

Policy of Green economic development in Vietnam in the context of industrial revolution 4.0

Dinh Thi Hong Tuyet

Faculty of Economics and Business Administration- Hai Phong University, Vietnam

Date of Submission: 09-01-2023

Date of Acceptance: 19-01-2023

ABSTRACT:

Economic development following the green economic model, circular economy is a trend that many countries are paying attention to, especially in the context of the economy being heavily impacted by climate change and climate change. drastic changes of the fourth industrial revolution (IR 4.0). This revolution has made landmark strides, having a strong impact on the process of economic development and industrialization and modernization of all countries. In the process of renovating the growth model towards green economic development and sustainable development, Vietnam is also affected by this trend. Green economy has become a turning point for the process of global economic recovery and development and also an inevitable trend for promoting sustainable development in many countries around the world. Facing this trend, Vietnam has initially implemented a green economic development strategy to promote the process of economic restructuring, towards the efficient use of natural resources, and reduction of greenhouse gas emissions, respond to climate change, ensure the goal of sustainable economic growth. Although certain results have been achieved, the current process of green economic development is revealing many difficulties and challenges that need to be thoroughly solved such as the unsynchronized legal system for green economic development, the development Vietnam economy is mainly based on natural resources and fossil fuels, human capacity and technology are not high. Therefore, the article is built on the basis of a review of legal and practical documents and documents on economic growth and green economic development in Vietnam, thereby proposing some solutions to improve development. Green economy in Vietnam in the context of industrial revolution 4.0.

Keywords: Green economy; Green economic

development; Growth model; Industrial Revolution 4.0 (IR 4.0); Sustainable Development; Vietnam.

I. INTRODUCTION

The economic development trend of all countries in the world today is green economy and low carbon economy. From the fact that countries are facing socio-economic crises in a row, climate change is becoming more and more complicated, natural resources are increasingly depleted, so economic growth is increasing rapidly. Green is considered a comprehensive program, creating a new approach to economic growth, towards restoring and conserving natural ecosystems, nurturing people's lives and mitigating the impacts of climate change climate. This also confirms the relationship between economy, social welfare and environmental protection. Therefore, many countries around the world are approaching this new trend towards sustainable development and Vietnam cannot be out of this trend. The experience of green economic development of countries shows that there are several approaches to promote green growth, such as a sector-by-sector approach of the economy or an interdisciplinary approach across sectors. , such as efficient use of resources, sustainable production and consumption.

Up to now, there are many approaches to green economic development and green growth. The author has summarized the content of green growth mainly including issues: Sustainable production and consumption; reduce greenhouse gas emissions and adapt to climate change; greening production and business activities through developing green technologies, developing high-tech industries, using less resources, applying cleaner production methods; building sustainable infrastructure; protect, exploit and effectively use natural resources; reform and application of economic tools; development and implementation of ecological indicators.

In Vietnam, the Green Growth program is concretized through the “National strategy on green growth for the period 2011 - 2020 and a vision to 2050” of the Prime Minister, the content of the National Strategy on green growth. Green growth includes: (1) Greening production, implementing a strategy of “Clean industrialization”, economical and efficient use of resources, encouraging the development of green industry, green agriculture with industry structure, technology and equipment ensuring environmental friendliness, investment and development of natural capital; actively prevent and treat pollution; (2) Greening lifestyles and promoting sustainable consumption, maintaining a lifestyle in harmony with nature in rural areas and creating sustainable consumption habits in the context of integration with the global world (TTg, 2012).

The new driving force of the green economy is protecting the environment, developing clean production technology and clean energy, and quickly achieving sustainable economic growth. The promotion of green growth or the transition to a green economy offers great potential for achieving sustainable development and poverty reduction at a high rate for all countries. Particularly for developing countries, green growth also creates momentum for a leap forward to economic development without following the economic development path of “pollution first, handling later - brown economy” and effective long-term results. According to a UNEP research report, with green investment measures and the use of capital of about 2% of global GDP (equivalent to 1.3 trillion USD), in the long-term, it will improve economic efficiency and increase total wealth globally on the basis of maintaining and restoring finite natural resources (UNDP, 2011) . On the basis of theory and practice, the article analyzes and assesses an overview of the implementation of green growth in Vietnam in the context of the industrial revolution 4.0 and the sustainable economic development model in Vietnam to 2050.

II. RESEARCH OVERVIEW

Theoretical overview of green economic development

In 1999, the World Bank proposed “Greening Industry: New Roles of Communities, Markets and Governments” introducing a new model for industrial pollution control as industrial greening. To date, most development activities have been required to be greened, including greening the economy. In 2015, the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) published a series of publications titled

“Greening of economic growth” series introducing how to green economic growth. , thereby also officially defining a new economic growth orientation and calling on Asia-Pacific countries to abandon the “grow first, clean up later” approach. Green economy is human activities associated with preserving natural resources and protecting the environment.

The United Nations Environment Program (UNEP) defines a “green economy” as one that improves human happiness and social equity and significantly reduces environmental degradation. Switching to a green economy will slow the rise of carbon and prevent climate change. It will benefit human health, ensure the survival of the planet and the survival of humanity. The global market will follow a green supply and demand value chain, the flow of trade and investment is strictly regulated according to the principles of sustainability. “Green growth” is a new trend that promotes sustainable economic development and consumption patterns to ensure that natural capital continues to provide ecological resources and services of life, for this generation as well as for future generations.

