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The Role of Green Finance in Sustainable Development and Climate Change Adaptation in Danang City

Vu Thi Tuyet Mai
Vietnam – Korea University of Information and Communication Technology

Abstract *- This paper analyzes the role of green finance in promoting sustainable development and climate change adaptation in Danang, particularly in the context of the city's strategic orientation toward becoming an International Financial Center based on two pillars: digital finance and green finance. Drawing on theoretical foundations, local practices, and international experiences, the study highlights that while Danang has made initial efforts—such as partnering with BIDV and developing Eco-industrial parks in collaboration with GIZ and UNIDO—it still lacks a dedicated legal framework, domestic green financial instruments, and sufficient implementation capacity. Accordingly, the paper proposes four key solution groups: improving the institutional framework and establishing criteria for identifying green projects; piloting green financial instruments such as green bonds and sustainable investment funds; enhancing the capacity of local officials through training and international cooperation; and integrating green finance into the restructuring of delayed or stagnant urban development projects, particularly in the Son Tra Peninsula and former Quang Nam areas.*
Key Words *- green finance, sustainable development, climate change, Danang, urban*

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I. INTRODUCTION

Following the administrative boundary expansion, Danang has become the centrally governed city with the largest area in Vietnam, covering a total of 11,859.6 square kilometers. This merger has brought about significant changes in population scale, urban spatial distribution, and resource exploitation potential, opening a new chapter for the city's comprehensive development across economic, cultural, and tourism sectors.

However, alongside these opportunities come considerable challenges in urban planning and management, particularly the imperative to pursue sustainable, synchronized development that is resilient to climate change—especially in the context of an expanded topography and uneven population distribution.

In the context of intensifying climate change and its increasingly severe global impacts, coastal cities like Danang are facing urgent demands to pursue sustainable development with high adaptive capacity to environmental risks. In recent years, Danang has frequently experienced extreme rainfall events, intense storms, urban flooding, flash floods, and landslides in mountainous areas— causing significant damage to infrastructure, community livelihoods, and ecological systems. At the same time, with the rapid pace of urbanization and economic growth, the city faces a pressing need to mobilize substantial capital for investments in green technologies, climate-resilient infrastructure upgrades, and low-carbon development.

In this context, the Government's strategic orientation to establish an International Financial Center in Danang is not only a breakthrough in the economic– financial development of the Central region, but also presents a significant opportunity to promote green finance as an integral component of a modern, integrated, and sustainable financial ecosystem. This center is expected not only to attract both domestic and international capital flows, but also to serve as a hub connecting financial institutions, investment funds, banks, and enterprises involved in climate finance, green bonds, sustainable credit, and disaster risk insurance. However, for green finance to be truly effective in Danang, the city must develop a clear and locally adapted legal framework, establish mechanisms for mobilizing and monitoring green capital flows, and enhance institutional and human resource capacities to meet the demands of international integration. Given this context, studying the role of green finance in sustainable development and climate change adaptation in Danang—within the framework of its orientation toward becoming an International Financial Center— is of critical importance. This research not only clarifies the leading role of green finance in the new development landscape but also proposes specific solutions to integrate green finance into the city's strategic urban development planning. The aim is to ensure that Danang emerges not only as a regional economic and financial hub, but also as an ecological, safe, and climate-resilient city.

II. LITERATURE REVIEW

A. Overview of Green Finance

Green finance, or the green financial system, refers to a set of financial instruments used to fund sustainable development, climate change adaptation actions, and policies aimed at promoting low-carbon emissions (Berensmann & Lindenberg, 2019; Bhattacharya & Yan, 2024; Biju et al., 2024; Fu et al., 2024; Lindenberg, 2014; Kim Hue, 2021; UNEP, 2015; Yuan et al., 2024).

Green finance is a multidimensional concept that reflects the integration of financial objectives with environmental goals in the process of sustainable economic development. According to the United Nations Environment Programme (UNEP, 2016), green finance refers to a system of financial activities aimed at supporting sustainable development goals while minimizing negative environmental impacts. The OECD defines green finance as the use of financial policies, regulations, and institutions to promote the flow of investment into environmentally friendly sectors such as renewable energy, energy efficiency, water and waste management, and climate change adaptation. From a market perspective, green finance includes instruments such as green bonds, green equities, green credit, and green investment funds—tools specifically designed to mobilize capital for projects that generate environmental and social benefits. Thus, green finance is not merely a new type of financial instrument, but a strategic approach to restructuring the current financial system toward sustainability, aligning economic efficiency with responsibility for the global ecosystem.

