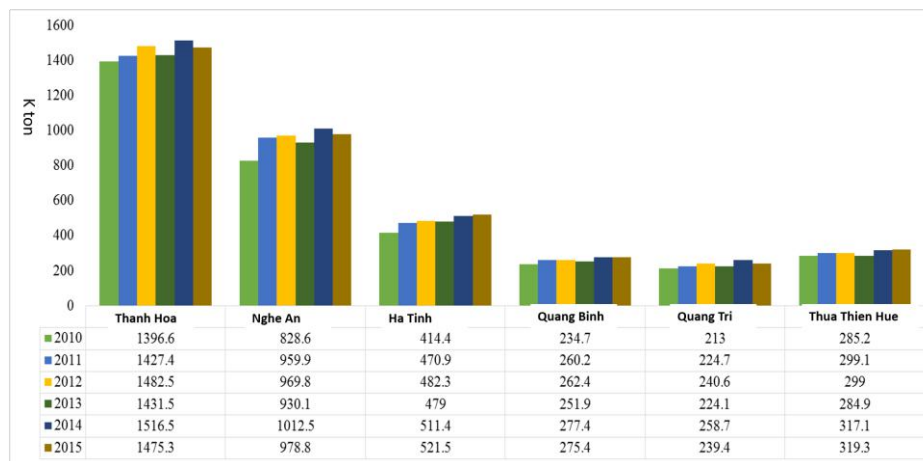


Fig.1: Rice production in 6 provinces in the North Central region in the period 2010-2015

(Source: GSO)

Figure 1 shows that rice production in the 6 provinces in the Central Coast region, Vietnam in 2010, 2013 and 2015 decreased more than in the remaining years. The results also show that the rice output of Thanh Hoa and Nghe An provinces is much higher than the other four remain provinces, however this change is mainly based on the large area of cultivated land in the two provinces (Thanh Hoa and Nghe An provinces).

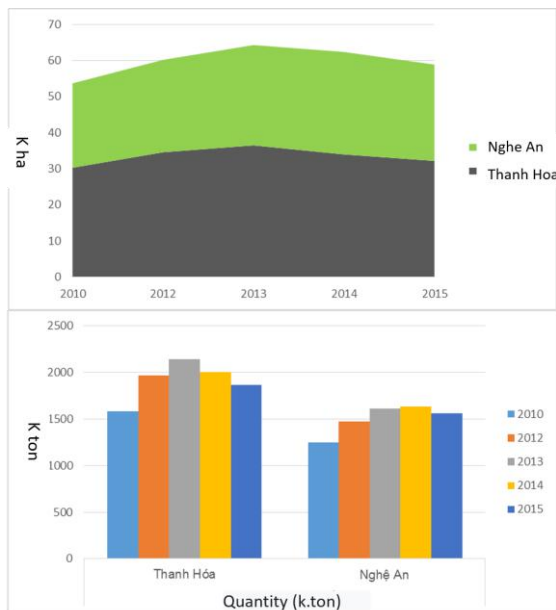


Fig.2: Sugarcane production in Thanh Hoa and Nghe An in the period 2010-2015

(Source: compiled from statistical yearbook)

Vietnam Sugar Institute, 2016 has shown that during this period from 2010-2015, although the Nghe An's sugarcane area was heavily affected by grass buds, resulting in thousands of hectares of sugarcane suffered from serious diseases to be destroyed, but due to the development of new planting areas, the area basically remained at a stable level. In Thanh Hoa, according to the report on sugar cane production in the 2010-2015 period of the Department of Agriculture and Rural Development of Thanh Hoa Province, the province has currently the largest sugarcane production area and output in the country (the area is equal to 11.3% and the output is 10.4% of the whole country) [4-5]. The sugar cane manufacturing industry in the period 2010 - 2015 has faced many difficulties and challenges due to some issue such as: (i) abnormal weather conditions changed completely; (ii) sugar prices decrease continuously; (iii) the sugarcane acreage, productivity and output are not stable and the sugarcane production efficiency of farmers and the sugar production efficiency of the factories have not been significantly improved. On the other hand, when Vietnam officially joins the ASEAN Free Trade Area (AFTA), the advantages and disadvantage of the sugar industry are increasingly evident, affecting the stability and development of the industry [5].

### 3.3. Orientation of priority technologies in agricultural production in the North Central region in the context of climate change.

#### 3.3.1 Biotechnology



The proposed priority technology orientation for the Central Coast region, Vietnam in the situation of climate change is biotechnology. Biotechnology plays an important role in the development of the agricultural sector. Under the accelerating impact of climate change, experiences from agricultural countries show that a priority direction for the biotechnology sector is necessary. Agricultural biotechnology has only been in use since 1990, but by 2003 only 7 million farmers used biotech products (statistics from 18 developed countries) [5], and that number is even higher that folow on increase exponentially every year.

### 3.3.2 Automation Technology

Automation, or automatic control, is the use of multiple control systems for equipment that acts as machines, processors, circuit boards; steering and stability of autonomous machines and other applications with minimal or reduced human intervention. The biggest benefit of automation is that it saves labor, however, it is also used to save energy and materials as well as improve quality with high precision. Automation has been done by various means including mechanical, hydraulic, pneumatic, electrical,

electronic and computer, often combined. Complex systems, such as modern factories, aircraft and ships, often use all sorts of techniques. Or in the agricultural field, automation is applied to cultivating and gathering machines; automatic irrigation, spraying and fertilizing systems; systems for water sensing, disease screening and calculating appropriate measures; Postharvest selective systems ...[5]

### 3.3.3. Information Technology

Information Technology (IT) is an engineering branch that uses computers and computer software to convert, store, protect, process, transmit, and collect. information. In Vietnam, the concept of IT is understood and defined in the Government resolution 49/CP signed on August 4, 1993: "IT is a collection of scientific methods, modern technical facilities and tools - mainly computer engineering and telecommunications - to organize the effective exploitation and use of rich and potential information resources in all fields of human and social activities "[5] .



*Fig.3: Application of GPS technology in agricultural production*

#### 3.3.4. Green home technology

Hi-tech greenhouses is a type of green house that applies modern and advanced CNCs and technologies on related technology fields to create an ecological environment as desired, a the most favorable ecological environment possible for plants to grow and develop; to implement highly intensive farming technologies; to minimize even the

possible elimination of adverse external factors outside production; to produce agricultural products and foodstuffs that are not favored by nature (off-season), or even cannot be produced in natural environment (such as production of mushrooms in the desert); to maximize product quality productivity and production efficiency; to minimize production costs and especially to save water.

#### IV. CONCLUSION

In conclusion, we have achieved the general goal for research to provide orientations priority technologies within the agricultural sector focus mainly on the crop sector in the North Central region in the context of climate change. The evaluation of the status of agricultural production and the study of priority technology orientations in agriculture in the northern central region in the context of climate change are meaningful and practical for managers in local. Research in the North Central Coast region is also an initial proposal, promising to be a premise for application of research in other localities across the country.

#### ACKNOWLEDGEMENTS

The results of the paper are part of the results of the national project "Research and application of advanced technology for agricultural production in the North Central mountainous regions adapting to climate change (climate change program. 01 / 16-20) "

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