In the world, there are many different definitions of green economy, of which, the European Union says: “Green economy is an economy with smart, sustainable and fair growth”. The Green Economy Alliance group defines a green economy as “An economy that creates a better quality of life for all within the ecological limits of the Earth”. The International Chamber of Commerce, ICC is the largest, most representative business organization in the world that has looked at the green economy from a business perspective: “A green economy is an economy where economic growth and environmental responsibility are met. schools go hand in hand and complement each other, while supporting social development”. The report of the United Nations Economic and Social Affairs Commission (UNDESA, 2012) summarizes the definitions of many countries and points out that the common point that a green economy needs to be towards is the reduction of impacts. negative effects of economic activities on the environment and society. In Vietnam, the category of “Green economy” appeared in 2010 since the Conference of the United Nations Environment Program (UNEP) in Nairobi, Kenya to prepare for the RiO+20 Summit in June/ 2012 in Rio de Janeiro, Brazil on “Sustainable Development”. During the implementation of this program, Vietnam has received help and support from a number of countries and the international community. As a result, the transition to a green economy in Vietnam has had initial results, such as: Building and putting

into operation many small hydroelectric projects, wind power, using solar energy, increasing strengthen afforestation and regeneration, control to limit deforestation, etc. Along with that, Vietnam has proposed to “temporarily close natural forests” to reduce greenhouse gas emissions.

From the synthesis of views on economic development and green economy in the country and internationally, the author’s conception of green economic development in Vietnam: “Green economy is an economy that aims to improve living standards, people and social assets, while focusing on minimizing environmental hazards and resource scarcity. Green economy is a combination of three factors: Economy - Society - Environment. The green economy has a sustainable nature, which means that the activities in the economy create profits or beneficial values, aiming to develop the life of the human social community in which the most important factors are considered. cultural and social factors”. The concept of green economic development is different in each country, organizations have different visions of green growth in accordance with the conditions, mission and orientation of their own countries and organizations.

Theoretical overview of the industrial revolution 4.0

The characteristic of previous industrial revolutions (IR) was the application of different techniques to production. “The first IR used water and steam to mechanize production.

The second IR uses electricity for mass production. The third IR uses electronics and information technology to automate production. Currently, the fourth IR is based on the Third Revolution and is accompanied by the digital revolution that began in the middle of the last century. The characteristic of this revolution is pushing the network to develop technology that helps blur the boundaries between physical, digital and biological elements.”

Broadly defined, IR 4.0 is characterized by rapid technological improvement through increased use of mobile communications and internet connectivity (“Internet of Things”), big data, intelligence, and more. artificial intelligence, robotics, autonomous vehicles, 3D printing, nano and biotechnology, computing technology.

According to experts, IR 4.0 has shown a great step forward in improving productivity by transforming the operating method and the relationship between factors of the production process. At the same time, a new economic form was born, which is the "sharing economy" with a wide and revolutionary influence such as some online ride-hailing platforms or workspaces,

through the form of business and business and between business and customers.

In addition, the industrial revolution 4.0 has created many breakthroughs in new technologies in fields such as artificial intelligence production, robot manufacturing, internet development, 3D printing technology, nanotechnology, and technology. biotechnology, materials science, energy storage and informatics.

Accordingly, the newly born technologies will be the connection between the fields of physics - biology; mechanics - electronics - biology... forming new professions, especially those related to human-machine interaction (ILO, 2018).

In Germany, it is estimated that by 2025, industrial revolution 4.0 will create about 350,000 jobs, an increase of 5% compared to the workforce of 7 million people in 23 manufacturing industries currently participating in the study. The spread of robotics and computer technology will reduce about 610,000 assembly and manufacturing jobs, but will add 960,000 jobs. The fields of information technology, analysis, research and development require an additional 210,000 highly skilled personnel... all of which are new sources of employment opportunities (MOIT, 2021).

Not only that, IR 4.0 will also create new professions that appear for the first time such as electronic data forensic analysts and carbon emissions managers, smart hardware engineers, operations and maintenance personnel. industrial vision system maintainer, integrated circuit engineer, online sales consultant, online instructor, along with a rather special profession as a calorie nutritionist and self-care assessor. elderly based on an artificial intelligence system.

In addition, there are many other new professions that have also been recognized and have made certain contributions to the community and society.

According to the “Report on New Types of Service Industry and the Number of New Practitioners in 2020” of the Mission Institute (USA), 53.9% of people choose a new career because of income and 50.4% Choose a new career out of passion. In particular, the common perception of many people is that they want to take advantage of opportunities from a new career to quickly develop professional capabilities, improve income levels and meet like-minded partners (MOIT, 2021).

Research results

Green growth in developed economies in Asia and the world

US: The government spends about 150 billion USD in stimulus package 782 billion USD to invest in

green growth businesses, especially renewable energy (wind, solar and nuclear) and set a target that the Renewable energy sources will account for about 25% of electricity production by 2025. The country has established a clean energy development agency (CEDA) under the Ministry of Energy, which functions as a “Green Bank” to mobilize and disburse funds for clean energy programs. At the end of June 2009, the US House of Representatives passed a climate change bill with the goal of reducing greenhouse gas emissions by 17% by 2020 compared to 2005; Applying emission quotas and allowing lower emissions companies can sell off emissions to other companies. From 2012 to 2025, the US will spend 55% of its emissions quota sales to appeal to consumers, drive up fuel prices, 19% to support clean energy projects. (Worldbank, 2020).

