Situation and solutions for the construction industry in the trend of green economic development in Vietnam

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Abstract: The trend of developing a green economy is becoming a global trend and is supported and promoted by many countries and international organizations. The green economy focuses on sustainable development and minimizing negative impacts on the environment and natural resources. Around the world, many countries have launched plans and policies to promote the green economy, including the transition to renewable energy, waste treatment and reuse, enhancing energy efficiency and resources, encouraging the use of green products and services. The construction industry plays an important role in the economy but also contributes significantly to environmental pollution, resource use and carbon emissions globally. Developing the construction industry in a green economy is one of the important approaches to achieving sustainability in the construction sector. In Vietnam, the Government has launched many policies and plans to encourage the development of a green economy. Activities include promoting the use of renewable energy, promoting the use of electric vehicles and green products and services, improving air and water quality, and disposing of waste in a sustainable manner. The construction industry in particular has also begun to transition to a green building model, in which many construction works have been designed and built using international standards and certifications on green construction. However, the development of a green economy, including the construction industry, still faces many challenges, including high costs and lack of resources, as well as necessary changes in the way companies and organizations operate.

Keyword: green economy; construction industry; energy; resource; global; Vietnam.

1 Introduction

The green economy trend has become a global trend in recent times, as it helps reduce the impact of business activities on the environment and society. The green economy is not only about integrating environmental issues into economic development, but it is now understood more deeply, addressing balanced and harmonious development between goals.
Nowadays, it is considered a new development model that many countries support and follow. According to the United Nations Environment Programme (UNEP), the green economy is "an economy that improves human well-being and social equity, while reducing environmental risks and ecological scarcities" [1]. Meanwhile, the European Union (EU) believes that "the green economy is an intelligent, sustainable and fair economy that promotes growth" [2]; The International Chamber of Commerce (ICC) considers the green economy from a business perspective and believes that "the green economy is an economy in which economic growth and environmental responsibility go hand in hand and support social development” [3].

The concepts of different organizations have different expressions, but they all converge on three main points:

1. The green economy is an environmentally friendly economy that reduces greenhouse gas emissions to minimize climate change.
2. The green economy is a deepening economy that wastes less fuel, strengthens eco-industries, and innovates technology.
3. The green economy is a sustainable growth economy that eradicates poverty and develops equity.

Through the concepts above, it is clear that the green economy is the target model for countries. According to a study by a group of UNEP experts, the green process not only creates more wealth, especially for natural capital, but also increases the speed of GDP growth. The green economy is also a pillar for poverty reduction.

The trend of the green economy is also one of the important topics addressed in the United Nations Sustainable Development Agenda (Agenda 2030). The Sustainable Development Agenda of the United Nations is a global action plan approved by the United Nations in 2015 to promote sustainable development and reduce poverty worldwide. The agenda consists of 17 Sustainable Development Goals (SDGs) and 169 specific targets. These goals and targets cover many aspects of sustainable development, including reducing poverty, ensuring high-quality education, improving health and promoting sustainable economic development [4].

In the overall field of economic development, the construction industry is playing an important role in the green economy trend worldwide. As of 2020, the construction industry accounted for about 40% of global resources and generated about 40% of greenhouse gas emissions [5]. Therefore, improvements in the construction industry can have a significant impact on reducing its environmental impact.

Green building is a form of construction that minimizes the impact on the surrounding environment. The main goal of green building is to reduce the consumption of energy and material resources, while ensuring comfortable conditions inside the building throughout its life cycle, including technical surveys, design, construction, operation, repair, renovation, and demolition. The practice of green building has expanded and supplemented traditional building designs with concepts of usefulness, efficiency, durability, and convenience. The basic idea of constructing green buildings is to enhance the sustainability of the living environment by minimizing the overall impact of construction projects on the environment and human health.

The green development trends in the construction industry may include:

- Green design: Green design is the process of creating structures and buildings with the aim of maximizing the use of renewable resources and limiting the use of non-renewable resources.
- Green materials: Green materials are materials that can be recycled, are environmentally friendly, and do not cause pollution to the environment.
● Energy savings: Energy-saving buildings are capable of using less energy than traditional buildings. Ways to save energy include using energy-saving devices, automatic lighting systems, and efficient air conditioning systems. Using renewable energy: Using renewable energy such as solar, wind, and water to supply buildings is a way to save energy and protect the environment.
● Waste and wastewater treatment: Properly treating the waste and wastewater of buildings will help reduce negative impacts on the environment. Ways to treat waste and wastewater include using efficient wastewater treatment systems, separating waste, and recycling them.

