Green transition - a roadmap for sustainable development

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Abstract: *This article provides a systematic analysis of the theoretical foundations, practical contexts, and policy orientations related to the green transition within Vietnam's sustainable development process. Based on theoretical frameworks developed by international organizations, the study identifies the green transition as a comprehensive restructuring of the economy, society, and governance systems to achieve low-carbon growth, efficient resource use, and social equity. Drawing on an assessment of current conditions, the article highlights Vietnam's initial achievements in green transition across the energy, agriculture, and urban development sectors, as well as key challenges in institutions, finance, science and technology, and public awareness. Accordingly, it proposes comprehensive and feasible policy solutions to accelerate the green transition in close alignment with the sustainable development goals and the national commitment to achieving net-zero emissions by 2050.*

Keywords: *Green transition; development; sustainable development; hunger eradication, poverty reduction.*

1. Introduction

In recent years, the world has been confronted with a range of serious challenges: intensified climate change, depleted natural resources, and global environmental pollution. At the same time, social inequality and poverty persist in various countries, particularly in some developing nations. In this context, green transition is not only a prevailing trend but also an inevitable requirement to ensure long-term, sustainable, and equitable development for all. Moving toward a green transition means advancing sustainable development and reducing poverty. It is also an essential pathway for effectively responding to climate change, maintaining economic growth, and ensuring social justice. Choosing this pathway will enable Vietnam and other developing countries to both protect the environment and create new opportunities for people to escape poverty, secure sustainable employment, and live in a healthier society.

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2. Theoretical foundations of green transition and sustainable development

2.1. Key concepts

The green transition has become

an increasingly prominent concept as global climate change and environmental degradation exert profound impacts on all areas of development. It is not merely an environmental issue but also a driving force reshaping the global economic structure toward greater sustainability and a greater sense of responsibility toward nature.

According to the Organisation for Economic Co-operation and Development (OECD) (2023), the green transition (Green Transformation - GX) is "a comprehensive restructuring of the economy, society, and governance models toward low-carbon growth, efficient resource use, and enhanced social welfare." This process includes the application of clean technologies, expansion of renewable energy, development of circular economy models, and integration of environmental standards into development strategies and corporate governance (World Bank, 2022). The United Nations Environment Programme (UNEP) similarly defines the green transition as "a fundamental shift in the way economic value is produced, consumed, and distributed, toward a green economy - where economic growth is linked with ecosystem conservation, social equity, and efficient use of natural resources" (2018).

In Vietnam, the Prime Minister's Decision No. 1658/QD-TTg dated October 1, 2021, which approves the National Strategy on Green Growth for the 2021 - 2030 period with a vision to 2050, serves as a key legal document defining the concept of "green transition" and outlining specific targets related to emissions reduction, renewable energy expansion, economic restructuring, green urban development, and other cross-sectoral policies. According to Article 8 of the Annex, "green transition" is defined as "a comprehensive transition toward a green, low-emission economy aimed at achieving prosperity and sustainability." The document also provides quantitative targets which include reducing greenhouse-gas emissions per unit of GDP by at least 15% by 2030 and 30% by 2050; increasing the share of renewable energy to 15 - 20% by 2030 and 25 - 30% by 2050; and achieving targets related to waste treatment, green public transportation, and green procurement.

The concept of "sustainable development" is understood as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs, as defined in Our Common Future (also known as the Brundtland Report), published by the World Commission on Environment and Development (WCED) in 1987. In both academic discourse and practical governance, sustainable development is grounded in three fundamental pillars: (1) Economic sustainability - ensuring stable growth, improved productivity, and enhanced competitiveness; (2) Social sustainability - ensuring equity, social progress, and improved quality of life; and (3) Environmental sustainability - ensuring the rational use of natural resources, minimizing pollution, and protecting biodiversity (United Nations, 2023). In Vietnam, this concept has been incorporated into domestic law and concretized in numerous policy documents, most notably the Government's Resolution No. 136/NQ-CP dated September 25, 2020, on sustainable development, which emphasizes the need for a close and harmonious integration of economic growth, social progress, and environmental protection.

2.2. The relationship between green transformation and sustainable development

Green transformation has an intrinsic, organic relationship with sustainable development, as both aim to achieve shared goals of economic prosperity, social equity, and environmental protection for present and future generations. In essence, green transformation serves as the driving force for realizing sustainable development, while sustainable development provides the strategic orientation for achieving a holistic, equitable, and practical green transition.