EU: In 2008, EU countries passed an environmental protection law, focusing on 2020, raising the share of renewable energy to 20% and reducing greenhouse gas emissions by 20%, investing 0.5% of GDP of the EU for the achievement of these goals. In addition, the EU applies gas emission quotas in the industrial sector. Since 2013, the EU has auctioned 60% of its gas emission quotas in the energy sector (Worldbank, 2020). And from 2020 onwards and in 2020, all industrial companies will have to purchase emission quota permits (except for some industries such as metallurgy, cement, chemicals). In addition, the EU has issued EU Strategy 2020 with three priorities:

Smart growth: knowledge-based economy and disruptive innovation in technology.

Sustainable growth: promoting a more efficient, greener and more competitive use of resources in the economy aimed at ensuring economic growth while reducing resources, energy, CO₂.

Inclusive growth: towards an economy with a high employment rate, in line with economic, social and regional development.

Japan: This country is aiming for green growth through the issuance and implementation of the New Growth Strategy. Japan's No. 1 growth strategy was approved in December 2009 and revised in June 2010, introducing a growth model based on domestic demand, innovation, and stronger economic integration. , with a greater focus on Asia, as well as less reliance on public investment and infrastructure. The strategy also recalls the challenges of climate change and an aging population in Japan, and identifies the environment, health, leisure time and increasing travel as the main sources of demand and trends. key drivers of future growth and job creation. In particular, promoting “Green innovation” in the field of environment and energy towards a

low-carbon economy is one of the policy foundations of the development strategy. The green tax system is also one of the tools used to promote green initiatives. Specific content of this strategy includes: green investment, research and development, infrastructure, low carbon, tax tools, labor market coordination with education policy and cooperation international. To observe the implementation of the strategy, Japan established the “Council to promote the new growth strategy” in September 2010, headed by the Prime Minister.

China: China approaches green growth through more investment in technological innovation and renewable energy development in order to innovate its growth model towards efficiency and sustainability in three main directions: (1) Modernize key industries. In the economic stimulus package of 586 billion USD, China focuses on investing in technological innovation, economic restructuring and renewable energy, step by step towards green development, transitioning to a thrifty growth model. energy. China has restructured ten key industries (steel, automobile, cement, etc.) to create jobs, improve competitiveness, and initially modernize these industries to access green technology (Worldbank, 2020). With automobiles, China switched to producing new energy-saving and energy-efficient cars. With the steel industry, control output at 300 million tons/year. (2) Transferring low-tech and medium labor-intensive industries to the western provinces and abroad. (3) restructuring the extractive industries, increasing the import of resources and energy, limiting mining and domestic production. In addition, to protect the environment China is planning to use land in urban and rural areas; Amend the Law on Environment in the direction of improving environmental standards; Forced recycling in some industries.

Korea: this country had very high carbon emissions between 1990 and 2005. To reduce the intensity of greenhouse gas emissions, in 2008 the Government issued the Low Carbon, Green Growth Strategy (2009-2050) with a vision to become the 7th largest country with a green economy in the world by 2020 and the 5th in green energy by 2050. The strategy identifies 3 goals: climate change mitigation and energy independence; create new driving force to promote economic growth; improve the quality of life and raise the national status. On July 6, 2009, Korea approved the Green Growth Plan (2009-2013) to implement the national strategy on green growth. Under this plan, USD 83.6 billion (equivalent to 2% of GDP) is invested in climate change, energy, sustainable transport and green technology. Strong commitment and active implementation in the transition from the “Brown economy” growth model

to the “Green economy” growth model of Korea is likely to bring positive results affecting the country, economies of other Asian countries, as well as other regions of the world. To achieve the goal, Korea focuses on building and innovating a number of contents:

Firstly, building institutions on green growth. Korea has promulgated the Basic Law on Green Growth, Low Carbon (effective from April 14, 2010); Establishing a National Committee on Green Growth, headed by the Prime Minister and members of which are Ministers; Established the Global Green Growth Institute (GGGI), an intergovernmental organization to develop low-carbon green growth strategies and support countries to implement these strategies.

Second, innovate environmentally friendly shopping methods (green shopping). In addition to the Government's incentives for environmentally friendly products, it helps businesses reduce production costs in the early stages. The Korean government also encourages the transition to environmentally friendly public procurement, making the procurement market more friendly. Consumers using similar products will know and switch to using environmentally friendly products.

Third, make a determination to become a national leader in implementing green growth policies and setting the global green growth agenda. Korea's two-tier strategy focuses on short-term responses to the current global economic crisis and long-term transition towards green growth through research and development of green technologies. export.

Fourth, Korea's green growth has been used as a countermeasure against the global economic downturn. Therefore, the stimulus plan focuses on green growth, towards economic restructuring and development, changing consumption and production patterns, and creating more green jobs. and “New green” to serve the green industry in the future. The stimulus package of USD 30.7 billion was approved in 2009, with 80% of total investment in environmentally friendly projects, including infrastructure upgrades, energy resource improvement, construction energy-efficient buildings, eco-friendly cars, railways, water and waste management (Worldbank, 2020).

Towards the leading green country in the world, developing export green technology, Korea has focused on integrating with countries in the region and the world to turn green programs into green power for economic development. . South Korea has chosen to combine Japan's high technology with China's huge market and abundant foreign currency reserves.

Southeast Asian countries are also in the process of developing a national roadmap for green growth. The above-mentioned international trends show that green growth is a key trend in the economic development policies of countries around the world in order to overcome the economic crisis and to reduce dependence on natural resources. Natural resources are increasingly depleted, contributing to mitigating climate change and towards sustainable development.

