AN QUOC CHAU, VU KIM HANH DUNG, MONG TUYEN NGUYEN THI

Issues of Equity and Efficiency in Twin Transition in Vietnam from an Economic-Legal Integrated Perspective

Abstract

In the context of globalization and the fourth industrial revolution, the twin transition (digital transformation and green transformation) is becoming a key strategic direction for nations, including Vietnam, to promote fast and sustainable growth of the economy. However, alongside the promoted economic benefits, the twin transition process also gives rise to certain issues of fairness, affecting the sustainability of the transition model. This raises doubts about the role of the twin transition, posing a need to refine the legal framework to harmonize the goals of economic growth and social equity. This paper reinforces the view on the inevitability of the twin transition, defining the twin transition as two parallel processes, with a synergistic and contradictory relationship between digital transformation and green transformation, that contribute to promoting sustainable development. Based on the analysis of the theoretical framework and the current situation of the aforementioned digital transformation process in Vietnam, the paper proposes solutions to ensure the harmonization of fairness and efficiency in this process. Specifically, the solution involves simultaneously combining digital transformation policies with social security and sustainable development policies, tailored to regions and industries, consistent with the current practical context in Vietnam.

AN QUOC CHAU – PhD in law, University of Economics and Finance, Vietnam National University, Ho Chi Minh City, ORCID – 0000-0002-2330-7959, e-mail: chauquocan6868@gmail.com

VU KIM HANH DUNG – PhD in law, University of Economics and Law, Vietnam National University, Ho Chi Minh City, ORCID – 0000-0002-1907-3598, e-mail: dungvkh@uel.edu.vn

MONG TUYEN NGUYEN THI – MA in finance, CyberLogitec Vietnam Corporation, e-mail: tuyen.an5@gmail.com

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1 Introduction

The twin transition not only enhances labor productivity and the competitiveness of enterprises, but also helps the economy to grow rapidly, sustainably, and increases responsibility towards future generations. Concurrently, this process is not only a challenge in terms of technology or economic structure but also raises profound issues related to fairness and efficiency in resource allocation, ensuring social security, and designing a legal framework that supports sustainable development. Excessive focus on economic efficiency without due attention to the element of fairness will erode sustainability and the quality of growth. Conversely, being overly rigid in protecting traditional social values creates barriers that reduce economic efficiency. This poses the need to harmonize economic goals with social equity in the twin transition, ensuring both rapid growth and fairness. The balance between the goals of economic efficiency and social equity always requires the law to harmonize environmental regulations and regulations protecting the legitimate rights and interests of related parties with the overall interests of the economy, placing them under the perspective of creating a development impetus suitable for the nation's development conditions.

In the current context of Vietnam, how the twin transition should be understood, whether this process has truly harmonized the goals of economic growth and fairness, and what economic-legal solutions the State needs to ensure no one is left behind, are questions that require research and clarification. This is also the research objective of this paper.

2 Identifying the Twin Transition

Today, "twin transition" is not only an inevitable trend associated with the strategic orientation for sustainable and efficient development, but also an opportunity to promote the growth of any socio-economy in the world, including Vietnam. Twin transition is not simply the parallel transformation of two processes – the green transformation and the digital transformation – but a transformation process with close linkages, mutual support, and contradictions between them.

Digital transformation provides the foundational tools to make the green transformation more effective. Through the application of digital technology, especially automation technology based on AI, IoT, and Big Data platforms, digital transformation helps optimize production, management, and business processes. This helps minimize the waste of resources, optimize energy use, achieve emission reduction, and enhance the effectiveness of environmental monitoring and management. In other words, digital transformation is an intrinsic need to minimize environmental impacts, enhance labor productivity, strengthen the competitiveness of enterprises and the resilience of the economy to environmental change challenges, promote the transformation of the sustainable growth model, and achieve the goal of greening the economy. Calculations by the World Economic Forum and Accenture (2022) have shown that digital technology can cut up to 20% of emissions by 2050 to achieve the International Energy Agency's (IEA) net-zero emissions target in the energy, materials, and transport sectors. Accelerating the adoption of technology in these sectors by 2030 could reduce emissions by 4%-10%.[1]

Conversely, the green transformation also influences the goal orientation and investment priorities of the digital transformation, promoting the development of green digital business models. The green transformation sets sustainability requirements for the digital transformation, driving digital technology innovation to meet green targets. This, in turn, limits the negative impacts of digital transformation. Because, digital technology itself also increases the use of electricity, water, and rare earths; increases carbon emissions, electronic waste, and other non-recyclable waste into

1 World Economic Forum, *World Economic Forum Annual Meeting History at a Turning Point: Government Policies and Business Strategies* (White Report, 2022). https://www.weforum.org/stories/2022/05/how-digital-solutions-can-reduce-global-emissions/.

the environment, diminishing some of the environmental benefits they could bring. Research results from the World Bank have shown that this accounts for about 1.4% to 4% of global emissions, equivalent to the emissions of the aviation industry.[2] The telecommunications industry alone is projected to generate 5.5% of the world's carbon emissions by 2025, while energy consumption, mainly from data storage and transmission by data centers along with billions of smartphones, tablets, and other connected devices, accounts for about 20% of the world's electricity consumption.[3]

In general, digital transformation and green transformation are two processes that are both mutually supportive and contradictory contributing to promoting sustainable development. Therefore, policy and law-making need to integrate both of these processes.

3 Theoretical Framework on Equity and Efficiency in the Twin Transition from an Economic and Legal Perspective

3.1. From the Perspective of Economics

Fundamentally, the twin transition is considered a profound economic restructuring process, innovating the growth model towards maximizing benefits quickly and sustainably. It is a complex process that brings both opportunities and challenges, costs and benefits, and needs to be managed in the right direction.

Through the lens of economics, the twin transition is considered the main driver for long-term economic growth. In this context, digital transformation helps optimize processes, increase labor productivity, and create new business models. Green transformation, through investment in clean technology and renewable energy, not only helps minimize environmental impact, but also opens up new markets and reduces dependence on

[2] World Bank, *Green Digital Transformation: How to Sustainably Close the Digital Divide and Harness Digital Tools for Climate Action. Climate Change and Development* (Washington: World Bank Group, 2023), xx.

[3] Alchemy Crew, *The Future of Commercial Sustainability: Closing the Digital Gap For Emerging Commercial Insurance Risk* (White paper: Alchemy Crew Ventures, 2022), 3. [accessed: 10.12.2025].

fossil fuels. This transition process is not without costs. It requires huge investments in technology infrastructure, training the workforce for the transition, and developing and implementing policies to mitigate risks from the transition process, including asset depreciation, job losses in labor-intensive and resource-intensive industries, high carbon emissions, and addressing the aftermath of the transition. However, there are also differences in how to solve the problem among different schools of economics.