First, green transformation serves as the foundation for achieving sustainable development. In the context of global climate

change and environmental degradation, growth models based on natural resource exploitation and fossil fuels have shown apparent limitations. Green transformation - through the adoption of renewable energy, clean technologies, circular economy principles, and sustainable consumption models - helps reduce greenhouse gas emissions, preserve ecosystems, and balance the three pillars of sustainable development: economic, social, and environmental. This process not only mitigates climate risks but also creates new opportunities for emerging green economic sectors such as renewable energy, organic agriculture, recycling industries, and smart cities, thereby promoting economic restructuring toward low emissions, efficiency, and enhanced competitiveness.

Second, green transformation promotes social equity and sustainable poverty reduction. One of the core objectives of sustainable development is to "leave no one behind." In this regard, green transformation carries not only environmental significance but also profound social implications. It generates millions of green jobs across renewable energy, sustainable infrastructure development, ecological agriculture, and environmental management. These jobs both replace traditional employment in polluting industries and provide new opportunities for the poor and informal workers to shift toward more stable income sectors. At the same time, expanding access to clean energy and environmentally friendly technologies in remote and disadvantaged areas improves living standards, facilitates production, education and healthcare, and thereby helps reduce social inequalities.

Third, poverty reduction is a prerequisite for successful implementation of green transformation. When low-income groups experience improved earnings, they can access and participate in green economic activities, reducing dependence on natural resource extraction or environmentally harmful livelihoods. Conversely, if poverty rates remain high, policies such as energy price increases, carbon taxes, or industry transitions may face adverse social reactions. Therefore, green transformation policies must be closely linked to poverty reduction programs, vocational training, social welfare, and a "just transition" to maintain social consensus and political stability throughout the transition.

Fourth, green transformation serves as a catalyst for innovation and enhanced national competitiveness, thereby reinforcing long-term sustainability in the development process. Compliance with international environmental standards under such agreements as the EU-Vietnam Free Trade Agreement (EVFTA) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) requires businesses to adopt green technologies and low-emission certifications. This not only enhances domestic production capacity but also enables Vietnam to integrate more deeply into global value chains and access "green" markets with high added value.

Fifth, the relationship between green transformation and sustainable development is mutually reinforcing and dynamic. A green economy generates employment, improves living standards, and reduces poverty; in turn, a stable, equitable, and prosperous society provides favorable conditions for expanding green activities, increasing long-term investment in renewable energy, sustainable infrastructure, and environmental education. This interaction creates a "positive development cycle": green transformation → sustainable development → poverty reduction → enhanced capacity for green transformation → further sustainable development. This is the pathway Vietnam is pursuing under its national green growth strategy for 2021 - 2030, with a vision toward 2050.

3. Current situation and challenges of green transformation toward sustainable development

3.1. The current state of green transformation in Vietnam

Over the past decade, Vietnam has

demonstrated a strong commitment to pursuing a green development pathway. On September 25, 2012, the Prime Minister issued Decision No. 1393/QD-TTg approving the National green growth strategy for the period 2011 - 2020, with a vision to 2050, laying the foundation for environmentally friendly development policies. In 2021, this strategy was replaced by the Prime Minister's Decision No. 1658/QD-TTg dated October 1, 2021, approving the "National green growth strategy for the period 2021 - 2030, with a vision to 2050," which emphasizes reducing greenhouse gas emissions, greening economic sectors, and promoting sustainable consumption.

Vietnam has made several notable achievements in its green transformation efforts:

First, in the energy sector, Vietnam is among the fastest-growing renewable energy markets in the region. By the end of 2023, the total installed capacity of solar and wind power reached approximately 21,664 MW, accounting for about 27% of the country's total power system capacity (EVN, 2024). The rapid expansion of renewable energy has not only reduced emissions but also strengthened energy security amid volatile fossil fuel prices.

Second, in agriculture, a variety of organic farming models, circular agriculture practices, and climate-adaptation production systems have been implemented, particularly in the Mekong Delta. Integrated agriculture-aquaculture farming models such as "rice-shrimp," "rice-fish," and coastal organic agriculture have helped reduce methane emissions while increasing farmers' incomes. Several clean agricultural products have successfully entered high-standard markets, including the EU, Japan, and the United States.

