

The Effectiveness of Financial Sources for Climate Change in Vietnam

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Abstract

This research aims to give information about the current situation of five financial sources for climate change in Vietnam, including (i) the State budget used by ministries; (ii) the State budget used by provinces; (iii) Bilateral funds; (iv) Multilateral funds; and (v) Private funds, and then classify them in line with the effectiveness. The working paper's secondary data on spending on CC-related activities, collected from reports of six ministries and 29 provinces, show that the State budget has been crucial in subsidizing CC-related activities in Vietnam. Moreover, domestic investment has accounted for a major part of the total expenditure of ministries and provinces for climate change. In addition, by using primary data collected from surveys sent to twelve experts from 5 groups, such as researchers, practical experts, managers of private funding organizations (such as banks and enterprises), managers of international funding organizations and beneficiaries, and then analyzing the data through the AHP method, the study shows that all climate finance sources in Vietnam are still not very effective. However, private sector funds are considered the most effective financial source for responding to climate change.

Keywords: Climate Change, Climate Finance, Climate Funds, Vietnam

JEL Classification Code: G00, F35, E60

1. Introduction

Currently, climate change (CC), widely recognized as the consequence of greenhouse gas (GHG), such as carbon dioxide, into the atmosphere, is the most significant environmental challenge that humanity faces today (United Nations, n.d.). Over the past century, the Earth has experienced an increase in extreme weather events such as

global warming, drought, hurricanes, a significant increase in sea levels, and earlier spring snowmelt (United Nations, n.d.). According to research carried out in 2021 by Germanwatch, an environmental and development NGO based in Germany, Vietnam features in a list of the ten countries most affected by extreme weather events between 1999 and 2018. These events have led to rising sea levels and risk potential land loss of about 40,000 sq km, which accounts for 12.1% of the total area of Vietnam. This could cause food insecurity and have a negative impact on all economic sectors, as well as social life and public health.

Therefore, Vietnam has prepared policies and activities in response to climate change that has been implemented over the past decade. To be precise, Vietnam was one of the first nations to draw up an action plan to implement the Paris Agreement. In September 2012, the Prime Minister approved the National Strategy on Green Growth for the period 2014–2020, which also included prospective plans up to as late as 2050, which aimed to promote green growth as a means to achieve a low-carbon economy and to encourage diversified capital streams into the Climate Finance area. The Government of Vietnam (GVN) also wants to put in place strategies for sustainable economic development via several policies and support programs to respond to climate change.

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The need for a sustainable increase in production while enhancing resilience and a reduction in greenhouse gas emissions remains critically important. According to the Ministry of Planning and Investment (MPI), to achieve objectives proposed by governmental green development projects, Vietnam will need 30 billion USD of investment capital. Such a huge amount of capital for green growth needs to be mobilized from various sources, including public investment (from the government, INGO grants, and concessional loans) as well as private sector support. In the context of the country's widening fiscal deficits and public debt profile over recent years, securing external development assistance is likely to be a national priority. Moreover, the question of how to use different sources of financing effectively for combating climate change has been posed to authorities.

Both Vietnamese scholars and officials have paid attention to the topics of climate change and climate finance. Some studies assessed the effectiveness of typical funds to finance climate change mitigation activities in Vietnam. Huỳnh (2014) evaluated sources of funds for greenhouse gas (GHG) mitigation projects of NAMAs. Pham et al. (2019) proposed the measuring, reporting, and verification system (MRV) as an effective tool for measuring climate finance in Vietnam. Dong and Nguyen (2020) showed that climate projects in Binh Thuan province, which were funded by ODA, were tardy and inefficient. Mai et al. (2020) focused on the difficulties in implementing a carbon market in Vietnam. Nguyen (2021) focused on the benefits and drawbacks of mobilizing sources of financing through green bonds in Vietnam. Besides, some researchers mentioned other aspects related to green finance, such as Le and Pham (2021) determining factors influencing access to green finance in Vietnam, Dong and Nguyen (2020) and Do et al. (2022) investigating the development of green banks in Vietnam, and Nguyen et al. (2022) examining impacts of environmental Consciousness on Green Purchase Intention of generation Z in Vietnam.