The neoclassical school of economics emphasizes the role of the free market and economic efficiency. Accordingly, the market, through the price mechanism and competition, will automatically allocate resources optimally. The market will encourage businesses to spontaneously undergo digital transformation, optimize production processes to save energy and resources, thereby reducing costs, increasing productivity, and enhancing economic efficiency and competitiveness. Businesses will also spontaneously seek green technical solutions and supply green products according to market demand, thereby promoting green transformation. However, this solitary solution through price freedom does not completely solve the problems of negative externality. For example, without legal intervention, the market may not fully account for the social costs of the environmental impacts of digital technology, leading to a lack of environmental justice. In other words, the free market-oriented approach often only focuses on economic efficiency, while social equity and other non-financial factors are usually not the main objectives. They are only considered if inequity affects economic efficiency. Proponents of this view often accept the equity-efficiency tradeoff. For example, income redistribution policies through imposing high tax rates on the wealthy to subsidize the poor may reduce the motivation to work and invest for high-income earners, thereby reducing the overall efficiency of the economy.

Conversely, modern economics scholars argue that efficiency and equity can be complementary, coexisting without being separate, especially in the long run; both the market and the government have important roles. The market promotes innovation and resource allocation efficiently in economic and technical terms. However, due to significant externalities and public benefit, the market alone cannot complete the transition process. Therefore, the Government needs to intervene through policies and build legal frameworks to guide the market and correct market failure. Thus, the twin transition is essentially a long-term, systematic restructuring process that creates significant economic, social, and environmental externalities, requiring regulatory policies for the internalization of environmental

costs (regulations on carbon pricing, emissions trading system – ETS), encouraging innovation in green digital technology, and ensuring equity objectives through policy design that combines efficiency and equity. In other words, the twin transition is a process that integrates all three objectives of economic efficiency, social equity, and environmental sustainability, focusing on the unbiased distribution of costs and benefits to limit the "digital divide" and "environmental inequality". Accordingly, efficiency is often referenced in terms of Pareto improvement, meaning an increase in benefits for someone without making any group worse off, or at least having a reasonable compensation mechanism. Efficiency is not only measured by total utility, but also considers indicators of social welfare distribution or equity constraints. Therefore, accepting a reduction in total utility to prioritize improving the situation of vulnerable groups during the twin transition is still considered to achieve sustainable economic efficiency, a concept modern economics scholars call the theory of "just transition." In this case, "inclusive growth" becomes the main goal, not just overall growth, but also ensuring "economic justice." Economic justice is the fair and just distribution of potential costs and benefits. Economic justice is just one aspect of fairness, occurring mainly in 5 dimensions: employment and job transition; affordability of products and services; accessibility of products and services; access to finance and investment; and access to capabilities. In this context, economic justice is the ability of individuals and groups affected by the twin transition to be provided with resources and opportunities appropriate to their specific needs or circumstances to achieve equality. This involves equality of opportunity, equality of outcome, or ensuring social security for people in regions affected by the results of the twin transition. For instance, in the field of energy transition, policymakers must link low-carbon transition policies with distributive, procedural, and recognition justice, thereby transforming the goal of efficient emissions reduction into an equitable outcome in terms of costs and benefits among different groups and regions. Therefore, when evaluating the effectiveness of the twin transition process, the goal of equity must be placed alongside efficiency.

In the relationship between equity and efficiency, equity is a prerequisite for efficiency to occur and be sustainable, constraining policy design and evaluation criteria concurrently with efficiency. Equity creates legitimacy, political stability, and high social consensus to reduce the risk of social reactions that "break" reforms, creating a favorable environment for investment and sustainable growth. High levels of inequity will reduce the

efficiency of the twin transition. For instance, if a large portion of the population does not have access to digital technology, the efficiency of the digital transformation will decrease. This means that the efficiency of the twin transition is not just about rapid growth at a low cost, but also includes the equitable distribution of benefits and costs. Equity is not an "after-the-fact compensation for optimization," but a design constraint from the outset to make policies feasible and effective over time. Equity is a necessary condition to internalize externalities, maintain social consensus for long-term investment, and optimize long-term efficiency dynamics. Conversely, high inequality will erode the accumulation of human capital, technology absorption capacity, and productivity growth. Therefore, the focus of the twin transition is a "just transition" to reduce instability, thereby enhancing efficiency, sustainable growth, and ensuring that no social group is left behind.

However, an overemphasis on the goal of equity may reduce the motivation to participate in the transition process, thereby diminishing the economic efficiency of the twin transition . The optimal solution to promote the twin transition is to find a balance suitable for each nation's context, where the constraining mechanism based on an institutional foundation, including both formal institutions (laws enacted by the state) and informal institutions, is a point worthy of consideration.

3.2. From a Legal Perspective

In its role as a legal corridor that directs, regulates, creates, and promotes socioeconomic activities, the law on twin transition today does not stop at the requirement of economic-technical efficiency, but has integrated and affirmed equity as a mandatory standard in the design, implementation, and evaluation of all twin transition policies and programs. Accordingly, the law on twin transition is used to establish objectives, operating conditions, and economic-technical standards so that entities can implement them with confidence; to establish incentive and deterrent mechanisms; and to transparently delineate the rights, obligations, and legal liability of parties involved in twin transition activities. From this perspective, the law must be built on a foundation integrated with the development views of modern economics and its own specific role. It is the embodiment of justice, an instrument for creating development and correcting market failures, aiming to enhance good values for humanity.

To enhance the economic efficiency of the twin transition process, the law must aim to create a legal environment that minimizes transaction costs, optimizes resources, saves energy, promotes circular value chains, reduces emissions, and avoids transitioning to new forms of hazardous emissions to ensure the overall value added of the economy. More importantly, when developing legal standards and efficiency assessment procedures, legislators need to place them in a specific cultural-geographical-historical context, where their non-financial benefits are difficult to quantify and compensate for. Optimizing economic efficiency also requires optimizing the social costs of law-making and compliance. The law must ensure transparency and accountability, especially regulations on criteria for monitoring and evaluating the transformation process and outcomes.