Green financial instruments are classified into various categories to serve diverse objectives and stakeholders in the mobilization and allocation of capital for environmentally friendly projects. The most common group comprises capital market instruments, including green bonds and green equities, in which the raised capital is committed to projects such as renewable energy, sustainable transportation, or water management. Green banking instruments are provided by financial institutions and include green credit, preferential loans for environmental projects, and green credit guarantees. Additionally, green investment funds, such as ESG (Environmental, Social, and Governance) funds or climate funds, play a vital role in channeling and allocating capital to green sectors. Environmental insurance instruments, such as natural disaster risk insurance or climate-related agricultural insurance, also help mitigate damages and distribute financial risks associated with climate change. Thanks to the diversity and specialization of these instruments, the green finance system can effectively support the transition to a low-carbon economy and sustainable development. The distinctive characteristics of green financial instruments, as compared to traditional financial tools, are summarized in the following table.

Table 1 – Differences Between Green Financial Instruments and Traditional Financial Instruments

Criteria	**Green Financial**	**Traditional Financial**
Target	Supporting sustainable development and mitigating environmental impacts	Maximizing profits and increasing investment value without necessarily emphasizing social and environmental impacts
Target of investment	Focusing on green projects such as renewable energy, biodiversity conservation, and climate-resilient sustainable infrastructure.	Investing in traditional economic sectors such as real estate, industry, and finance.

Financial risk	Risks related to climate change, policy shifts, and technological changes.	Traditional types of financial risks such as interest rate risk, credit risk, and market risk.
Financial Instruments	Green bonds, green equities, green investment funds, and sustainable development projects.	Equities, bonds, and banking products.
Standards and regulations	Complying with environmental and social standards, often accompanied by certifications and sustainability impact reporting.	Complying with general financial regulations of the country without specific requirements regarding environmental impact.
Evaluation of effectiveness	Based on sustainability indicators, environmental and social impacts, alongside financial returns.	Based on financial returns, profitability ratios, and stock value growth.
Community participation	Encouraging the participation of stakeholders such as local communities, non- governmental organizations, and government authorities.	Focusing on investors and shareholders, often with limited attention to community participation.

Source: Lindenberg (2014); Le Thu Hang (2023); Ozili (2023); Bui Kim Thanh (2024); and European Commission (2024)

B. The Role of Green Finance in Sustainable Urban Development

In the context where cities are becoming centers of socioeconomic development while simultaneously facing increasing environmental pressures and climate risks, green finance has emerged as a vital instrument for promoting sustainable urban development. In fact, urban areas currently account for up to 70% of global CO_2 emissions, and achieving climate goals will require an estimated USD 50–80 trillion in green infrastructure investment by 2050 (OECD, 2017). Green finance enables the mobilization and allocation of capital toward sectors such as zero-emission public transportation, urban renewable energy, energy-efficient buildings, and environmentally friendly wastewater treatment systems. Moreover, amid rapid urbanization and increasingly complex climate change challenges, green finance enhances urban resilience by supporting adaptation projects such as flood-resilient infrastructure, coastal soft dikes, the expansion of green spaces, and the retrofitting of residential housing into "storm-resilient homes" (World Bank, 2021).

In addition, green finance plays a crucial role in attracting private sector participation in urban development through mechanisms such as public–private partnerships (PPPs), the issuance of green bonds, climate risk insurance, and green investment funds. According to ADB (2020), cities that issue green bonds have 30% greater access to international capital compared to those relying on traditional fundraising methods, owing to their clear commitments to transparency and environmental responsibility. Furthermore, the mandatory monitoring and reporting systems associated with green finance encourage urban governments to enhance governance capacity, increase transparency in public investment, and strengthen trust from both the community and investors (IFC, 2023).

It can thus be seen that green finance serves not only as a capital mobilization tool for urban infrastructure projects but also as a critical mechanism for shaping urban development toward green growth, low- carbon, and sustainable models. To fully realize this role, there must be alignment between institutional frameworks, local capacity, and the active participation of multiple stakeholders within the urban financial ecosystem.

C. Review of Relevant Studies

In recent years, green finance has emerged as a central focus of global research, as countries strive to achieve sustainable development goals and respond to climate change. Numerous international studies have demonstrated that green finance serves as a "bridge" between capital sources and the climate–environmental objectives of the economy. Campiglio (2016) emphasized that the financial system must be restructured to support the transition to a low-carbon economy through instruments such as green bonds, preferential credit policies for green enterprises, and sustainability-based financial asset classification standards. Meanwhile, Flammer (2021) provided evidence that companies issuing green bonds not only enhance their brand image but also achieve better long-term financial performance, thereby illustrating the spillover effects of green finance on both environmental and economic domains.