2 Method
To obtain data for this study, the author mainly used secondary data collection methods from summary reports of reputable organizations both domestically and internationally, such as the Vietnam Green Building Council (VGBC), US Green Building Council (USGBC), International Chamber of Commerce (ICC), World Bank; agreements, current legal regulations of Vietnam and international laws; studies from domestic and foreign journals, scientific reports, and information on the internet.

3 The current situation of the construction industry in the trend of green economic development

3.1 In the world

3.1.1 Situation
Greening the construction industry is a movement to build environmentally friendly structures that has emerged since the end of the 20th century (1990-1995), and has been implemented by nearly 100 countries worldwide. In 2015, the World Green Building Council (WorldGBC) set the goal of "no greenhouse gas emissions from buildings by 2050" [6].

Green buildings aim to evaluate buildings built for ecosystem conservation, non-impact operation on regional and urban environments, reduced consumption of fossil energy, thereby reducing CO2 emissions, conserving natural resources, especially water resources, and creating the best living environment for people. The green building model proposed by the US Green Building Council (USGBC) in 1995 and widely recognized around the world includes standards: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality.

The United States is one of the countries leading this movement, with many policies and standard systems to encourage and guide green construction projects, specifically:
● The US Green Building Council's (USGBC) Green Building Standard program: USGBC is a non-profit organization specializing in green building and green building management. The USGBC's Green Building Standard program provides the LEED (Leadership in Energy and Environmental Design) standard system to evaluate and certify green buildings, construction projects, and urban areas.
● Policy to encourage the use of solar energy: Local and state governments provide programs to encourage the use of solar energy for construction projects. This
includes financial support for the installation of solar panels and other energy-saving solutions.

- Policy to encourage the use of recycled building materials: Local and state governments provide programs to encourage the use of recycled building materials to reduce construction waste.
- Rainwater management policy: The US government provides programs to encourage rainwater management solutions to reduce the impact of construction on the environment (such as designing drainage systems, installing wastewater treatment facilities, and building rainwater storage tanks).

In addition, the European Union (EU) has also implemented many policies and standards to encourage and guide green construction projects, including regulations on energy efficiency and green building standards, along with funding and training and research programs related to green building. However, the green construction process in EU countries is still developing and facing many issues. Regulations and standards for green construction vary by country in the EU. This can lead to unevenness in green construction and requires coordination among member states to achieve the EU's green construction goals.

Besides, the Asia region is also making significant efforts and achievements in the development of green construction. However, according to research by the US Green Building Council, the greenest construction-developed country in Asia today is Singapore. Singapore has very strict policies and standards for green construction, such as the Singapore Green Mark Scheme, which is a green building standard system similar to LEED in the US. Singapore plans to have 80% of its buildings be green by 2030. It has established a subsidy of 50 million Singapore dollars for the green construction award criteria plan, supporting small and medium-sized developers and tenants at existing buildings and locations using energy-saving and green equipment [7]. In addition, Singapore invests heavily in research and development of green building solutions, especially in the smart city field. Green building projects in Singapore often incorporate energy and resource-saving solutions, utilize recyclable and reusable building materials, and focus on improving air and water quality. Many buildings in Singapore have achieved green building certifications such as Marina One, CapitaGreen, and Mapletree Business City.

China is one of the countries with the highest levels of environmental pollution in the world and is facing serious challenges related to resources and the environment. Therefore, green building has become an important topic and is encouraged by the Chinese government. In recent years, China has introduced many new policies and standards to encourage green building. For example, China has issued the national standard GB/T 50378 for green building, as well as regulations on energy savings and emissions in building construction [8]. In fact, in major cities in China such as Beijing and Shanghai, high-rise buildings and new urban areas are often designed and built to green building standards. Many buildings and urban areas have achieved international green building certifications such as LEED, BREEAM, and Green Mark. In addition, China has also introduced solutions to enhance the use of renewable energy sources in construction: solar and wind energy systems are integrated into the design of many construction projects in China.