Approaching green economic development in Vietnam

For Vietnam, green growth is an important content of sustainable development and a development process with a close, reasonable and harmonious combination between socio-economic development and environmental protection. . Vietnam is one of the countries that are heavily affected by climate change, natural disasters, epidemics and many external factors. Vietnam is on the path of innovation, transforming the growth model in terms of depth, quality and efficiency.

As early as 2012, green growth has been concretized through the National Strategy on Green Growth in the 2011-2020 period, with a vision to 2050. This is considered the key to ensuring the set targets. in the Socio-Economic Development Strategy for the period 2011 - 2020. The problem of reducing greenhouse gas emissions, greening production, greening lifestyles and sustainable consumption is set out through the implementation of 17 groups of solutions. In which, focus on communication, raising awareness, mobilizing resources to implement the strategy; Training and developing human resources; research and implement science and technology; improve energy efficiency and efficiency; reduce energy consumption in production activities, practice sustainable consumption...

The Prime Minister has approved the National Green Growth Action Plan for the period 2014 - 2020, including 12 groups of activities with 66 specific action tasks under 04 main themes: Building national institutions and planning local green growth plan, including 08 activities in 02 groups; reduce the intensity of greenhouse gas emissions and promote the use of clean and renewable energy with 20 activities in 04 groups; greening production with 25 activities in 04 groups; implement greening lifestyle and sustainable consumption with 13 activities in 02 groups (TTg, 2014).

Along with that, the National Assembly has promulgated new, supplemented and amended a number of laws related to green growth such as:

Law on economical and efficient use of energy; Law on Natural Disaster Prevention and Control; Environmental Protection law; Law on Hydrometeorology. A number of new legal documents have been developed to promote the implementation of activities related to green growth.

In 2021, the Prime Minister approved the “National strategy on green growth for the period of 2021 - 2030, with a vision to 2050” which sets out goals for transforming growth models towards greening sectors. economy, applying a circular economy model through economical and efficient exploitation and use of natural resources and energy based on science and technology, digital technology application and digital transformation, develop sustainable infrastructure to improve growth quality, promote competitive advantages and minimize negative impacts on the environment (TTg, 2021).

The emergence of the Covid-19 pandemic is a major human event, creating a crisis on a large scale, changing the world in many fields. Controlling the spread of the disease, limiting the impact and recovering from the economic downturn are the top priorities of countries. It is also an opportunity for countries to reassess their economic development models, raise public awareness of serious threats from environmental and health issues, and take advantage of changes. from the pandemic. In that context, Vietnam continues to affirm its international commitment to the implementation of the 2030 Sustainable Development Goals and the Paris Agreement on climate change.

Vietnam is facing huge environmental challenges such as the deterioration of environmental quality: forests, biodiversity are destroyed; mineral resources are exploited and used inefficiently; Water pollution, air pollution and waste increase.

With the awareness that green growth is not only a driving force for global recovery but also a model and tool for sustainable development, Vietnam has clearly determined that there is no better path than promoting green growth. Vietnam is also determined to pursue an environmentally friendly growth model.

Green growth that balances between economic and environmental goals is a sustainable development approach that harmonizes three economic, environmental and social factors:

First, green growth is development that must be linked to a variable structural economy, in which the industry must be linked to the chain. Currently, the positioning of Vietnam's industrial chain is not clear, it must be linked with the global industrial chain to develop supporting industries. Vietnamese businesses need to think and act in a

positive way, so that they can become partners of large corporations in the world. Similarly, restructuring agricultural production towards low emissions, combining production and protection of natural resources. The goal is to create high-tech, high-value-added products instead of just focusing on high volume but low productivity.

Second, reduce greenhouse gas emissions to respond to climate change, protect, exploit and effectively use natural resources. In particular, it is necessary to protect and exploit land, forest, water resources, and use energy efficiently and economically... to reduce greenhouse gas emissions. Implement technological and policy solutions, especially in energy production and consumption through the clean development mechanism of the Kyoto Protocol, with technological and financial assistance from countries and International organizations .

Third, stimulate demand, promote sustainable production and consumption. To develop sustainable production and consumption, it is necessary to join hands of managers, researchers, communities and especially businesses. Specifically, develop policies related to sustainable production and consumption; Raise awareness of society and community towards sustainable production and consumption; create a mechanism for the development of environmentally friendly technologies, services and products; Provide product information to consumers; Green procurement development, with special attention to public procurement, is a very important issue that many countries have effectively implemented.

Fourth, to build a sustainable infrastructure, managers and policy makers need to develop a “green plan”, without repeating the spread of technical infrastructure, which is not economically viable.

Fifth , reform and apply green tools such as green tax, green budget. Apply tax incentives to enterprises engaged in environmental protection activities. Resource tax is considered the most important, widely applied and effective instrument. For resource tax, the Government should apply higher raw material tax rate, lower tax rate for processed resources.

Sixth, develop green industries to create new impetus for economic development and creative work for society, focusing on economic sectors that can improve the comparative advantages of Vietnam as developing organic agriculture; ecological economic models; environmental goods and services, waste recycling, ecotourism; The reproduction of Nature forest, planting of mangroves, breaking waves, sand

blocking.

National citizens undergo demonstrations where there is a number of approaches to promoting green growth: a regional approach, or an interdisciplinary approach through areas such as: Efficiency resources, sustainable production and consumption.

Green growth not only has many opportunities but also many challenges. This is a long-term process, all levels, sectors and businesses need to be fully aware, thereby shifting production and consumption towards efficiency to achieve the goals in the green growth strategy.