An important point to recognize is that economic efficiency is only truly sustainable in the long term when the policies and regulations of the twin transition law are linked to the goal of equity. In legal science, equity is the foundation of law. Equity is not only a universal principle but also a regulatory objective of law in general. According to the natural law school, equity is a category associated with natural law and is an objective attribute that state-enacted law must ensure. This includes the distributive justice of wealth and social benefits, which natural law scholars call distributive justice, later developed by John Rawls (1921-2002) into his theory of justice. According to Rawls, inequality in the distribution of wealth and opportunities is acceptable only if it benefits the most vulnerable groups in society. When businesses restructure and lay off workers, it must not harm those in weaker social positions; on the contrary, policies should aim to prioritize improving their status.[4] This is also the theoretical foundation upon which legislators build regulations to protect vulnerable people in the twin transition. Accordingly, equity is specified as a guiding principle in the development of twin transition law. Specifically, the twin transition law focuses on protecting vulnerable groups, reducing regional disparities, supporting retraining for the digital transformation, ensuring social security for workers and communities affected by the closure of carbon extraction and carbon energy industries, ensuring all citizens can access and benefit from the development of the digital economy and greening, making the right to request mandatory community consultation transparent when approving large-impact projects, publicizing distributional and environmental impact assessments, and creating effective complaint/

4 See: John Rawls, *A Theory of Justice* (Harvard: Harvard University Press, 1971).

feedback mechanisms. In general, contemporary legal science has recognized the harmonization of the goals of equity and efficiency as a mandatory principle in the design and implementation of twin transition policy.

3.3. Integrating Economic and Legal Perspectives on Equity and Efficiency in the Twin Transition

Today, the development and planning of twin transition policies are often approached in parallel from both economic and legal dimensions. Economics helps optimize resources, identify drivers for sustainable growth, analyze positive and negative externalities, and evaluate efficiency and equity from design to implementation. In particular, institutional economics helps determine the role, content, and scope of impact of institutions on the process of transforming the development model, including formal institutions such as state-issued laws and regulations, which create the foundational material for perfecting the state's positive law. Meanwhile, law plays the role of creating a binding foundation, establishing rights, obligations, and legal liability; and building mandatory criteria for efficiency and equity in transformation programs. The integration of economics and law in the twin transition will then help increase feasibility and sustainability, reduce conflicts of interest, enhance social acceptance, and optimize long-term efficiency. Therefore, the twin transition can only be successful and sustainable when all economic solutions (cost optimization, technological innovation, etc.) are implemented within a transparent legal framework, with supervision and compliance with legal standards on economic-technical aspects, social equity, and the environment. Conversely, legal design must also be based on cost-benefit analysis, economic drivers, economic data, and the practical capacity of society, rather than being formalistic or imposing measures without a practical basis. In other words, a successful twin transition requires an organic coordination between economic optimization and ensuring justice. Both must be prerequisites and constraints for each other, not to be taken lightly or addressed unilaterally. In this context, the principle of harmonization of economic efficiency and social equity in the twin transition always goes hand in hand and is integrated into policies and legal regulations. Then, the assessment of the economic efficiency of the twin transition can be expanded to incorporate environmental and social factors, such as the Genuine Progress Indicator (GPI) or

the Human Development Index (HDI), the right to access digital technology and green technology, the right to be consulted, the right to access employment opportunities and benefit from technological development, and the right to adequate compensation. Because economic transformation is ultimately a tool to promote human progress, serve human interests, and allow people to become agents of change, not its subjects. In other words, the twin transition must be human-centered in all its changes.

In general, the integration of economic and legal perspectives can be carried out based on the following 4 pillars:

- The first pillar is the synchronization of the legal-economic framework: the twin transition policy links codification with ensuring implementation conditions. For example, digital universalization for remote areas, establishing environmental protection funds.
- The second pillar is establishing tools that are both effective and equitable. For instance, establishing an emissions trading system (ETS)/carbon tax simultaneously with a distributive compensation mechanism; investment in industrial transition with criteria for retraining, ensuring social security, and mandatory community consultation processes.
- The third pillar is mandatory socio-economic impact assessment. Accordingly, all major transition projects must conduct impact assessments not only on the environment, but also on the distribution of benefits/costs and equity of access.
- The fourth pillar is the mechanism for accountability, complaints, and consultation. The law stipulates requirements for community consultation, data disclosure, and having a mechanism to receive and resolve complaints regarding the distribution of benefits and costs.

4 The Current Situation of Ensuring Equity and Efficiency in the Twin transition in Vietnam

4.1. Context and Vision for the Twin Transition

Vietnam is one of the countries most heavily affected by climate change, sea level rise, and the over-exploitation of water resources in the upper Mekong River, even becoming a strategic weapon for upstream countries in the regional geoeconomic and political game. Its economy is deeply integrated into global supply chains with products that have a low value-added content. The contribution share of total factor productivity (TFP) to the GDP growth rate in the 2021-2023 period was only about 39.48%[5] and is estimated to be about 42% for the 2021-2025 period, wherein the contribution of science and technology to GDP is less than 2.5%, and the contribution of digital technology to GDP growth is less than 1%. Moreover, Vietnam also faces many challenges in attracting responsible investment capital and in its main export markets, especially with the current unpredictable tax policies of Trump and the rapid changes from regional geopolitical-economic competition. In that context, the twin transition is both a trend and an inevitable necessity for the transition from an extensive growth model to an intensive growth model, a model of rapid and sustainable growth, adapting to unpredictable uncertainties.

Recognizing very early the nature and importance of the twin transition process, Vietnam has proactively participated in and implemented many international commitments on climate change and responsible trade and investment. As early as 1994, Vietnam joined the United Nations Framework Convention on Climate Change (UNFCCC) and the Montreal Protocol on Substances that Deplete the Ozone Layer; in 2002, it joined the Kyoto Protocol; in 2016, it joined the Paris Agreement on climate change; in 2018, it joined the CPTPP Agreement; in 2020, it joined the EVFTA Agreement; in 2021, it joined the Global Methane Pledge and the Declaration Glasgow on Forests and Land Use, while also adopting the ASEAN Digital Masterplan 2025; in 2022, it joined the Global Declaration on the transition from coal power to clean energy and the Just Energy Transition Partnership. These are also the important legal bases that require Vietnam to accelerate the green transformation and domestication of law.

[5] Source: General Statistics Office, *Statistical Yearbook of Vietnam 2024* (Hanoi: Statistical Publishing House, 2024), 276.