Third, in urban development and transportation, major cities such as Hanoi and Ho Chi Minh City have piloted electric buses, expanded urban metro systems, and increased public green spaces. Initiatives on waste separation at source and circular economy practices have been launched, contributing to improved waste management and better urban living conditions.

Fourth, Vietnam made a strong commitment at COP26 in 2021 to achieve net-zero emissions by 2050, signaling a high level of political determination from a developing country to the international community (Phuong, 2021).

These achievements indicate that Vietnam has begun to lay a solid foundation for green transformation toward sustainable development and deeper integration with global trends.

3.2. Challenges in green transformation

Despite notable progress, Vietnam's green transformation still faces many challenges.

First, the energy structure remains heavily dependent on fossil fuels. According to the Vietnam Electricity Group (EVN), coal-fired power accounted for around 46% of national electricity generation in 2023, while renewable energy cornered less than 30% (EVN, 2024). Energy demand is projected to grow by 8-10% per year until 2030, placing significant pressure on supply and transmission infrastructure (Prime Minister, 2023).

Second, the transition costs are high, and access to green finance remains limited. According to estimates by the World Bank (2022), Vietnam will need approximately USD 368 billion by 2040 - equivalent to 6.8% of GDP annually - to pursue a development pathway that integrates resilience and a net-zero emissions trajectory. Of this amount, the decarbonization process required to meet international commitments accounts for about 30% of total financing needs (Quan, 2023). However, by the end of 2023, outstanding green credit amounted to only about VND 621 trillion (roughly USD 25 billion), representing 4.5% of total credit in the economy (Ha, 2024). This scale of green finance remains far below actual investment needs.

Third, pressures on employment and livelihoods are significant. High-emission industries such as coal mining, cement

production, and steel production employ hundreds of thousands of workers. Without adequate "just transition" policies, downsizing these industries could result in large-scale job losses, particularly in provinces dependent on heavy industries.

Fourth, the legal and policy framework remains fragmented. Although the 2020 Law on Environmental Protection introduced financial instruments and incentives for green development, Vietnam has yet to issue a National Green Taxonomy, making it challenging to classify green projects and regulate the issuance of green bonds due to the lack of a unified legal basis. Overlapping regulations across such sectors as energy, environment, and finance also hinder effective implementation.

Fifth, scientific and technological capacity remains limited. Vietnam still depends heavily on imported technologies for renewable energy, waste treatment, and green materials. Domestic research and innovation capacity are not yet strong enough to drive breakthrough solutions.

Sixth, public awareness of green transition remains uneven. A survey by the Private Sector Development Research Board (2024) found that 64% of enterprises are not prepared for green transition, only 5.5% have reduced emissions in core operations, and only 3.8% monitor and report emissions annually. From the consumer perspective, PwC's 2024 report "From strategy to action: strengthening consumer trust in Vietnam" shows growing climate awareness (94% of Vietnamese consumers report experiencing significant climate-related impacts on their daily lives). However, sustainable consumption remains constrained by cost factors, with only 54% willing to pay more than 10% above the average price for recycled or sustainable products.

Nonetheless, these challenges also present new opportunities. New-generation trade agreements (EVFTA, CPTPP, RCEP) incorporate environmental protection requirements, providing incentives for Vietnamese businesses to adopt greener technologies and integrate more deeply into green value chains. At the same time, international cooperation initiatives such as the Just Energy Transition Partnership (JETP) and the Green Climate Fund (GCF) offer important financial resources to support Vietnam's comprehensive green transformation.

4. Objectives, roadmap, and solutions for green transformation linked to sustainable development in Vietnam

4.1. Objectives and roadmap

Green growth in Vietnam contributes to restructuring the economy and innovating the growth model, aiming to achieve economic prosperity, environmental sustainability, and social equity. It moves toward a green, carbon-neutral economy while contributing to the goal of limiting global temperature rise. According to the National Green Growth Strategy for 2021 - 2030, with a vision toward 2050, approved by the Prime Minister in Decision No. 1658/QD-TTg, Vietnam aims to establish a green, low-carbon economy in which economic development is closely aligned with environmental protection and climate adaptation. The strategy also emphasizes comprehensive development of green sectors, such as renewable energy, high-tech industry, organic agriculture, and the circular economy, ensuring balance among the three pillars of sustainable development: economy, society, and environment.