Status of green economic growth in the context of industrial revolution 4.0

These achievements

About Vietnam's economic development

The orientation and goal of greening the economy are detailed in the Prime Minister's Decision No. 1393/QĐ-TTg dated September 25, 2012 approving the National Strategy on Green Growth 2011-2020. and vision to 2050. This is the first national strategy, comprehensive in the field of green economic development in Vietnam.

On that basis, Vietnam has also achieved the following achievements:

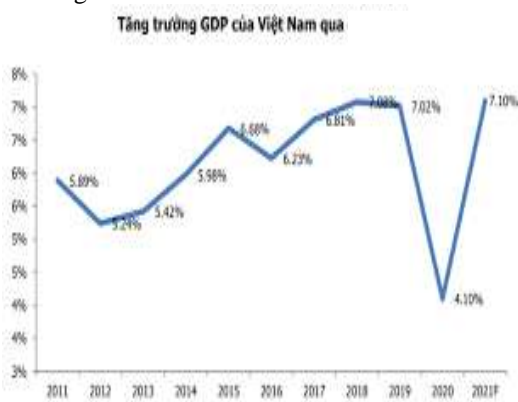


Figure 1: Vietnam's economic growth rate in the period 2011-2021

(Source: General MBS)

According to the macroeconomic report for the period 2011-2021 of MB Securities Joint Stock Company (MBS), GDP growth in the first 6 months of the year decreased sharply over the same period due to the impact of the Covid-19 epidemic. However, this result is still quite positive when compared to other countries in the region as Vietnam leads the world in disease control and economic recovery. Despite many difficulties due to objective factors, Vietnam's economy also showed a high ability to adapt and recover when it still achieved positive growth in 3 years from 2019 to 2021, in the context of the pandemic. Covid-19 hit

hard and many economies around the world grew negative.

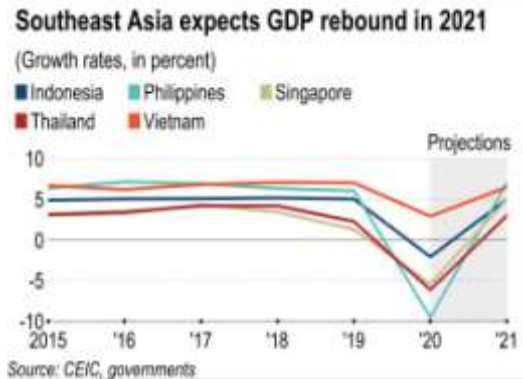


Figure 2. Economic growth of Vietnam compared to other countries in the ASEAN region

(Source: CEIC, Governments Vietnam)

Vietnam continues to be expected to lead in economic growth in Southeast Asia. In 2020, Vietnam recorded 2.9% growth thanks to its success in preventing the spread of the disease as well as strong exports of electronics and other consumer products. Vietnam also achieved a GDP growth target in 2021 of 6.5% on that basis, setting a GDP of 6.5%.

On green economic development in the context of Vietnam's 4.0 industrial revolution

Currently, the formulation and implementation of a green economic development strategy in Vietnam presents many opportunities and challenges in the context of the industrial revolution 4.0. In terms of opportunities, Vietnam will have conditions to absorb and apply the technological advances and achievements of mankind, first of all, information technology, digital technology, control technology and automation to improve the quality of life. labor productivity, efficiency in all stages, especially management in the whole economy, government systems at all levels, in all sectors, in businesses, individuals and households.

(1) Capable of developing environmentally friendly technologies and products, using and developing clean energy sources

In the green economy, technological innovation towards environmental friendliness and low emissions is an inevitable requirement, this is the right direction and suitable with the new development trend of enterprises today, not only bring benefits to businesses, but also the efficiency of the economy in the long run to transition to a green economy. With the arrival of the industrial revolution 4.0, research and innovation in production technology forces businesses to pay attention and develop, it will bring extremely

positive effects, not only increasing capacity, reducing costs. production but also effectively contribute to environmental protection. In the context of globalization and trade liberalization, the removal of protectionist barriers between countries and the industrial revolution 4.0 with new generation technologies have and will have a strong impact on countries. developing like Vietnam, opening up opportunities and challenges for businesses and agencies that manage and make policy on technology transfer.

The industrial revolution 4.0 that we have just entered will create a world in which the virtual and physical systems of the global production chain can flexibly cooperate with each other. Industry 4.0 is not just about connected and intelligent machines and systems, it is much broader in scope. From a production perspective, in the long term, the industrial revolution 4.0 will first have a strong impact on production activities, creating a big change in production methods, the convergence between physical applications and applications. The use of digital technology to create the appearance of the Internet of Things (IoT) will rapidly and deeply change the entire value chain from research and development to production, logistics to customer service, significantly reducing account for transaction and transportation costs, leading to production and productivity miracles that consume less resources.

The industrial revolution 4.0 is redrawing the economic map of the world, with the decline in power of countries that rely heavily on resource extraction and the increase in power of countries that rely heavily on technology. technology and innovation. Thanks to technological breakthroughs in the fields of energy (both production and use), materials, Internet of things, robotics, the application of 3D printing technology (also known as additive manufacturing technology). gradually, has the advantage of saving materials and storage costs much more than traditional cutting and manufacturing technology, etc., which has helped to improve production efficiency, reduce pollution and environmental risks. reducing greenhouse gas emissions that cause climate change, contributing to sustainable development.