In the face of the explosive development of the Fourth Industrial Revolution, in 2019, the Politburo issued Resolution 52-NQ/TW with a policy of developing policies and laws to promote science, technology, innovation, and national digital transformation, with a focus on developing the digital economy, building sustainable smart cities, e-government, and progressing towards digital government, while limiting the negative impacts of the Fourth Industrial Revolution. Creating a legal corridor for the implementation of new labor and employment models on digital technology platforms and perfecting social security policy suitable for the Fourth Industrial Revolution, promptly addressing the challenges posed to social development. Promoting participation in the Fourth Industrial Revolution to address environmental pollution, climate change, and sea level rise. By 2021, the 13th Party Congress had set the socio-economic development strategy for the 2021-2030 period as "rapid and sustainable development based mainly on science and technology, innovation, and digital transformation", while also considering "strong development of science, technology, innovation, and digital transformation as the main driver of economic growth." Implementing national digital transformation comprehensively to develop the digital economy and build a digital society. Implementing digital transformation in national governance, state administration, production, business, social organizations, and national resource management. Striving by 2030 to complete the building of a digital government, to be among the top 50 countries in the world and ranked third in the ASEAN region for e-government and digital economy.[6]

To create new momentum and breakthroughs in the development of science, technology, innovation, and digital transformation, and to drive the country's strong development in the new era, in late 2024 the Politburo issued Resolution No. 57-NQ/TW On breakthroughs in the development of science, technology, innovation, and national digital transformation, with the guiding viewpoint: "The development of science, technology, innovation, and national digital transformation is the most important breakthrough, the main driving force for rapidly developing modern productive forces, perfecting production relations, innovating national governance methods, developing the economy and society, preventing the risk of falling behind, and enabling the country to achieve breakthrough development and prosperity in the new era." The development of science, technology,

6 Communist Party of Vietnam, *Documents of the 13th National Party Congress*. Vol. I (Hanoi: National Political Publishing House-Truth, 2021), 92.

innovation, and digital transformation is considered a decisive factor for the development of nations and a prerequisite for the country to develop prosperously. Among these, the goal by 2030 is for Vietnam to be in the top 3 leading countries in Southeast Asia and the top 50 countries in the world in terms of digital competitiveness and the e-government development index; in the top 3 leading countries in the Southeast Asian region for research and development of artificial intelligence, and a development center for certain sectors and fields of the digital technology industry where Vietnam has advantages. The vision to 2045 is for Vietnam's digital economy to account for at least 50% of GDP; to be one of the digital technology industry centers in the region and the world; and to be among the top 30 leading countries in the world for innovation and digital transformation.

Clearly, the twin transition is not only a trend but also an intrinsic need and a foundation for the development of Vietnam's economy. The twin transition helps Vietnam achieve in-depth development, innovate its growth model, restructure economic sectors, increase labor productivity and economic efficiency, enhance the economy's competitiveness and resilience against uncertain challenges, open up new business models, and help reduce transaction costs. In other words, Vietnam views the twin transition as an inevitable trend for the rapid and sustainable development of its socio-economy. In this process, efficiency and equity are two parallel and inseparable goals.

4.2. The Twin Transition Process and Emerging Issues in Ensuring Efficiency and Equity

Since the launch of the national digital transformation program in 2020, the digital transformation process in Vietnam has been proceeding strongly and comprehensively, identified as a major policy and a national focus. This process is being implemented synchronously across three main pillars: digital government, digital economy, and digital society, while having a profound impact on many specific sectors.

For digital government transformation activities, Vietnam promotes online public services through the national public service portal and ministerial and provincial public service portals, enabling citizens and businesses to perform administrative procedures online; digitalization of administrative management by applying information technology in

the internal management of state agencies, implementing an electronic document management system, online meetings, and developing national digital data; and developing digital data through the construction of national databases on population, businesses, land, and finance to create a foundation for effective data sharing and exploitation among agencies.

For digital economy activities, Vietnam promotes the development of e-commerce, digital finance, and digital agriculture, optimizing production processes through automation, IoT (Internet of Things), and big data analytics in the industrial and construction sectors, and applying technology to manage supply chains.

For digital society transformation, Vietnam implements digital education, digital health, and digital skills universalization, especially in rural areas and for vulnerable groups, to narrow the digital divide.

To promote this process, Vietnam has implemented the following solutions:

- Building and institutional improvement: Building a legal framework and policies to promote digital transformation, such as the National Assembly's promulgation of the Law on Data, Law on Electronic Transactions, Law on Digital Technology Industry, Law on Science, Technology and Innovation, and the personal data protection law, Resolution No. 193/2025/QH15 on piloting several special mechanisms and policies to create breakthroughs in the development of science, technology, innovation, and national digital transformation; the Government's issuance of Decree 180/2025/ND-CP; the Prime Minister's issuance of Decision No. 749/QD-TTg Approving the National Digital Transformation Program to 2025, with an orientation to 2030; and localities building action programs on innovation and digital transformation.
- Digital infrastructure development: Investing in broadband telecommunications infrastructure, cloud computing, data centers, and 5G technology to create a foundation for digital applications.
- Digital platform development: Building shared platforms for the government, businesses, and citizens, such as the national public service portal, cashless payment platforms, and online learning platforms.
- Digital human resources development: Enhancing training and improving digital skills for officials, civil servants, public employees, workers, and the entire population. This is a key factor for adapting and developing in the digital environment.

- Cyber safety and security: Ensuring information safety and cybersecurity is a vital factor in protecting personal, business, and national data in the digital environment[7].

This digital transformation process has achieved many significant accomplishments, with Vietnam's national digital transformation index (Digital Transformation Index – DTI) reaching 0.7955 in 2024.[8] Vietnam's e-government ranking was 71st out of 193 countries in 2024, an increase of 15 places compared to 2022.[9] The proportion of the digital economy in GDP reached nearly 18.3% in 2024, and this ratio is expected to be 18.72% by the end of 2025.[10] The revenue of the digital technology industry in 2024 reached approximately 151.86 billion USD. The export value of information technology hardware electronics and telecommunications in 2024 reached approximately 132.341 billion USD, accounting for about 32% of the nation's total goods export value. In the first 6 months of 2025 alone, the export value of information technology hardware, electronics, and telecommunications reached 81 billion USD, and e-commerce revenue reached 8.26 billion USD. The percentage of the adult population with a digital signature reached 35.48%. By the end of June 2025, internet infrastructure had covered 99.8% of the territory, with 99.6% of villages having mobile broadband connectivity and 82.3% of households had a broadband fiber optic internet connection. The broadband telecommunications network has covered 99.3% of the territory, with 88.7% of mobile subscribers using smartphones. Vietnam's mobile broadband download speed in February 2025 ranked 19th out of 103 countries. Fixed broadband download speed

7 Tuyet Dung Thai Thi, Phuc Dao Gia, "Balancing the Right to Access Information, the Right to Privacy, the Right to Personal Data Protection, and the Right to Be Forgotten in the Digital Age: The Case of Vietnam" *Prawo i Więź*, No. 6 (2024): 709-703.