Although the supportive policies for green building in each country may differ depending on local conditions, they all aim to encourage the use of green building solutions and enhance environmental protection.
3.1.2 International standards system

Currently, the most widely used international standards for green construction are LEED (USA), BREEAM (UK), and EDGE (Switzerland).

- LEED (Leadership in Energy & Environmental Design): This is a certification for green buildings awarded by the US Green Building Council (USGBC), established in 1995 in the US. It is an international pioneering standard for energy-efficient construction and protection of the human living environment. To receive LEED certification, construction projects must comply with standards for energy efficiency and create a green environment, such as increasing water efficiency, reducing emissions, improving the quality of the living environment, enhancing the adaptability of the project to environmental changes, and optimizing the use of renewable energy sources.

- BREEAM (BRE Environmental Assessment Method): This is the first set of green building evaluation standards in the world, issued by the UK's Building Research Establishment (BRE). The standard is quite flexible and can be modified to suit many different climatic regions. However, since it only applies to projects within the UK, it is not widely used in many countries around the world.

- EDGE (Excellence in Design for Greater Efficiencies): This is a resource-efficient construction evaluation system that helps save energy, water, and energy used to produce construction materials, thereby reducing greenhouse gas emissions. To achieve EDGE certification, projects must ensure a minimum of 20% reduction in energy, water, and energy contained in materials, which is the energy used throughout the life cycle from production to disposal of the materials compared to conventional projects.

According to the USGBC (U.S. Green Building Council) report in 2020, as of June 2020, there were over 100,000 LEED-certified buildings worldwide, with more than 2.6 million square meters certified everyday [9]. Many countries and regions around the world are promoting the development of green building through encouraging policies and support. For example, the United Kingdom government has committed to building all new public buildings to BREEAM standards since 2019 [10], while the Chinese government has committed to building at least 50% green buildings by 2020 [11].

3.1.3 Some typical projects

The construction industry is increasingly focusing on using environmentally friendly materials and construction technologies to minimize its impact on climate and the environment. New technologies such as BIM (Building Information Modeling) and IoT (Internet of Things) are being applied to help manage and optimize energy efficiency in construction projects.

Here are some notable examples of green design in the construction industry:

- “One Angel Square” in Manchester, UK: The headquarters of the Co-operative Group with over 3,000 employees. This building was once awarded "Outstanding" according to the BREEAM scale of the UK Building Research Organization. The building uses energy from a pure vegetable oil thermal power system and utilizes rapeseed oil grown on the Co-operative farm. Excess energy will be reused. The building also uses LED lights, a waste recycling system, and rainwater [12].

- “The Crystal” in London, UK: This building is one of the most advanced green design buildings, operated entirely by electricity, mostly from photovoltaic solar
panels. The building is illuminated by an LED lighting system and fluorescent lights that turn on and off automatically depending on the amount of sunlight. The roof is designed to retain rainwater, while waste is treated and recycled on site [13].

- “Bahrain World Trade Center”, Bahrain: This building has two interconnected skyscrapers connected by huge wind turbines that generate electricity from wind. The building also has a smart energy management system and energy-saving air conditioning [14].

- “Sun-Moon Mansion” in Dezhou, Shandong Province, China, with an area of 75,000 square meters, is one of the largest solar-powered buildings in the world. Comprising office buildings, hotels, and convention centers, the building uses solar energy to supply hot water. The Sun-Moon Mansion also has over 4,600 square meters of photovoltaic panels on the roof to provide electricity [15].

3.2 In Vietnam

3.2.1 Situation

As of 2021, green construction is slowly developing in Vietnam but still in its infancy and not yet widely adopted. However, the Vietnamese government is making commendable efforts to promote green development, particularly in the construction industry. According to the Vietnam Green Building Council (VGBC) report, as of June 2021, Vietnam has 276 buildings certified with green building standards, including 258 LEED-certified buildings and 18 LOTUS-certified buildings (Vietnam's green building rating system). These buildings are located throughout the country, from major cities such as Hanoi and Ho Chi Minh City to other provinces such as Da Nang, Can Tho, Hai Phong, Quang Ninh, Binh Duong, Vung Tau, and Nha Trang. Among them, Hanoi and Ho Chi Minh City have the highest number of green-certified buildings. Hanoi currently has around 78 LEED-certified buildings and 2 LOTUS-certified buildings, while Ho Chi Minh City has approximately 124 LEED-certified buildings and 14 LOTUS-certified buildings. Additionally, according to VGBC, Vietnam has over 1,500 green construction projects in progress or in the design stage, with more than 700 projects using international standards such as LEED, LOTUS, and EDGE [16].
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Table 1: General comparison of some green building certification systems