It can be seen that there has not been any research assessing the effectiveness of different alternative sources of financing for climate change in Vietnam, which provided motivation for this study. This working paper aims to give an overview of activities to respond to climate change and climate finance in Vietnam. Based on seven criteria proposed by Sherifdeen et al. (2020) and the AHP approach, this research tried to classify five types of climate finance, including (i) State budget used by ministries; (ii) State budget used by provinces; (iii) Bilateral funds; (iv) Multilateral funds; and (v) Funds from private sectors, in terms of their effectiveness. Finally, the authors make some recommendations to improve the conditions for using sources of funding for climate change in Vietnam effectively, contributing to achieving national goals as well as the Government's commitments on climate change.

This research tries to build evaluation criteria for sources of financing for climate change as well as assess the five types of climate funds described above by using AHP methods. The study findings will contribute to the literature review on various sources for the financing of climate change mitigation. In addition, this working paper provides empirical evidence regarding the effectiveness of climate finance in Vietnam.

The paper is structured into five parts. Besides the introduction, the second part clarifies the main concepts related to climate finance and the criteria for evaluating the effectiveness of climate finance. The research methodology has three main parts, including the collection and analysis of data, and is presented in the third section. The results are shown in part 4. The discussion is given in part 5. Some conclusions, as well as some limitations of the research, are found in the final section.

2. Literature Review

2.1. The Concept of Effectiveness of Climate Finance

The effectiveness of climate finance can be defined as the degree of intervention necessary to achieve set goals (OECD, 2017). As a result, each country may emphasize different aspects when assessing the effectiveness of their interventions to respond to climate change, depending on their different purposes or objectives. In addition, when determining whether a specific intervention is effective or not, determinants such as the context of implementation, the duration of the assessment, and the scale must be considered (OECD, 2017).

According to Buchner et al. (2012) and Caruso and Ellis (2013), the efficiency of financial resources is defined as a response to financial needs and the effective use of available resources to achieve goals relating to climate change mitigation and adaptation. There are two factors to be considered, including (i) The input, that being the value of financial sources used in climate change projects and the methods of allocating capital; (ii) The output, that is what climate change projects bring to the environment and society (Doswald et al., 2014; Knight et al., 2019; McKinnon & Hole, 2015). The output focuses on the implementation process and how projects are carried out to meet the objectives. Both input and output factors are used to assess the effectiveness of sources of financing for climate change.

2.2. Criteria for the Effectiveness of Financial Sources for Climate Change

According to Ford et al. (2013), Nakhoda and Amin (2013), Nakhoda and Norman (2014), and Schalatek

and Bird (2016), the effectiveness of financial sources for addressing climate change can be measured through the assessment of national capacity with several different indicators. A group of nine international financial institutions (IFIs) has calculated the impact of GHGs in their project portfolio (World Bank, 2012), while the carbon footprint tool which is proposed by the French development organization AFD is used to conduct preliminary assessments of greenhouse gas impacts in projects (AFD, 2011). Some organizations, to a lesser extent, prefer indicators such as the amount of renewable energy capacity installed (in MW) and the amount of energy saved annually (in GWh) (SE4ALL, 2013; IDB, 2012; CIF, 2012; GEF, 2011). Furthermore, several organizations have developed a set of indicators, such as implemented policies or capacity-building activities (IDB, 2012; USG, 2012; KFW, 2011).

In addition, since climate change has been increasingly unpredictable, countries have prioritized adaptation goals over mitigation goals. According to the OECD (2017), the effectiveness of climate change adaptation can be measured by specific indicators of vulnerability or resilience, such as (i) The number of people vulnerable to climate change; (ii) The number of laws, policies, regulations, and strategies addressing climate change adaptation; (iii) The number of people evacuated by climate change; (iv) The number of individuals which can access financial sources; (v) The number of organizations which have an increase in financial capacity to cope with climate change; (vi) Upgraded physical infrastructure and assets.