8 Source: Ministry of Science and Technology, National DTI in 2024 increased by 8.6% compared to 2023. News report (Hanoi: Vietnam News Agency, 2024). https://happyvietnam.vnanet.vn/dti-quoc-gia-nam-2024-tang-86-so-voi-nam-2023/47418.html#:~:text=Vi%E1%BB%87t%20Nam:%20K%E1%BB%B7%20nguy%C3%AAn%20m%E1%BB%9Bi&text=Theo%20c%C3%B4ng%20b%E1%BB%91%20c%E1%BB%A7a%20B%E1%BB%99,x%C3%A2y%20d%E1%BB%B1ng%20Ch%C3%ADnh%20ph%E1%BB%A7%20s%E1%BB%91. [accessed: 1.9.2025].

9 United Nations, *UN E-Government Survey 2024*. Report and Annex. (New York: United Nations, 2024), 111. https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2024. [accessed: 1.9.2025].

10 Source: Department of Digital Economy and Digital Society.

ranked 35th out of 154 countries.[11] Vietnam's human development index (HDI) in 2023 reached 0.766, rising to 93rd out of 193 countries, placing it in the group of countries with a high HDI. However, when considering the aspect of inequality, this figure drops to 0.641, a decrease of 16%, due to disparities in education, healthcare, and income.[12]

Indeed, alongside these achievements, the digital transformation process still faces challenges that affect its efficiency and equity. Specifically:

First, the lack of synchronization in technical infrastructure reduces growth efficiency and increases digital inequality. Specifically:

Digital technical infrastructure: the data system is quite fragmented, lacking description and classification standards, which makes integration, sharing, and interoperability difficult; the lack of a national-scale shared platform between businesses and localities increases transformation costs.

Specifically, by the end of March 2025, approximately 50% of the shared databases of ministries, sectors, and localities that have been listed as slow to be implemented, including the national databases on construction and immigration[13], will still be affected. This impacts the equitable access to opportunities and costs for citizens, especially in online public services, healthcare and energy – three areas that significantly affect people's quality of life.

In online public services, some national and specialized databases (such as land, construction, civil registration, etc.) are slow to be completed and put into operation, or do not yet meet the requirements of "accurate, complete, clean, and active" data for implementing interconnected administrative procedures without depending on provincial administrative boundaries, making the centralized online public service system of some ministries and sectors unstable. The rate of exploitation and reuse of digitized data at ministries and sectors only reached 4.18% of dossiers; localities reached 40.71% of dossiers. The rate of online dossiers throughout the entire process of resolving administrative procedures nationwide in August 2025 only reached 39.71%, of which ministries and sectors reached 52.45%, and localities reached 15.79%. The rate of digitization of dossiers and results of resolving administrative procedures at ministries and sectors reached

11 Source: : Ministry of Science and Technology, Report No. 44/2025 on National Digital Transformation, March 2025. White Report. (Hanoi: Ministry of Science and Technology, 2025), 4-7.

12 United Nations Development Programme, *Human Development Report 2025. A Matter of Choice: People and Possibilities in the Age of AI* (New York, 2025), 2.

13 Ministry of Science andTechnology, Report No. 44/2025, 4-7.

52.57%; localities reached 65.01%. The percentage of electronically issued results with legal validity for reuse in ministries and agencies reached 52.72%; and in localities reached 68.13%.[14]

Similarly, in the healthcare sector, Vietnam is promoting the development of shared data infrastructure through hospital information systems (HIS) and electronic medical records (EHR/EMR) to facilitate patient access, avoid duplicate tests, and improve treatment quality. However, due to fragmentation, a lack of standardized terminology, and a structure for describing/classifying data across individual systems (HIS, LIS, PACS), integration, sharing, and interoperability between hospitals are hampered. This, in turn, affects the effectiveness of digital transformation and the equitable distribution of access to digital services.

There is a disparity in digital infrastructure between regions and between business groups, which widens the digital divide between urban residents and those in high mountainous areas, and between large enterprises and small and medium-sized enterprises that lack resources to invest in digital technology, affecting fairness in accessing and benefiting from the achievements of digitalization. For example, due to a lack of investment in digital infrastructure and enhanced security capabilities, many hospitals in disadvantaged areas have not yet completed the implementation of electronic medical records. As of October 2025, only about 61% of facilities will have implemented electronic medical records.[15] Meanwhile, about 26% of the population has 5G coverage, making it easier to use the internet for business activities and administrative procedures. Approximately over 50% of the adult population, mainly concentrated in rural areas, do not have digital signature certificates, which will make transactions in the digital environment less convenient.[16]

The organization of connected data is also unscientific, lacking a data lifecycle policy and authorization – controlling, which reduces economic efficiency and raises public concerns about information security.

14 Source: Ministry of Interior, Report No. 8674 on the implementation of administrative reform work in the third quarter of 2025. White Report (Hanoi: Ministry of Interior, 2025), 6.

15 Source: Ministry of Health's. http://moh.gov.vn/tin-lien-quan/-/asset_publisher/vjYyM7O9aWnX/content/-a-co-hon-1-000-benh-vien-trien-khai-benh-an-ien-tu. [accessed: 101.12.2025].

16 Source: Ministry of Science and Technology, Report No. 44/BC-KHCN dated March 31, 2025 on National Digital Transformation, March 2025.

Energy infrastructure: The digital transformation and economic development process increases the demand for electricity consumption, with an average increase of 12-16% per year during the 2026-2030 period.[17] This also puts pressure on the green transformation, as the main energy source is still fossil fuels. By the end of the first quarter of 2025, coal power accounts for 56.5%, hydropower for 19.1%, and renewable energy for only 16% of the national system's total electricity output, with solar power reaching 6.69 billion kWh and wind power reaching 4.45 billion kWh.[18]

The national power grid system lacks the capacity and intelligence to efficiently integrate a large proportion of variable renewable energy sources. Transmission line congestion limits the capacity to absorb new renewable energy, leading to renewable energy curtailment, which reduces investment efficiency and affects green energy development goals. In parallel, energy storage technology, such as batteries and green hydrogen are still limited in scale and high in cost, posing challenges to the development process.

Second, regarding digital human resources: there is a shortage of high-quality digital human resources at all three levels: leadership (digital strategy literacy), experts (AI, cloud, cybersecurity, data analysis), and employees (basic digital operation skills), leading to a shift of digital human resources from small and medium-sized enterprises to large enterprises, which further exacerbates the digital divide between large enterprises and small and medium-sized enterprises.

Compared to other countries in the region, the digital skills of Vietnam's workforce are still low, ranking only above Cambodia; on a global scale, it ranks 97th out of 141 countries.[19] Approximately 55% of Vietnam's adult population has basic digital skills, about 15% have intermediate to advanced digital skills, and about 1% have specialized skills (information technology,

17 Song Linh, "Green and Clean Energy Development to Meet Economic Growth" *Vietnam Financial Times* (2025). https://thoibaotaichinhvietnam.vn/phat-trien-nang-luong-xanh-sach-dap-ung-tang-truong-kinh-te-173675.html [accessed: 3.4.2025].