Beyond the corporate perspective, the World Bank (2021) emphasizes the role of green finance in funding climate-resilient infrastructure projects, particularly in developing countries where public budgets are limited and vulnerability to natural disasters is high. Similarly, UNEP (2022) highlights that over 60% of global climate investments need to be deployed at the urban level—where green finance can contribute to advancing zero-emission public transport, retrofitting eco-friendly housing, and developing smart water management systems. In addition, according to Volz et al. (2020), the development of regulatory frameworks such as the EU Green Taxonomy and ICMA standards for green bonds has played a foundational role in building trust and ensuring transparency in the global green finance market.

In Southeast Asia—one of the regions most vulnerable to the impacts of climate change—green finance is gradually becoming a strategic tool in advancing sustainable development. According to research by the ASEAN+3 Macroeconomic Research Office (AMRO, 2022), green finance plays a pivotal role in mobilizing capital for climate-resilient infrastructure, energy transition, and sustainable urban management across ASEAN countries. In Indonesia, one of the regional forerunners, the government has successfully issued multiple green bond tranches since 2018, totaling USD 3.5 billion, to fund renewable energy projects, flood mitigation, and sustainable transportation initiatives. Empirical analysis by Setyowati (2021) indicated that investments from green bonds have contributed to enhancing climate adaptation capacity in major cities such as Jakarta and Surabaya, while also improving regional sustainable development indicators.

In Thailand, the study by Kanchanapiya et al. (2022) revealed that integrating green finance into the urban development planning of the Bangkok metropolitan area has enhanced energy efficiency, expanded green spaces, and promoted green building models. Additionally, Malaysia has established a national Sustainable and Responsible Investment (SRI) Taxonomy to direct investment flows toward sectors with positive environmental impacts. Evidence suggested that companies adopting green finance models demonstrate environmental performance that is over 12% higher than the industry average (BNM, 2022).

Notably, the quantitative study by Nguyen et al. (2023) in Vietnam utilized data from public investment projects aligned with green criteria during the period 2016–2021 and found that provinces with higher proportions of green investment exhibited lower per capita CO_2 emissions and faster disaster response capabilities following extreme climate events. These empirical studies demonstrate that, when properly designed and managed, green finance is not only an effective alternative source of capital for public investment but also a foundational mechanism for sustainable development and enhanced climate adaptation in Southeast Asian cities—a region under significant pressure from sea-level rise, extreme rainfall, and rapid urbanization.

III. THE CURRENT STATE OF GREEN FINANCE IN SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE ADAPTATION IN DANANG CITY

A. The Current State of Green Finance

Danang City is facing numerous adverse impacts of climate change, including urban flooding, coastal and mountainous landslides, increasing extreme temperatures, and a decline in biodiversity in coastal and highland areas. These challenges underscore the urgent need to develop sustainable financial mechanisms, among which green finance is considered a key instrument to enhance the city's adaptive capacity and to realize the goal of sustainable urban development.

Recently, Danang has begun implementing several notable initiatives related to green finance. A prominent example is the signing of a strategic cooperation agreement with the Bank for Investment and Development of Vietnam (BIDV) in March 2024 to develop green credit products for projects involving clean energy, wastewater treatment, and technological upgrades in industrial zones. In addition, the city is also cooperating with international organizations such as GIZ (Germany) and UNIDO to implement eco-industrial park models in Hoa Khanh and Lien Chieu—an approach that integrates green finance through technical assistance and capital mobilization for green industrial activities (UNIDO Vietnam, 2023).

However, the green finance ecosystem in Danang remains nascent and faces numerous limitations. According to the International Finance Corporation (IFC, 2023), the city currently lacks a dedicated legal framework and clear operational mechanisms for green finance at the local level. Green projects mainly rely on official development assistance (ODA) and international cooperation programs, while domestic green financial instruments—such as urban green bonds, sustainable investment funds, and climate risk insurance—have yet to be implemented. Additionally, the capacity of local officials in identifying, appraising, and monitoring green finance projects remains limited, falling short of the requirements for localizing international standards such as the EU Green Taxonomy and ICMA guidelines (UNDP, 2022).

Although the Government issued Resolution No. 119/NQ-CP (2021) and the National Assembly passed Resolution No. 170/2024/QH15 to orient Danang towards becoming an international financial center with a focus on digital finance and green finance, no concrete proposal had been announced as of mid-2024. This delay has resulted in a significant gap between policy direction and implementation, undermining the effectiveness of capital mobilization and the practical execution of green programs.

B. Institutional Opportunities and Strategic Shifts

A significant milestone in the development of green finance in Danang was marked by the issuance of Official Notice No. 340/TB-VPCP dated July 1, 2025, by the Government Office. In this document, Permanent Deputy Prime Minister Nguyen Hoa Binh delivered conclusions and provided direct instructions on the establishment of the International Financial Center in the city, centered on two key pillars: digital finance and green finance.