In particular, using an approach focusing on fundamental components of climate finance, including mobilization, allocation, monitoring, and evaluation, as well as effectiveness principles, Sherifdeen et al. (2020) have identified a set of criteria to assess the effectiveness of national climate financing mechanisms. Accordingly, the set of criteria consists of seven separate but closely related components, including (i) The ability to mobilize capital; (ii) Legal and policy regulations; (iii) Fund management and allocation; (iv) Evaluation and monitoring of capital sources; (v) Accountability and transparency; (vi) Vulnerable people's ability to access capital; (vii) Adaptation effect and sustainability impact on the natural environment.

The ability to mobilize capital can be understood as the importance of diverse and innovative climate finance. This criterion is mentioned by some previous studies such as Mendelsohn and Nordhaus (1999), Nelson et al. (2010), Gupta et al. (2010), Tippman et al. (2013), and Schalatek and Bird (2016).

Legal and policy provisions mean that nations must have an appropriate legal and regulatory framework to

encourage the participation of both the public and private sectors. Gupta et al. (2010) and Morita and Pak (2018) noted that a transparent legal system of nations is essential for attracting financial sources from public and private sectors as well as international organizations. The legal and regulatory framework must ensure accountability and transparency through rules and procedures that various stakeholders are required to follow when they are involved in climate projects (Dilling et al., 2019; Irawan et al., 2012).

Fund management and allocation, which are mentioned by Tippman et al. (2013) and Vij et al. (2017), emphasized the importance of managing and distributing climate funds. The outcomes and decision-making processes for allocating financial sources to climate projects are especially important because they have a significant impact on stakeholders' trust. Furthermore, stakeholders must be equally and fairly treated in the decision-making process (Fankhauser & Burton, 2016).

Capital evaluation and monitoring are critical processes in determining whether the project is effective (Lamhauge et al., 2012). To ensure that the expenditure on climate projects is effective for long-term development, each country must focus on developing systems of monitoring and evaluation, as well as ensuring that assessments are conducted regularly in accordance with regulations.

Accountability and transparency focus on the disclosure of information to stakeholders in general and authorities in particular (Lebel et al., 2017). Smyth (2011) stated that accountability is "a situation in which certain actors have the following rights: (i) keep other actors in compliance with a set of standards, (ii) assessing whether such actors have fulfilled their responsibilities under these standards, and (iii) imposing sanctions if these responsibilities are unsatisfied". Authorities are required to be accountable for their actions (Dore & Lebe, 2010; Biermann & Gupta, 2011).

The ability of vulnerable people to access capital means a widespread allocation of financial funds to those people who suffer from climate change, such as farmers, low-income people living in areas prone to frequent natural disasters, ethnic minorities, and manufacturing enterprises. The communication process between stakeholders is critical to this activity (Burch et al., 2013; Adams et al., 2018).

The adaptation effect and sustainability impact on the natural environment must be integrated into all aspects of environmental protection and responses to climate change. This criterion refers to how an adaptation project contributes to long-term and transformative changes (Stein & Shaw, 2013). Furthermore, sustainability can be improved through investment plans and the development of renewable energy sources such as biomass energy, solar energy, wind energy, and others to help reduce emissions