18 Lan Anh, "Renewable energy accounts for 16% of total system-wide electricity output" *Ha Noi: Vietnam Clean Energy e-Magazine*, Q1 (2025). https://nangluongsachvietnam.vn/d6/vi-VN/news/Quy-I2025-nang-luong-tai-tao-chiem-16-tong-san-luong-dien-toan-he-thong-6-8-28130. [accessed: 4.4.2025].

19 Klaus Schwab, *The Global Competitiveness Report* (Switzerland: World Economic Forum, 2019).

AI, big data).[20] A notable point is that people with basic digital skills rarely use them for innovation, but mostly use social networks for entertainment or shopping purposes. In early 2025, about 75.2% of the country's total population uses social networks,[21] and of these, about 1/3 of users regularly follow influencers, brands, and real-time entertainment content[22]. On average, social platform users spend 2 hours per day sharing content, messaging, and watching videos. Notably, 86% of Gen Z internet users are identified as online gamers, many of whom use live streaming as a way to interact with the gaming community.[23]

Meanwhile, the current training system lacks legal requirements for equipping individuals with AI Literacy and regulations on AI Literacy learning outcome standards. This creates barriers to the effectiveness of the digital transformation process.

More notably, there are also significant disparities in digital skills among different groups, such as workers in rural and remote areas, low-income individuals, informal workers, low-skilled workers, the elderly, and laborers in the traditional sectors of ethnic minorities. Therefore, accelerating the digital transformation process is likely to severely exacerbate digital inequality, affecting the ability to maintain employment, access new job opportunities, and enjoy the benefits of this transition.

Third, regarding information security: information safety and data security have not met societal demands, with many illegal acts related to digital technology emerging, eroding the digital trust of citizens and businesses, and adversely affecting the digital transformation process. For instance, in 2024, Vietnam had up to 14.5 million leaked accounts, accounting for 12% of the global total, and over 40,000 security vulnerabilities. Fraudulent activities and cyber attacks caused nearly 11 million USD in damages, primarily concentrated in the finance, energy, and technology sectors.[24] In the first 8 months of 2025 alone, according to statistics from the Department

20 PricewaterhouseCoopers, *Vietnam Digital Readiness Report* (PwC, 2021); TopDev, *Vietnam IT Market Report (2024 -2025) – Vietnam IT & Tech Talent Landscape* (TopDev, 2024).

21 Source: Datareportal.com. https://datareportal.com/reports/digital-2025-vietnam.

22 Source: statista.com. https://www.statista.com/topics/6231/internet-usage-in-vietnam/#topicOverview.

23 Source: ibidem.

24 Viettel Cybersecurity Company, Report on T*he Information Security Risk Situation in Vietnam in 2024* (Vietnam, 2024).

of Cybersecurity and High-Tech Crime Prevention, Vietnam recorded over 4,500 detected malicious domains and 1,500 cases of online fraud disguised as deepfakes, chatbot spoofing, and malware distribution, with estimated damages exceeding 1,660 billion VND. Among these, a transnational fraud ring operating in Cambodia scammed over 13,000 victims, misappropriating nearly 1,000 billion VND.[25]

Furthermore, the process of integrating complex legacy systems is difficult to integrate with modern digital technology. Additionally, overreliance on a single technology provider (vendor lock-in) makes switching to another provider excessively costly, creating risks of operational disruption that affect the efficiency of the twin transition. This, in turn, creates a digital divide and a green divide in the economy, increasing the risk of vulnerable groups being left behind and eroding the goal of equity.

Fourth, regarding culture and social ethics: Culture shapes human perception, directly affecting the manner of resource allocation, opportunities for technology access, and the benefits from the twin transition. With the characteristics of a collectivist culture (collectivist culture), which values community interests and social harmony, there is a tendency to prioritize "restorative fairness" (restorative fairness). This impacts policies and laws regarding the twin transition, leaning towards rectifying consequences rather than forecasting and preventing them, thereby weakening the ability to ensure long-term fairness. The emergence of a mentality of fearing change, being afraid of failure, and lacking trust in digital services, which originates from an agricultural culture, has negatively impacted economic development and reduced the effectiveness of the digital transformation process. A risk-averse mentality, a preference for safety, and choosing technology based on "trends" (AI, blockchain, etc.) but lacking clean data/standard processes, leads to the inability to develop pilot products, undermining the effectiveness and fairness of the transformation process.

Fifth, regarding policy and law: there is a lack of synchronization and comprehensive coverage of the issues that need to be regulated in the twin transition process. A common strategy and legal framework to synchronously regulate both the digital transformation and green transformation processes as a single entity has not yet been formulated. Policies and laws

25 Doan Thi Phuong, "High-tech crime and challenges in the digital transformation process" *Cong Ly* Newspaper, (2025). https://congly.vn/toi-pham-cong-nghe-cao-va-nhung-thach-thuc-trong-tien-trinh-chuyen-doi-so-475527.html. [accessed: 22.10.2025].

are designed and regulated separately for each process, rather than being placed in a synergistic relationship, leading to a waste of resources and reducing the effectiveness of the twin transition. Indeed, many businesses currently combining digital transformation with green transformation face numerous challenges in terms of human resources, finance, and technology infrastructure that require support from formal institutions. However, the lack of synchronization and delays in issuing implementation policies and regulations have eroded their motivation and determination to transform. The majority of businesses only undergo a relative transformation within their limited resources and do not yet dare to truly push for a deep transformation. Specifically, about 80% of innovative enterprises currently only stop at improving existing processes, rather than creating new value for the market.[26] This is also a consequence of the delay in issuing regulations to implement support policies. Resolution 57-NQ/TW sets a target for spending on research and development (R&D) to reach 2% of GDP, with funding from society accounting for over 60%; and to allocate at least 3% of the total annual budget expenditure for science, technology, innovation, and national digital transformation, increasing gradually according to development needs. However, actual spending on investment in research and development (R&D) only accounts for 0.5% of GDP.

Regarding the digital transformation process, current legal regulations have not kept pace with new digital economy models related to artificial intelligence (AI), blockchain, tokenization of digital assets, cryptocurrency, etc. There is a lack of mechanisms to encourage digital investment, and the sandbox regulatory mechanism for new business models (Fintech, Healthtech, Edtech) is still limited. Current provisions of intellectual property law also have many shortcomings in recognizing and protecting rights to digital intellectual property created by AI as well as AI inventions. This reduces the efficiency of digital economy development in particular and the digital transformation process in general.