<table>
<thead>
<tr>
<th>Certification systems</th>
<th>LOTUS</th>
<th>LEED</th>
<th>EDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizations</td>
<td>VGBC</td>
<td>USGBC</td>
<td>IFC – World Bank Group</td>
</tr>
<tr>
<td>Released year</td>
<td>2010</td>
<td>1998</td>
<td>2013</td>
</tr>
<tr>
<td>Target market</td>
<td>Vietnam</td>
<td>US and International market</td>
<td>Emerging countries</td>
</tr>
<tr>
<td>Application in Vietnam (as of June 2021)</td>
<td>18 projects</td>
<td>258 projects</td>
<td>1.017.300 m²</td>
</tr>
<tr>
<td>System structure</td>
<td>Point-based system</td>
<td>Design performance-based</td>
<td></td>
</tr>
<tr>
<td>Certification conditions</td>
<td>Meet all 8 prerequisites Score at least 40/108 points</td>
<td>Meet all 12 prerequisites Score at least 40/110 points</td>
<td>Reach 20% efficiencies each at: - Energy - Water - Embodied energy in materials</td>
</tr>
<tr>
<td>Certification and Classification</td>
<td>4 classifications level (based on total points scored)</td>
<td>No classification level</td>
<td></td>
</tr>
<tr>
<td>Certified</td>
<td>Sliver</td>
<td>Gold</td>
<td>Platinum</td>
</tr>
</tbody>
</table>

Source: [17]

Table 2: Comparative evaluation criteria of some green building certification systems

<table>
<thead>
<tr>
<th>Comparative Criteria</th>
<th>Certification systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOTUS</td>
</tr>
<tr>
<td>Rating system</td>
<td></td>
</tr>
<tr>
<td>New construction &amp; Major Renovation</td>
<td>Homes, Dwelling units</td>
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<tr>
<td></td>
<td>Multi-Family Residential Buildings</td>
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<tr>
<td></td>
<td>Industrial buildings</td>
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<tr>
<td>Existing buildings</td>
<td>√</td>
</tr>
<tr>
<td>Interior spaces</td>
<td>√</td>
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<tr>
<td>Cities &amp; Communities</td>
<td>x</td>
</tr>
<tr>
<td>Category group</td>
<td></td>
</tr>
<tr>
<td>Resource Efficiencies</td>
<td>Energy efficiency</td>
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<tr>
<td></td>
<td>Water efficiency</td>
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<td></td>
<td>Material use efficiency</td>
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<tr>
<td>Occupant wellness</td>
<td>Indoor Environmental Quality</td>
</tr>
<tr>
<td></td>
<td>Building occupant comforts</td>
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<tr>
<td>Environmental impacts</td>
<td>Location &amp; Transportation</td>
</tr>
<tr>
<td></td>
<td>Negative impacts on site</td>
</tr>
<tr>
<td></td>
<td>Waste &amp; Pollution management</td>
</tr>
</tbody>
</table>
Although it is a global trend, green building faces many difficulties and challenges when implemented in Vietnam. The reasons for the difficulties in implementing green construction projects come from various sides, including:

- A portion of businesses, investors, developers, architects, engineers, and consumers still lack awareness of the benefits and value of green building. They are not familiar with sustainable construction methods, how green building systems work, and still believe that green building is an expensive option. Moreover, Vietnam currently lacks formal and professional training programs that can provide the necessary skilled workforce to design, build, and manage green building, leading to difficulties in implementing green construction projects.

- Lack of policies and support from the government to encourage businesses and developers to invest in green building projects. Currently, the Vietnamese government does not have specific support policies to promote the construction of green buildings, such as tax incentives, discounts, or clear regulations on green building standards. In addition, implementing green construction projects requires coordination among many ministries, sectors, and localities, but there is currently no closely linked mechanism among these entities for this issue.

- The shortage of quality and reasonably priced green building products and materials. The capacity to produce green materials in Vietnam is still limited and heavily dependent on imports from other countries. However, there have been some domestic companies that have invested in and developed the production of green building materials such as smart house walls, insulation materials, solar energy panels, energy-saving lighting systems, and environmentally friendly air conditioning systems. These companies have applied new and advanced production technologies to minimize environmental impact, improve efficiency, and reduce production costs. However, the quantity and quality of green building products and materials are still limited compared to market demand.