3. Research Methods

3.1. Data Collection

To assess the effectiveness of five financial sources for climate change in Vietnam (including (i) State budget used by ministries; (ii) State budget used by provinces; (iii) Bilateral funds; (iv) Multilateral funds; and (v) Funds from private sectors), the study collects secondary data reported by 6 ministries (including (i) Ministry of Natural Resources and Environment (MONRE), (ii) Ministry of Agriculture and Rural Development (MARD), (iii) Ministry of Industry and Trade (MOIT), (iv) Ministry of Construction (MOC), (v) Ministry of Transport (MT) and (vi) the Ministry of Science and Technology (MOST)), and 29 provinces as well as data of international and domestic organizations over a 5-year period, from 2016 to 2020. Besides, the study also uses the set of criteria proposed by Sherifdeen et al. (2020), which were divided into seven main criteria, including (i) The ability to mobilize capital; (ii) Legal and policy regulations; (iii) Fund management and allocation; (iv) Evaluation and monitoring of capital sources; (v) Accountability and transparency; (vi) Vulnerable people’s ability to access capital; (vii) The adaptation effect and sustainable impact on the natural environment. The questions are designed on a Likert scale from 1 to 5, where 1 is the lowest level of agreement, and 5 is the highest level of agreement.

Next, the researchers selected five groups of experts for interview. They are researchers, practical experts, managers of private funding organizations (such as banks and enterprises), managers of international funding organizations, and beneficiaries. Finally, the research received a total of twelve answers from the five groups of experts mentioned above.

3.2. Data Analysis

The study uses the analytic hierarchy process (AHP) to classify financial sources for climate change in Vietnam. The reason for choosing this model is that AHP is a quantitative method used to evaluate a set of multiple options and select the optimal one based on an analysis of given criteria. Instead of requiring large volumes of respondents, the AHP method only uses the opinions of experts who deeply understand the topic mentioned. With the information gathered from the results of the expert survey, AHP is a useful tool for classifying these five sources of financing for addressing climate change in Vietnam by their effectiveness.

There are:

Five alternatives to classify – Call A_j with $j = 1, 2, 3, \dots, n$ and $n = 5$

- A1: State budget used by ministries
- A2: State budget used by provinces

- A3: Bilateral funds
- A4: Multilateral funds
- A5: Funds from private sectors

Seven criteria – Call C_j with $j = 1, 2, 3, \dots, m$ and $m = 7$

- C1: The ability to mobilize capital
- C2: Legal and policy regulations
- C3: Fund management and allocation
- C4: Evaluation and monitoring of capital sources
- C5: Accountability and transparency
- C6: Vulnerable people’s ability to access capital
- C7: The adaptation effect and sustainable impact on the natural environment

Five groups of decision-makers – Call D_r with $r = 1, 2, \dots, k$ and $k = 5$

- D1: Researchers
- D2: Practical experts
- D3: Managers of private funding organizations (banks and enterprises)
- D4: Managers of international funding organizations
- D5: Beneficiaries.

So, we have:

- \widetilde{X}_{ji}^r is an assessment value of decision-maker D_r about criteria C_j for Alternative A_i
- W_j^r is the weight of the criteria C_j evaluated by decision-maker D_r

In the first stage, authors calculate the weighted average of each criterion and the average value of each alternative, leading to two matrixes. Next, the authors establish the pairwise comparison matrix of criteria, and the relative reciprocal matrix of criteria and calculate the EBQ Ranking Vector for the criteria, as well as deriving priorities (weights) for the criteria as below:

$$EBQ_j = \frac{\sum C'_{ij}}{n} = \frac{\sum C_{ij}}{n} = \frac{\widetilde{w}_i}{\sum \widetilde{w}_j} \tag{1}$$

with $t, j = 1, 2, \dots, 7$

The next step continues by checking the consistency of judgments through a consistency ratio (CR). According to Saaty (2012), the AHP analysis will be executed in case of CR smaller than 0.10. CR is determined by dividing the consistency index (CI) of the matrix by a random-like matrix (RI), while CI is calculated as below:

Weighted sum $[C_j] = \sum C_{ij} \times EBQ_j$ (2)

Consistensive vector $[D_j] = \frac{[C_j]}{[EBQ_j]}$ (3)

$\alpha = \frac{\text{sum } [D]}{k}$ (4)

$CI = \frac{\alpha - k}{k - 1}$ (5)