The industrial revolution 4.0 opens an era with non-linear development, the greater the demand for human energy, develops and replaces fossil energy sources with clean energy (renewable energy). create) is an inevitable trend. Clean energy sources include wind energy, solar energy, geothermal energy, biomass energy... Most countries in the world are interested in renewable energy sources, led by European and American

countries, Denmark and Finland are at the top. This is a giant leap of progress in the use and development of energy resources. It is and promises to create enormous benefits and have a strong impact on the world economy as well as on the Vietnamese economy.

For renewable energy, especially solar energy and bioenergy, Vietnam has advantages for these two types of energy because its cost is not too high. The energy restructuring will help Vietnam reduce environmental pressure and external dependence on hydropower, thermal power, oil and gas and nuclear power. Vietnam with a coastline of 3,260 km, has a total solar radiation of about 5kW/h/m²/day in the central and southern provinces and about 4kW/h/m²/day in the northern provinces with a relatively large total radiation value of 100 - 175 kcal/cm²/year, wind energy is estimated at 500-1000 kWh/m²/year; Our country has great potential for these two renewable energy sources.

It can be said that human progress with the creation of environmentally friendly, biodegradable products, new sources of raw materials and the application of science and technology creates highly efficient production technologies, low emission has actively contributed to the development of green economy, this is an inevitable innovation trend in environmental protection in the era of the industrial revolution 4.0.

(2) Application of information and digital technology in natural resource and environmental monitoring

Industry 4.0 creates a trend of combining virtual and physical systems, Internet of Things (IoT) and Internet of Things (IoS) systems, which is the development of the internet of things that connects things to the Internet. a non-linear logic development system. This development plays an important role in resource management, environmental protection and climate change. These technologies have been applied more and more around the world. As fast-growing environmental monitoring technologies are supported by the Internet of Things, which collect and process information continuously in real time as well as provide early warning of natural disasters; automatic weather monitoring station system for forecasting and warning of the risk of forest fire. This is a product that integrates new technologies of the fields of electricity, electronics and information technology into automation in forest fire prevention and fighting, bringing prospects in disaster management, environmental protection and firefighting. organization of precision forestry production in Vietnam.

The wave of high-speed technological

innovation of the industrial revolution 4.0 along with global trade integration and liberalization will create competitive pressure, forcing businesses to review their business models; improve the method of providing products and services; constantly innovate technology. The digital era with new technologies and new operating platforms will have a strong impact on state management of technology, appraisal and technology transfer of investment projects in the direction of ensuring the business environment. Favorable, open, attracting foreign investment to increase the country's development resources, and at the same time must control the current state of technology, especially technology in investment projects to ensure the preservation of the environment. schools and sustainable development.

(3) Green economy development through technology application

Thanks to the industrial revolution 4.0, the world economy is entering a period of growth that is mainly based on the unlimited driving force of technology and innovation, instead of growth based mainly on input factors. There is always a limit on entry. It is clear that the industrial revolution 4.0 will open a new era of choosing production and business options, optimizing the use of resources; promote labor productivity and efficiency; creating a breakthrough in the speed of development as well as fundamentally changing the production system and social management activities in both breadth and depth. For Vietnam, the industrial revolution 4.0 is also bringing opportunities for the digital economy, smart manufacturing and services, smart agriculture, smart tourism, and financial and banking services. , intelligent logistics ... help increase labor productivity, save management costs, production costs, bring great benefits to the State, businesses and consumers.

(4) Limited investment resources from both the public and private sectors

Greening the economy requires financial resources and human resources as well as effective coordination of proposed activities. The financial challenge for green growth in Vietnam today is limited budget to implement the strategy, businesses face difficulties in capital in the context of economic difficulties and no financial institutions. However, investment resources from the budget as well as the non-state sector for 4.0 technology in the direction of green technology are still limited. green, sustainable development: opportunities and challenges for Vietnam and the business community" organized by the Ho Chi Minh National Academy of Politics and the Economic and Forecast Magazine on November 8, 2017) and Government commitment through budget support is

needed.

Issues related to enterprises in the implementation of "greening production". Enterprises are not only the subject of enforcement, but also the subject of implementation, or above have policies, and below have countermeasures. However, the role of enterprises in participating in the development of a set of indicators on greening production has not been focused. The current difficulty of Vietnamese enterprises in implementing green growth is the source of investment capital for technologies and production lines. Because of the fact, investment in green technology and production process is not cheap, while Vietnamese enterprises account for a large proportion of small and medium enterprises, with limited resources. Many businesses are still passive with new trends, not ready to change production and business models.

(5) Greening lifestyles and sustainable consumption are affected by low labor skills that have not kept pace with the industrial revolution 4.0

Besides the conservation of ecosystems and the environment, inequality will be the biggest social problem that countries face in the process of exploiting the advantages of the industrial revolution 4.0 for growth. economy. The modern industrial revolution 4.0 may cause inequality and the gap between rich and poor to increase as machines and artificial intelligence replace human power and put great pressure on the labor market.

Under the impact of the industrial revolution 4.0, production gradually shifted from countries with a lot of unskilled labor and natural resources to countries with many research centers and highly skilled and specialized workers.

The Industrial Revolution 4.0 poses many challenges when, especially, it will drastically change the structure of human resources and the labor market. Automated machinery systems will gradually replace manual labor in the economy of each country, of course, the increasing proportion of high-quality labor causes low-skilled or untrained workers. will be eliminated. At that time, the profit of the simple skill was replaced and plummeted. The demand for low-skilled low-cost labor will give way to the demand for highly qualified human resources, and without a total solution to improve the skills of workers, developing countries like Vietnam will face challenges. faced with labor surplus and unemployment.