### 3.2.2 Some typical projects

Here are some typical green construction projects in Vietnam:

**ACB Building, 218 Ba Trieu, Hanoi:** is one of the first LEED Platinum certified standard office buildings in Vietnam. The building is designed with energy-saving solutions and energy optimization, including air conditioning systems, energy-saving lighting systems, and water-saving systems. In addition, the building uses building materials and equipment that meet environmental and human health protection standards. The wastewater treatment and waste management system of the ACB building is also designed to minimize environmental impacts. Furthermore, the building has a rooftop garden and green space to create a cool and improve air quality.

- **Vincom Landmark 81 Complex, Ho Chi Minh City:** is one of the large and modern premium real estate projects. It has achieved EDGE certification with many green solutions, including:
  
  + The use of environmentally friendly and recyclable building materials. Design of gardens on each floor to enhance the ability to absorb CO2 and reduce the temperature of the surrounding environment.
  
  + Application of energy-saving technology in air conditioning and lighting in public areas and apartments.
  
  + The use of a recycled water system to irrigate plants and clean the surrounding area.
+ The use of green trees and vines planted on each floor to reduce emissions and improve air quality.

- Solar Energy Park in Danang: is a typical example of renewable energy in Vietnam, built to maximize solar energy to produce electricity and reduce environmental pollution. The park covers an area of 6.7 hectares in Phuoc Ly, Son Tra district, Danang city and was completed in 2019.

The Solar Energy Park in Danang includes 4 solar power stations with a total capacity of 2.6 MWp and over 7,400 solar panels. The park is designed with a sunlight tracking system and a remote monitoring system to optimize electricity production. In addition to providing electricity to the local area, the solar energy park in Danang also contributes positively to protecting the environment and reducing greenhouse gas emissions. This project is a typical example of applying green technology to solve energy and environmental issues.

- Six Senses Con Dao Resort, Ba Ria-Vung Tau: is a resort built with a focus on environmental sustainability. The resort is designed to blend harmoniously with nature and to minimize its impact on the environment. The resort uses eco-friendly materials, reduces waste and water consumption, and uses renewable energy sources. Six Senses Con Dao Resort is also actively involved in conservation activities to protect sea turtles, coral reefs, and other endangered species.

4 Solution for developing the construction industry in the trend of green economic development in Vietnam

4.1 Improving regulations, standards, and norms

As of now, there are over 14 Vietnamese standards and regulations on energy efficiency and conservation that have been researched, developed, and published by the Ministry of Construction and transferred to the Ministry of Science and Technology. Some of these standards and regulations include:

- QCVN 09:2017/BXD - National technical regulation on energy-efficient buildings (based on the review and amendment of QCVN 09:2013/BXD
- TCVN 13470-1:2022 ISO 52003-1:2017 - Energy performance of buildings - Indicators, requirements, ratings, and certificates etc.

However, there is currently no legal tool in place for evaluating green projects to serve state management in general. This has led to the spontaneous development of certified green projects that are not supervised, inspected, or maintained. Many projects are labeled as "green" or "ecological," but they do not demonstrate positive contributions to the environment or society. The government needs to establish common criteria for evaluating green projects, issue regulations for managing green projects throughout their lifespan to serve management work. Based on this, investors and design consultants have a basis for developing green projects in a systematic, serious manner.

International experience shows that it is necessary to improve and upgrade the system of standards and criteria to support the implementation of green project design, construction, and operation, as well as energy-efficient projects. However, it is necessary to quickly implement a series of other related technical standards related to materials, installation and equipment design, and evaluate the energy efficiency of materials and equipment and the energy efficiency of buildings.
In addition, the government needs to design and build a pilot model of a green project. Implementing a pilot design and construction project for a green project that fully complies with national standards, criteria for green projects, and achieves the highest level of energy efficiency, water and environmentally friendly materials, higher indoor environmental quality, and creates a realistic model example. This will create the best example to replicate and promote the development of green projects in Vietnam.