The process ends when authors calculate the value of each alternative (the higher the value, the better) after finishing the pairwise comparison matrix of alternatives for each criterion, the relative reciprocal matrix of alternatives, and the EBQ Ranking Vector of alternatives for each criterion

$EBQ_{ji} V_i = \sum EBQ_j \times EBQ_{ji}$ (6)

With $i = 1, 2, \dots, 5$ and $j = 1, 2, \dots, 7$

4. Results

4.1. Overview of Financial Sources for Climate Change in Vietnam

4.1.1. State Budgets Used by Ministries and Provinces (A1 and A2)

Overall, there was an upward trend in the expenditure of the six ministries and provinces. Figure 1 started at more than 9,090 billion VND in 2016, after which it saw a slight decrease to nearly 8,351 billion VND in 2017 before gradually increasing to 13,400 billion VND in 2020.

In terms of spending structure, while the total domestic investment and recurrent domestic figures increased, the official development assistance (ODA) for climate change tended to decrease at the end of the period. The proportion of ODA investment and ODA recurrent expenditure accounted for 53.23% and 63.94% in 2016 and 2017, respectively. However, there has been a shift in respect of the ratio of ODA to the domestic budget (including investment and recurrent expenditure) since 2018.

As regards provinces, about 15,000 billion VND was spent on activities to respond to climate change in 2016, with a subsequent considerable rise to about VND 25,000 billion in 2020, which resulted from an increase in ODA investment (Figure 2). The figure for ODA capital started at approximately 3,800 billion VND in 2016, after which it saw significant growth to 10,900 billion VND in 2020. This meant an increase in the proportion of total expenditure, from 24% in 2016 to 46% in 2020. By contrast, the absolute values of the domestic investment budget stayed unchanged over 5 years, leading to a considerable decrease in the proportion of domestic sources of funding from 76% in 2016 to 55% in 2020.

4.1.2. Bilateral Funds (A3)

For five years, Vietnam has been able to approach developed countries such as Japan, the US, the UK, and others for climate funding. Japan's International Cooperation Agency (JICA) and the United States Agency for International Development (USAID) are well-known in Vietnam.

JICA annually spends approximately 10 billion USD on different activities, such: as (i) Promoting growth and enhancing international competitiveness; (ii) Improving

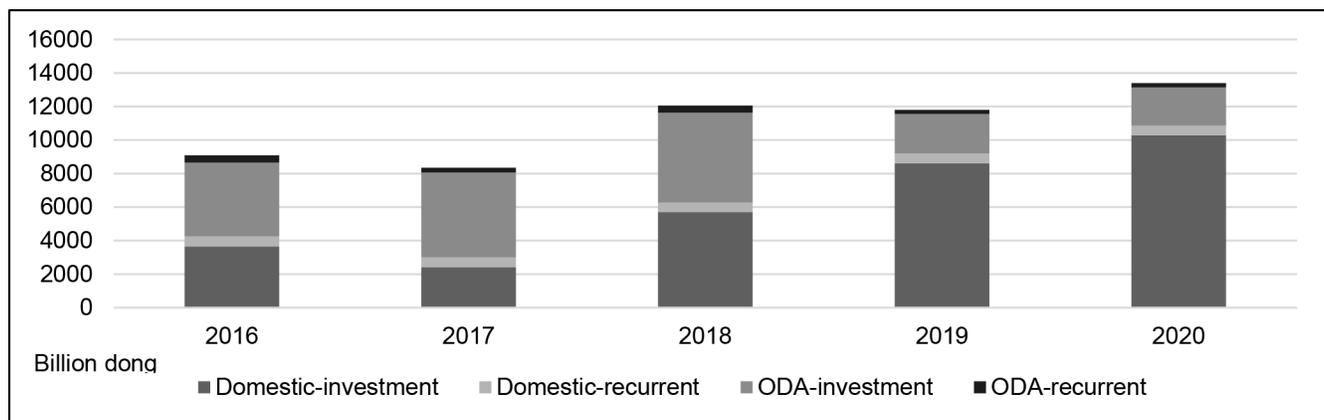


Figure 1: Expenditure of Six Key Ministries on Activities to Respond to CC

Source: Data Collected from Ministries' Report.