In the future, many workers in Vietnam's industries may be unemployed, such as agriculture, textiles, accountants, equipment assembly and repair workers. This leads to income inequality that has been on the rise in recent years, and the

industrial revolution 4.0 will further amplify this trend due to high-skill gains and digitalisation. automation increased dramatically.

When the low-income group is the majority and has not yet been able to access, direct benefits from this growth process, especially people in remote, isolated and ethnic minority areas. affect the criteria of greening the lifestyle and sustainable consumption of Vietnamese people.

(6) Challenges of managing FDI inflows in the green growth target

Emerging industrial countries and many developing countries compete fiercely, seeking to attract and cooperate for investment, technology transfer, and rapid application of technological achievements from the industrial revolution. 4.0 through FDI inflows to gain development advantages. There is a lot of pressure for Vietnam in terms of alertness in integration, international cooperation, development of the market economy, especially in attracting FDI investment, in the science and technology market, in improving innovation in the business investment environment. businesses, accumulate investment to attract transfer and quick application of scientific and technological achievements of the industrial revolution 4.0 to the development of the economy.

Some difficulties, challenges

However, looking back on the past journey, the general assessment of the Government and international research organizations shows that the economic development is not sustainable, the quality of growth, productivity, efficiency and competitiveness are not high. The economic balance is still low, the macroeconomic balances are not stable because the development still relies heavily on the exploitation of natural resources, investment capital, labor-intensive, resource use, untapped energy. efficiency, increased environmental pollution, high intensity of greenhouse gas emissions...

Besides, the economic transformation towards green growth in Vietnam also faces some difficulties and challenges:

Although green growth is interested in many localities and applied by many businesses, its importance has not been really appreciated compared to promoting economic growth. Therefore, most people and businesses are not fully aware of the urgency of green growth. This is considered a weakness of Vietnamese enterprises in the context of globalization. In addition, the financial need to implement green growth activities in the context of limited state budget and the declining support from international organizations is also a big challenge.

The legal system is in the process of continuing to be perfected, so it is not synchronized, not really suitable with the trend of globalization and towards green growth. The organization of strategic management of sectoral, regional and local development nationwide is still fragmented and localized. Due to the way of thinking with a short-term vision, in the immediate future, the phenomenon of racing to build industrial parks, factories, ports, golf courses, hydroelectricity ... while not taking into account socio-economic efficiency, Failure to do a thorough environmental impact assessment has become common in localities.

Vietnam's technological development capacity is still very low, production technology is old, labor productivity is low, competitiveness is not high; renewable energy production technology has not yet developed; science - technology level, efficiency in using resources is still low.

Natural resources are seriously degraded due to the heavy growth method in breadth, the use of fossil energy and input materials, while the level of using new technologies to reduce material consumption is still low. resource management is limited...

Policy implications of green economic development in Vietnam in the context of the industrial revolution 4.0

Firstly, reduce the intensity of greenhouse gas emissions and promote the use of clean energy, renewable energy.

Secondly, greening production, implementing the strategy of "clean industrialization", reviewing and adjusting the existing sector plans, economically and efficiently using natural resources, encouraging the development of green industry, green agriculture with industry structure, technology and equipment suitable to the environment, development of natural capital, anti-pollution.

Third, greening the lifestyle, promoting sustainable consumption. However, in order to transition to a green growth economy, in line with world trends and actual conditions in Vietnam, the following policy suggestions should be kept in mind:

The political system should involve model transformation, institutional reform, and building a sustainable legal and institutional framework for green growth. It also emphasizes the personal responsibility of the manager.

Propagating and disseminating knowledge about 'green economy', 'green growth' in industries, levels, businesses and all classes of people.

Referring to green, the model focuses on restructuring industries. In line with the green economy, priority is given to high-tech, environmentally friendly industries. In addition, the development model should focus on community welfare, human welfare and ecological health. Develop skills training programs to support workforce participation in the green economy.

Fourth, international cooperation, mobilizing international support resources, especially 2% of global GDP for 'green economy' development, international capital for climate change mitigation and adaptation. At the same time, it is necessary to make the most of other financial mechanisms such as CDM (Clean Development Mechanism) and mobilize all resources from the people as well as the private sector.

Fifth, have a strategy to build key areas of the green economy as well as prioritize the development of spearhead green industries to create new driving forces for economic development and create new jobs. Meeting. Focusing on industries where Vietnam has comparative advantages such as agriculture, forestry, fisheries, food processing, tourism, water resources, building ecological economic models. Therefore, Vietnam needs to redefine its investment resource allocation strategy instead of spreading and wasting investment.

Sixth, it is necessary to have an investment policy for the development of green technology, as well as a mechanism to encourage enterprises to access modern technology in the world to increase the 'green' speed in the production process. production, leading to sustainable development. Facilitate and apply policies to support green businesses with low carbon infrastructure.

From a low starting point, over the years, Vietnam has implemented a green growth model based on cheap capital, resources and labor. Up to now, this growth model has not brought much effect to improving economic competitiveness as well as improving people's living standards. Therefore, transforming the approach to green growth is an inevitable requirement for the Vietnamese economy .

It can be seen that green growth and sustainable development is a development strategy that ensures high economic growth, together with efficient and economical use of natural resources, and the introduction of green technology into development. This is also the goal of Vietnam's economic development in the current period.