On 11 December 2025, the Vietnamese National Assembly enacted the Law on Digital Transformation (effective 1 July 2026). This law adopts a framework approach, coordinating inter-sectoral efforts, building upon and connecting existing laws related to digital transformation, avoiding overlap with

26 Anh Minh, "Promoting the Digital Economy and TFP to Contribute to Enhancing National Competitiveness" *Government Electronic Newspaper* (2025). https://baochinhphu.vn/thuc-day-kinh-te-so-va-tfp-gop-phan-nang-suc-canh-tranh-quoc-gia-10225071014170322.html.

specific laws, and filling legal gaps in current legislation to form a complete legal system for digital transformation. This is the first law to recognize the principle of linking the digital economy with the green economy, reducing greenhouse gas emissions, and promoting the use of renewable energy; it also promulgates standards and regulations for reducing greenhouse gas emissions for digital infrastructure and energy-intensive digital technology applications and platforms, and provides tax incentives and green credit for digital-green projects. Despite containing only one provision, the law reflects the spirit of dual transformation. The issue of integrating digital transformation and green transformation policies is left to specialized legal regulations, which inherently have many limitations. This law also acknowledges the vision for digital transformation, the role, and policies of the state. Accordingly, digital transformation is a top strategic breakthrough, with citizens and businesses at the center, as the subjects and driving force; the State plays the role of creating institutions, leading and promoting the national digital transformation process in a fast, sustainable, inclusive, and secure direction; promoting the development of the digital economy to become an important growth driver through supporting businesses in digital transformation; building a fair, inclusive, and secure digital society; and prioritizing national resources to ensure the essential conditions for digital transformation (Article 4 of the Law on Digital Transformation).

Selectively adopting the experience of the European Union (EU) in the Digital Markets Act (DMA), the Digital Services Act (DSA), the Artificial Intelligence Act (AI Act) regarding ensuring the development of a fair and competitive digital market; To enhance transparency and protect the fundamental rights of users, South Korea's experience in laws such as the Framework Act on Intelligent Informatization, the Basic Law on the Development of Artificial Intelligence and Creation of a Trust Base, the Framework Act on the Promotion of Digital-Based Distance Education, and the Industrial Digital Transformation Promotion Act, which regulate comprehensive social digitalization and the development of digital human resources, Vietnam's Digital Transformation Law also stipulates the fundamental rights of citizens in a digital society such as:

a. Right to access and connect to digital services: Guaranteed access to digital infrastructure, broadband internet connection services and terminal devices with reasonable quality and price, safety, meeting technical requirements, and suitable to regional conditions and the specific characteristics of population groups.

b. Right to education, training, and digital capacity building: To receive education, training, and development in digital skills, information skills, critical thinking, and digital security, ensuring full participation in the digital socio-economic life.
c. Right to labor and social security in the digital environment: To be guaranteed safe and fair working conditions; to receive social security benefits when working through digital platforms.
d. Right to safety, security, and protection of personal data: To be guaranteed information security and confidentiality; to be protected in terms of privacy, personal secrets, and family secrets; to have control over personal data.
e. Right to choose and decide on the use of digital services: To know, choose, or refuse to interact with algorithmic systems and AI;
f. The right to human interpretation and intervention in automated decisions affecting legitimate rights and interests.
g. The right to choose digital services in a fair competitive environment: To use digital services in a healthy and transparent competitive environment; not to be coerced or subjected to unlawful restrictions.
h. The right to work and access to career opportunities in the digital society for all citizens fairly, by facilitating access to essential technologies and popularizing digital skills through: providing terminal equipment and internet connectivity; implementing basic digital skills training programs; providing labor market data and supporting workers in self-directing their careers in the digital environment.

However, the mechanism for compensating those harmed by this process is not stipulated in this Law.

Regarding the green transformation process, Vietnam pursues the goal of transitioning to a low-carbon economy, viewing green transformation as a pillar of sustainable growth. The green transformation occurs across multiple sectors, including energy, industry, agriculture, transportation, and tourism, along with green urban governance and resource conservation initiatives. Despite significant progress, the green economy currently accounts for only 4%-4.5% of GDP.[27] The core barriers affecting the efficiency of this transformation also stem from infrastructure,

27 Song Ha, "Initiating a New Economy: Momentum from Green Transformation, Digital Transformation" *Vneconomy Online Magazine*, (2024). https://vneconomy.vn/khoi-tao-nen-kinh-te-moi-dong-luc-tu-chuyen-doi-xanh-chuyen-doi-so.html.

finance, implementation capacity, and supporting institutions. Specifically, in the energy sector, the energy "greening" strategy is being promoted but faces barriers in power grid and storage infrastructure, especially the instability in policies for receiving solar and wind energy sources, which has reduced efficiency. In the industrial sector, the high cost of green technology makes it difficult for small and medium-sized enterprises to secure development capital. The green agriculture sector faces limitations regarding incentive policies, high costs, and a lack of technical guidance and digitalization support. In other words, the lack of an effective overall strategy, and reasonable plans and action programs causes the issuance of policies and legal regulations to implement support policies, and policies and training programs for human resource development to be slowly and unsynchronizedly implemented, weakening the effectiveness of the green transformation process that is linked and interacts with the digital transformation.

The policy-making and legislative process is still too focused on economic efficiency and has not truly given full consideration to the element of equity, especially the harmonization between the goals of economic efficiency and social equity in the twin transition process. As analyzed above, the digital transformation itself also causes digital inequality among regions, ethnic groups, and population segments with different educational levels, social statuses, and socioeconomic conditions; inequity in income, job retention, and access to new job opportunities for vulnerable groups; and a lack of environmental justice, as digital technology itself can directly or indirectly increase environmental impact. Meanwhile, the green transformation also creates inequity in employment and job transition, affordability of related products and services (e.g., clean energy prices), accessibility of related products and services (e.g., access to education, digital health), access to transition finance, and access to capabilities (e.g., access to and development of knowledge, technology). Particularly, there is the issue of balancing current benefits with the costs borne by future generations from new forms of pollution, a concept scholars call intergenerational equity. For example, in urban transportation, the project for the energy transition from gasoline cars to electric vehicles has not clearly reflected a full assessment of the factors of a just and efficient transition. These are issues of distributive justice in benefits and risks, a reasonable transition process and roadmap, recognition of cultural characteristics, as well as compensation mechanisms for vulnerable groups/affected industries, the consequences of the post-transition period, and the issue of intergenerational equity when the