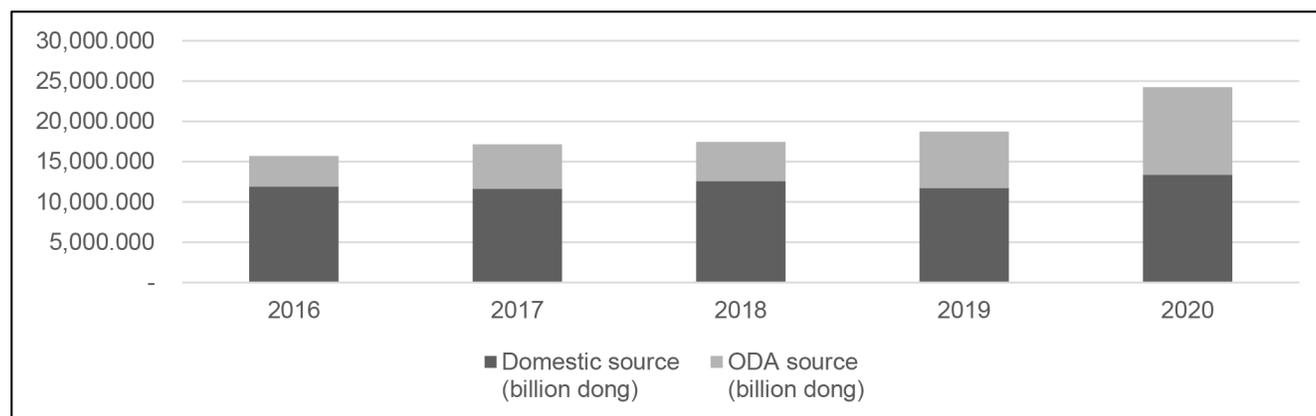


Figure 2: Sources of CC-response Spending in Provinces

Source: Data Collected from Provinces' Report.

living conditions and narrowing the development gap; (iii) Environmental Protection, and (iv) Strengthening Governance. In particular, JICA also has been promoting actions to respond to climate change in Southeast Asia.

USAID's aid to climate change mitigation in Vietnam is around 58.5 billion USD and is provided through several USAID programs, such as (i) Climate Change Cooperation in Vietnam; (ii) Capacity building and institutional reform for green growth and sustainable development in Vietnam (2014–2018); (iii) Vietnam Clean Energy - Energy Saving Program (2012–2017); (iv) Vietnam Low Emission Energy Program (2015–2020); (v) Vietnam Forests and Deltas Program (2012–2017); (vi) Youth and Adaptation in the Red River Delta (2015–2018); and (viii) Program on Sustainable Urban Development and Climate Adaptation (2015–2019).

4.1.3. Multilateral Funds (A4)

In terms of multilateral funds, the Worldwide Fund (WWF) or the Oxford Committee for the Relief of Hunger (OXFAM) are known as international organizations which have implemented several programs to help Vietnam cope with climate change.

WWF is committed to the mission of "Preventing the degradation of the natural environment in Vietnam and building a future where people live in harmony with nature." The vision of WWF Vietnam to 2030 is: (i) Vietnam's ecological footprint will be maintained within allowable limits to maintain biodiversity and create sustainable development; (ii) To maintain and restore ecological integrity and biodiversity in protected areas in Vietnam.

OXFAM started its first activities in Vietnam in 1955. Its vision in Vietnam is to eradicate poverty, injustice, and inequality by enabling women and marginalized communities to exercise their democratic rights. They

have implemented many projects to recover and adapt to climate change in Vietnam, such as (i) Biomass gasification technology - a sustainable energy solution for agricultural product processing and waste management in rural areas of Vietnam (2020–2024); (ii) Inclusion Project – Phase 2 (IP2); (iii) Humans Protect their Ecosystems in the Lower Mekong III (PEM III) (2019–2021), and (iv) Strengthening Vietnam's nationally determined contributions in the energy and agriculture sectors (2021).