III. CONCLUSION

Economic development poses great challenges for countries to improve their quality of life, meet social needs and ensure a sustainable

environment. A green economy with low-smoke green industrial parks, using new environmentally friendly energy sources, green belts, large-scale eco-tourism areas to re-establish a balanced ecosystem is a common development trend of all countries in the world. In Vietnam, the trend of green economic development is only at the starting point. With the advantage of the following country, Vietnam can fully develop a comprehensive green economy, towards sustainable development, achieving the goal of harmonizing economic growth, ensuring social security, environmental protection. In particular, the Government of Vietnam needs to promote the implementation of the public-private partnership model, proactively access private capital sources as well as deploy market-based financial instruments, such as trading and exchange markets. low carbon to ensure sustainability and stable financial resources for Vietnam's green economic development in the context of industrial revolution 4.0.

REFERENCES

- [1]. Nguyen Thi Lan Anh (2021), Green economic development in Vietnam - current situation and solutions, Journal of Industry and Trade, No. 12, 2021.
- [2]. Pham Duc Anh (2020), Green economy development in Vietnam, Industry and Trade Journal, No. 8, 2021.
- [3]. Central Economic Commission of Vietnam (2014): Some policy implications for the implementation of green growth in Vietnam, Vietnam's Green Growth Report to 2030 .
- [4]. Ministry of Industry and Trade of Vietnam - MOIT (2021), Industrial Revolution 4.0 and the Covid-19 epidemic have created a new trend in employment, Report on the impact of the Covid-19 epidemic on countries around the world and Vietnam.
- [5]. Ministry of Planning and Investment and World Bank - MPI and World bank (2016), Overview Report of Vietnam 2035 towards Prosperity, Innovation, Equity and Democracy.
- [6]. Nguyen The Chinh (2011), Transforming economic development mode towards a green economy in Vietnam , Institute of Strategy and Policy on Natural Resources and Environment.
- [7]. Nguyen The Chinh , Dang Quoc Thang (2014), Green growth strategy : Trends of the times .
- [8]. Government of Vietnam (2008), National target program to respond to climate change in 2008 , Decision No.

- 158/2008/QD-TTg dated 2/12/2008.
- [9]. Government of Vietnam - Gov (2019), Report on evaluation of 5 years of implementation of the Government's National Strategy on Green Growth.
- [10]. Nguyen Dinh Dap (2022), Solutions for implementing green growth, Banking Journal, March 2022.
- [11]. Vu Thi Thai Ha (2015), Transition to green growth - An inevitable trend of Vietnam's economy, National Workshop "Implementation of green growth policy in the US and Vietnam".
- [12]. Do Phu Hai (2018): "Theory issues on sustainable development and green economy in Vietnam", Science Journal of Vietnam National University, Hanoi: Policy and Management Research , Vol. 34, No. 2 (2018) 29-39.
- [13]. Nguyen Thi Thu Hoai (2019), Green economic development trends in Vietnam .
- [14]. Tran Linh Huan (2022), Opportunities and challenges for green growth in the post-Covid-19 context in Vietnam and orientation for improvement, Banking Journal, May 2022.
- [15]. Nguyen Thi Thu Huong (2021), Green Growth Strategy in Vietnam: Promoting Attraction of Private Investment. Numbers and Facts Magazine, No. 11/2021.
- [16]. International Labor Organization (2018), Industrial Revolution 4.0 in Vietnam: Implications for the labor market, Policy Report of Vietnam, May 2018.
- [17]. Kees Baldé et al (2011), Green growth in the Netherlands. Netherlands: Statistics Netherlands.
- [18]. Vo Van Loi (2016), Green growth in other countries and Vietnam today, Journal of Political Theory, November 2016 issue.
- [19]. Ministry of Government Legislation Korea (2010), Framework Act for Low Carbon , Green Growth, 2010.
- [20]. Dang Le Thao Nguyen (2021), Green growth - The key to sustainable development. Propaganda Journal, No. 10/2021.
- [21]. Nguyen Hoang Oanh, Truong Thi Nam Thang (2009), Policy Research Report of the Ministry of Foreign Affairs of Vietnam, "The trend of green economic development during and after the global economic-financial crisis and policy recommendations for Vietnam" .
- [22]. Nguyen Thi Thanh Tam (2019), Green growth in Vietnam and its problems , Financial Review, July 2019 issue.
- [23]. Prime Minister of Vietnam - TTg (2012), Decision approving the national strategy on green growth , Decision No. 1393/QD-TTg, September 25, 2012.
- [24]. TTg (2012), Vietnam's socio-economic development strategy for the period 2011 - 2020 , Decision No. 432/QD-TTg dated 12/4/2012;
- [25]. TTg (2024), National action plan on green growth for the period 2014 - 2020 , Decision 403/QD-TTg of the Prime Minister dated 20/3/2014.
- [26]. TTg (2021), National strategy on green growth for the period of 2021 - 2030, with a vision to 2050 , Decision No. 1658/QD-TTg dated October 1, 2021.
- [27]. Bui Quang Tuan (2021), Green growth strategy in economic growth model in Vietnam, Social Science Publishing House.
- [28]. Institute of Strategy and Policy on Natural Resources and Environment (2011), General report for policy makers, Towards a green economy, a roadmap for sustainable development and poverty alleviation , Agriculture Publishing House .
- [29]. UNEP (2011), Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication , United Nations Environment Programme.
- [30]. Vietnam Central Institute for Economic Management - CIEM (2014), Some policy implications for green growth strategy implementation in Vietnam .
- [31]. World Bank (2016), World Economic Forum articles may be republished in accordance with the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International Public License, and in accordance with our Terms of Use . The views expressed in this article are those of the author alone and not the World Economic Forum.
- [32]. World Bank (2020): "Press release number: 2020/10/EFI".