potential for pollution from improperly treated used batteries is considered. However, current legal regulations do not adequately provide for social impact assessment in policy-making, mandatory consultation mechanisms with parties with related rights and interests, or the establishment of a legal corridor for the formation and effective operation of support and compensation funds for vulnerable groups during the transition. Similarly, in ensuring the interests of the vulnerable group of workers, the provisions of the Labor Code do not effectively guarantee workers' interests during the digital technology transition, leading to employers abusing regulations on technological changes to unreasonably terminate labor contracts. In the field of human resource training to anticipate or transition to new jobs due to the twin transition or being affected by this activity, especially in the current context of AI technology development, legal regulations have many shortcomings in stipulating artificial intelligence literacy (AI literacy). Specifically, the Law on Education and its implementing documents do not have direct provisions on artificial intelligence literacy, nor an AI skills framework for different educational levels. Decision No. 1290/QD-BKHCN of 2024 only goes as far as recommending nine principles of responsible AI, and has not made them a mandatory legal obligation within the education system as in the United States, the European Union, Singapore, and South Korea. The Personal Data Protection Law of 2025 does not yet fully regulate acts of abuse and unauthorized self-storage of data as training data for AI in AI literacy education activities.

Today, the use of AI in the twin transition process brings many clear efficiencies. Concurrently, it also raises issues regarding the management and supervision of AI, especially the AI training dataset, to ensure that AI makes accurate, unbiased decisions that do not discriminate or violate the law. However, the 2025 Personal Data Protection Law is inadequate in providing mandatory regulations for controlling the origin, quality, and bias of the entire training dataset, as well as the algorithms used for large-scale data collection and processing. Furthermore, the model for management and product liability tracing for products created by AI also has many shortcomings. The 2025 Digital Technology Industry Law and the 2025 Artificial Intelligence Act have classified, managed, and traced liability for products created by generative AI based on a risk-based model, similar to the EU's approach, but it lacks detail and specificity, causing difficulties and increasing costs for the application process.

5 Policy Implications and Recommendations for Perfecting the Legal Framework

5.1. Policy Implications

In essence, the twin transition consists of two parallel processes with a synergistic and contradictory relationship between the digital transformation and the green transformation. Therefore, the design of state policies and laws must be carried out within the context of the relationship between both processes.

More importantly, in the twin transition process, efficiency and equity are two parallel, complementary, and inseparable legal-economic binding factors. A twin transition process that focuses only on economic efficiency while ignoring social equity will not be sustainable. Integrating economic and legal perspectives in the twin transition shapes the principle of harmonizing the goals of equity and efficiency in the transformation process. Economic efficiency is only recognized for implementation on the basis of ensuring the goal of equity, which is specified into legal standards for social and environmental performance. In that case, equity becomes a dual constraint, serving as both an economic goal to maintain consensus and sustainable growth, and a mandatory legal standard (equality in access to technical infrastructure, digital technology, and green technology; distributive justice through compensation mechanisms for affected regions/sectors, support mechanisms for vulnerable and disadvantaged groups; implementation conditions, procedures, and roadmaps; consultation with affected communities; delineation of rights and responsibilities of stakeholders). Therefore, the principle of harmonizing equity and efficiency needs to be reflected throughout the entire process, from the design to the implementation of policies and laws on the twin transition. Accordingly, equity must be considered from all three aspects: Distributive (who bears the costs/enjoys the benefits, minimum compensation levels, loss ceilings for vulnerable groups), Procedural (transparency of the consultation process with affected parties and accountability), and Recognition (identifying cultural-geographical-historical specificities in policy design).

To harmonize the fairness and efficiency of the twin transition, legislators and policymakers can establish financial instruments (carbon tax, emissions trading system – ETS) linked to compensation mechanisms from the outset. For example, reducing taxes/electricity prices to neutralize distributional impacts, reinvesting in affected regions, directly refunding carbon revenues

to low-income households, or establishing regional/sectoral transition funds to finance retraining for transitions in affected sectors/regions.

Harmonization can also be achieved through procedures. For instance, establishing a set of multi-objective criteria to sequence the fossil fuel phase-out roadmap among sectors/regions/countries, where efficiency indicators (marginal abatement costs) must be balanced with fairness indicators (capacity, dependency, historical responsibility, development needs). Or, stipulating that incentives/investments for renewable energy projects are conditioned on commitments to create local jobs.

To ensure the effectiveness of the twin transition, it is necessary to prioritize the budget for upgrading digital infrastructure and energy infrastructure, and to reformulate labor training policies to match the needs of the transition, prioritizing the budget for skills conversion and regional/sectoral restructuring.

5.2. Recommendations for Improving the Legal Framework

Based on the analysis above, it is thought that to harmonize the goals of fairness and efficiency of the twin transition, the law also needs to be adjusted according to the principle of proportionality. This emphasizes the balance in protecting fundamental rights. For example, balancing the right to privacy with the right to data access. Or, regulations that encourage digital technology innovation while still maintaining systemic control.

To limit situations that are difficult to correct post-hoc and affect future generations, the law also needs to establish a set of criteria for assessing the fairness of the transition, as well as for monitoring, measuring, and ensuring accountability. The assessment and monitoring of fairness can be ensured through the development and integration of fairness indicators into the set of criteria for evaluating transition efficiency, such as: poverty and inequality risk index, improved access to digital services/clean electricity for vulnerable groups; post-transition disposable income, the digital divide, the green divide, the percentage of affected workers who are retrained and have equivalent or better quality jobs within a specified timeframe, the level of acceptance over time, and the ability and cost to remediate new pollution from the transition. Linked to this set of criteria are adjustment clauses for when fairness objectives are not met.

In parallel, the law needs to refine the set of criteria for organizing the transition roadmap, which includes both technical efficiency/economic

benefits and equity indices; develop a mechanism for equitable access to open data for sustainability purposes to shorten the data access gap between entities; and refine the labor law regulations on the termination of labor contract due to technological changes.

Finally, to enhance the effectiveness of the twin transition process, the law also needs to refine regulations on the management and control of risks posed by AI, as well as refine legal regulations on the recognition and protection of rights to digital intellectual property created by AI, and regulations on the legal status of compensation support funds for impacts caused by the twin transition process. At the same time, it is necessary to transparently regulate policies that encourage the transition process.

6 | Conclusion

The twin transition is the foundation for Vietnam to develop its economy rapidly and sustainably, enhancing the competitiveness and resilience of the economy against uncertain challenges. This process also poses many challenges in balancing economic efficiency and social equity. This requires Vietnam to have comprehensive economic and legal solutions, including solutions to enhance technical infrastructure capacity, issuing policies to promote a "just transition" according to a suitable roadmap, and refining relevant legal regulations.

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