Accordingly, Danang has been instructed to promptly plan financial zones, develop technical and technological infrastructure, train high-quality human resources, and promote investment. These directives create favorable conditions for the city to integrate green financial instruments—such as urban green bonds, green investment funds, climate risk insurance, and preferential credit for low- carbon projects—into its emerging financial ecosystem.

Positioning green finance within the structure of the financial center will enable Danang to strategically channel capital flows into sustainable sectors such as renewable energy, low-carbon transportation, wastewater treatment, and green construction. This approach aligns with the national Green Growth Strategy as well as the city's vision of becoming an "environmental city" and achieving carbon neutrality by 2050.

IV. SOLUTIONS AND RECOMMENDATIONS

To effectively harness the potential of green finance in promoting sustainable development and enhancing climate change resilience in Danang, it is essential to implement the following solutions in a comprehensive and coordinated manner:

First, completing the legal framework and establishing a green finance coordination mechanism at the

local level is a fundamental requirement. Danang should urgently develop and issue a city-level set of criteria for identifying green projects, referencing international classification systems such as the EU Green Taxonomy and the ASEAN Green Framework, while adapting them to the city's specific environmental, infrastructural, and technical conditions. This set of criteria will serve as the legal basis for guiding, assessing, and monitoring green-oriented projects in the mobilization and allocation of financial resources. Experience from Indonesia (OJK, 2020) demonstrates that the early localization of the EU Green Taxonomy has enabled more effective management of green credit portfolios in the energy and infrastructure sectors. In parallel, Danang should establish a municipal Green Finance Coordination Committee comprising representatives from the Department of Finance, Department of Agriculture and Environment, commercial banks, enterprises, and scientific and technological organizations. This committee would be responsible for monitoring green capital flows, verifying project compliance, and ensuring cross-bencher coordination in the implementation of green development goals.

Second, piloting green financial instruments is a breakthrough step to generate new sources of capital. Danang should issue urban green bonds for projects with significant environmental and social impact, such as electric bus systems, organic waste treatment plants, and flood control and storm- water drainage infrastructure... Experiences from Thailand and Malaysia show that green bond issuance not only enables cities to access low-cost capital but also enhances transparency and accountability in public investment (ADB, 2022). In addition, the city should accelerate the establishment of a municipal sustainable investment fund, mobilizing resources from multiple sources: local government budgets, contributions from commercial banks, technical assistance from international financial institutions (such as the World Bank and the Green Climate Fund), and private sector participation. This fund should prioritize investment in key sectors such as green transportation, circular urban development, and renewable energy.

Third, strengthening the capacity of personnel and standardizing green finance procedures are essential conditions to ensure the quality and sustainability of implementation. The city should organize specialized training programs for technical staff from relevant departments, agencies, and commercial banks on topics such as green project classification, ESG reporting standards, environmental risk assessment, and green capital monitoring mechanisms. Experiences from Singapore and South Korea have demonstrated that interdisciplinary training, combined with practical application and international expert support, can significantly narrow the gap between policy and practice. Additionally, Danang should collaborate with organizations such as UNDP, GCF, and GGGI to develop climate impact assessment tools for public investment projects, thereby integrating climate change considerations from the planning stage onward.

Finally, green finance should be integrated into the review and re-planning of long-delayed projects, particularly in environmentally sensitive areas such as the Son Tra Peninsula and the former Quang Nam region. Applying green finance criteria to reassess the ecological risks of stalled projects will enable selective categorization and restructuring of the investment portfolio. For projects with potential for ecological restoration, the city should prioritize restructuring them towards green functional transformation. This includes mobilizing green loans, carbon credits, or support from international climate funds to redevelop such sites into sustainable Eco-tourism zones or urban regeneration parks. This approach has been effectively implemented in the Philippines, where abandoned riverside projects were revitalized into green public spaces through the use of local climate finance mechanisms.

In summary, the four groups of solutions outlined above form a tightly connected framework that will enable Danang not only to effectively leverage green financial resources but also to establish a sustainable institutional and technical foundation, progressively realizing its vision of becoming an Eco-city and achieving carbon neutrality in the near future.

V. CONCLUSION

Green finance is not only a capital mobilization tool but also a strategic instrument for guiding sustainable, low- carbon, smart, and climate-resilient urban development. For Danang, integrating green finance into its emerging financial ecosystem and urban planning is a critical factor in achieving the dual goal of becoming both an international financial center and a carbon- neutral Eco-city by 2050. To realize this vision, the city must urgently establish an enabling institutional framework, invest in human resource development, and promote diverse, transparent, and sustainability- oriented financial mechanisms.

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