According to the National Strategy, Vietnam's green transformation is planned in three main stages:

(1) Stage 2025 - 2030: The country focuses on building a legal and institutional foundation for green transformation; reforms energy market mechanisms; develops a domestic carbon market; completes the legal framework for circular economy and green growth; and vigorously implements pilot projects in green agriculture, smart cities, and sustainable transportation.

(2) Stage 2030 - 2040: During this period, Vietnam accelerates investment in green

infrastructure and technological innovation; the share of renewable energy in the electricity structure should exceed 50%; organic and circular agriculture should play a significant role in exports; major cities switch to electric transportation systems and develop green logistics networks.

(3) Stage 2040 - 2050: Vietnam completes a comprehensive green economy; achieves national net-zero emissions (Net Zero); and this position Vietnam as a regional hub for green technology production and renewable energy in Southeast Asia.

4.2. Key solutions

Based on the objectives and roadmap for green transformation linked to sustainable development, as well as the challenges Vietnam faces, the author proposes a number of solutions to enhance the effectiveness of this process.

First, raising awareness and communication. This aims to improve public awareness and behavior, including: (1) Enhancing community awareness: implement communication campaigns on green consumption, environmental protection, and sustainable development targeted at specific groups (women, farmers, youth, etc.); encourage consumers to choose environmentally friendly products through eco-labels and certifications. The success of green transformation depends not only on policies and technologies but also primarily on public awareness and behavior; (2) Developing green community models: support localities in establishing green villages and communes based on organic agriculture, solar energy use, waste collection, and recycling; strengthen the role of cooperatives and social organizations in promoting sustainable practices.

Second, improving policies and institutions for green transformation. This includes issuing a National Green Taxonomy as the basis for identifying and prioritizing green projects; unifying cross-sectoral regulations (environment, energy, construction, transportation, etc.) to avoid overlaps and ensure coherent implementation; stabilizing policies to prevent retroactive adjustments; and ensuring long-term and transparent commitments to investors to reduce risks for green transformation projects (e.g., retroactive FIT electricity pricing). Protecting the interests of vulnerable groups is also essential when implementing carbon taxes and career transition in high-emission sectors.

Third, financial and capital support. Measures include: (1) Enhancing access to green finance, establishing a National Fund for Green and Just Transformation, prioritizing concessional loans for SMEs, cooperatives, and farmers engaging in sustainable production, and, at the same time, encouraging green bond issuance and developing financial products such as green credit and climate insurance; (2) Mobilizing private and international capital: establishing effective public-private partnership (PPP) mechanisms in areas such as organic agriculture, renewable energy, and green transportation; and, leveraging international financial commitments such as JETP, GCF, IFC, and ADB.

Fourth, technology transfer and innovation. Promoting the transfer of green technologies and supporting businesses in adopting energy-efficient, renewable, waste-management, and sustainable agricultural technologies; encouraging green innovation centers in rural and mountainous areas to develop circular-economy models. Green skills training should be implemented through organizing vocational training programs for low-income workers in eco-agriculture, renewable energy, and green construction; and, integrating sustainability development skills into vocational and higher education curricula.

Fifth, linking green transformation with poverty reduction. Support should be given to low-income populations to participate in eco-agriculture, community-based tourism, and circular economy models to increase income; providing training and career transitions in green sectors (such as solar panel installation, recycling, sustainable logistics) to create

employment opportunities; investing in affordable green housing, clean water, and environmentally friendly transportation in remote areas to improve living conditions; and, restoring forests, developing climate-resilient infrastructure, early warning systems, and post-disaster livelihood recovery to reduce risks. Green transformation must ensure social equity, avoiding additional inequality, and explicitly integrate poverty reduction into national budgets and strategies. Public-private-community partnerships should be promoted to implement sustainable development models effectively at the local level.

5. Conclusion

Green transformation is not merely a development trend but an essential pathway to effectively respond to climate change, maintain economic growth, and ensure social equity. Choosing this path will help Vietnam and other developing countries both protect the environment and create new opportunities for citizens to escape poverty, secure sustainable employment, and live in healthier societies. To implement green transformation successfully and effectively, achieving the proposed objectives and solutions requires the joint efforts of the entire society - from the government, enterprises, and citizens to the international community - contributing to a sustainable, equitable, and green future.

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