4.2 Developing and issuing incentive policies to encourage the development of green infrastructure

The government needs to develop and issue policies and mechanisms to remove all barriers and obstacles to the development of green infrastructure, and to provide both material and non-material incentives to economic actors. To promote and incentivize the development of green infrastructure in Vietnam, the government needs to introduce supportive policy mechanisms such as:

- Financial support: The government can provide funding, preferential loans, or other forms of support to investors, project owners, and organizations with green construction projects.
- Tax incentives: The state can issue tax reduction, exemption, or import tax reduction policies for materials, technologies, and equipment related to green construction.
- Promoting research and development: The government can fund research and development activities related to green construction and create favorable conditions for organizations and businesses to carry out these activities.
- Implementing promotional programs and campaigns: The government can implement promotional programs and campaigns about green construction to enhance public awareness of the benefits of green construction and promote the development of green construction projects in Vietnam.

4.3 Developing scientific research and technology for green building design solutions

Developing scientific research and technology is an important factor in developing green building design solutions. Researching and developing new, efficient, and energy-saving solutions in green building design will help enhance energy savings, reduce emissions, and minimize negative impacts on the environment. Some research and development solutions for green building design in Vietnam may include:

- Creating favorable conditions for organizations, businesses, universities, research institutes, etc. to participate in research and development activities related to green building design. The government can provide financial support to organizations and businesses to carry out research and development projects related to green building design, for example: researching solutions for architectural design and the structure of the cover around the building to enhance the effectiveness of preventing and reducing solar radiation passing through the cover structure into the building, using renewable energy efficiently, improving the living environment quality inside the building; researching technical measures to maximize natural light usage, reduce the use of electric light, and ensure a comfortable light environment inside the building, etc.
Organizing conferences, meetings, exhibitions on green building design to exchange, share experiences and introduce new technologies in the field of green building design, especially promoting cooperation with The World Green Building Council and similar organizations in other countries. In addition, the state should also strengthen the organization of contests, awards to encourage researchers, engineers, architects, and students to develop new, innovative and efficient green building design solutions.

Accelerating the application of new technologies in green construction, including green materials, solar energy systems, efficient insulation and air conditioning systems, such as: researching and developing new environmentally friendly building materials and structures; developing the use of renewable materials, local materials, and good light-transmitting but heat-insulating glass to block solar radiation into buildings; developing water-saving sanitation equipment, on-site graywater treatment, and reuse of wastewater to save clean water resources; collecting, storing, and treating rainwater for use, which can reduce flooding in the rainy season and supplement water sources in the dry season; and so on. In addition, the application of modern management software tools also brings many benefits to the green construction industry. One example is the use of Building Information Modeling (BIM) in managing project information and resources. BIM allows architects, engineers, and contractors to create a detailed 3D model of the entire project, thereby optimizing design, increasing accuracy, and reducing waste. Moreover, this tool allows users to manage all project data, from planning, geological analysis, design, implementation planning, to operation and maintenance management after completion, helping to control and reduce waste of resources and energy during construction and operation, and minimizing the impact of the project on the environment. Recently, on March 17, 2023, the Prime Minister approved the roadmap for implementing BIM in Vietnam under Decision No. 258/QD-TTg on Approving the Roadmap for Applying Building Information Modeling in Construction Activities. This move shows that the government is very interested in and encourages the application of scientific and technological advances to contribute to the formation of a green construction industry in Vietnam [18].

5 Conclusion

Green building is a sustainable development trend in the construction industry, which has positive contributions to the environment and human health. In Vietnam, there is a huge potential for the development of green building with benefits to the environment, economy, and society.

Economically, green building helps reduce operating costs and energy consumption. Green buildings are designed with efficient energy use systems, which help to reduce electricity and water consumption costs. In addition, green building designs can create higher commercial value and attract investors due to the benefits of commercial, image, and reputation.

Socially, green buildings bring benefits to the health and comfort of users. Green buildings are often designed with gardens, green spaces, and cool areas, which improve air quality and reduce pressure on apartments, creating a healthier living environment for residents.
Environmentally, green building helps minimize the impact on the environment and protect natural resources. Green buildings are designed with renewable energy use systems, reduce emissions and pollution, and reduce natural resource and water use.

Although there are still many difficulties in implementing green building in Vietnam, it is necessary to recognize that green building is a trend that not only creates short-term benefits but also long-term benefits for the economy, society, and environment. The development of green building is a necessary and appropriate direction for Vietnam to meet the increasing demand for environmental protection and sustainable resource use.

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