4.1.4. Sources from the Private Sector (A5)

In Vietnam, the private sector still has some reluctance to invest in projects to respond to climate change. However, there are some more active organizations in respect of these activities, such as Vietcombank, Vietinbank, Agribank, and Vingroup. In fact, over a period from 2015 to 2019, Vietcombank developed the GREENNESS FOR LIFE project providing financial support above 41.7 million USD. In 2019, the project called FOR A GREEN VIETNAM delivered financial aid of 8.5 million USD in an attempt to protect the environment and plant trees in 63 provinces. Meanwhile, Agribank delivered an investment of 15,220 million USD to support citizens in overcoming difficulties caused by natural disasters and improve people's understanding of the environment. With regard to Vietinbank, this bank has granted green credit to many customers with the project funded by the Green Credit Program. Under this program, medium and long-term loans accounted for 89% of all loans, while the proportions for clean, renewable energy, sustainable water management in urban and rural areas, and waste treatment and pollution prevention were around 65%, 17%, and 16%, respectively.

Besides banks, Vingroup also has a pioneering role in responsibility for the national social environment and has

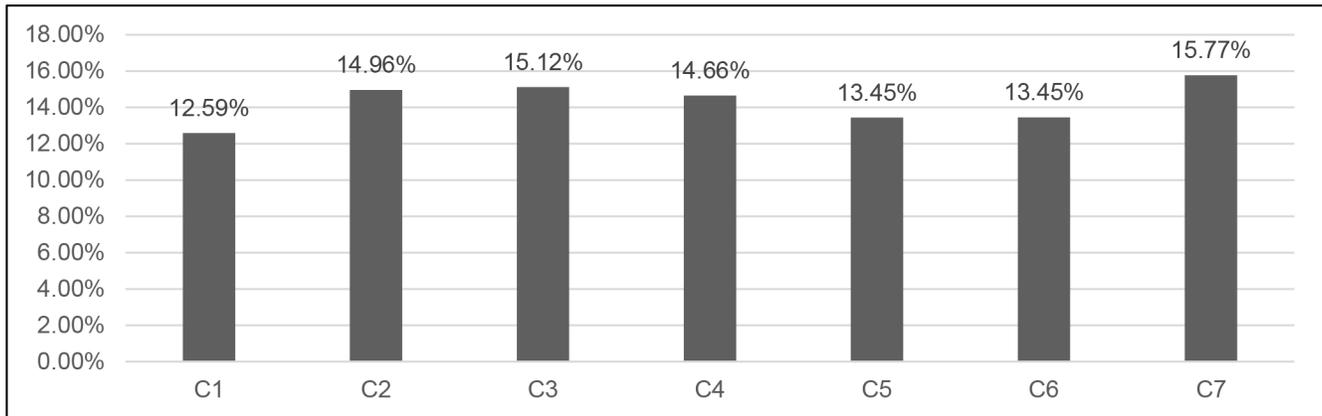


Figure 3: Effectiveness of Financial Sources for Climate Change in Vietnam

Source: Research Results Extracted from Excel.

implemented many projects. For instance, since October 2019, Vinpearl has reduced plastic waste by an average of 1.4 tons per month. In the field of smartphone manufacturing, Vinsmart has launched a campaign, “Say no to plastic,” to raise awareness among employees and suppliers about environmental protection.

4.2. Effectiveness of Financial Sources for Climate Change in Vietnam

Figure 3 shows experts’ assessments of the effectiveness of financial sources for responding to climate change in Vietnam. It can be clear that the values of the five climate funds featured are around 3 out of 5, which means that they are not very effective. In addition, the results of the expert survey indicate that the state budgets used by ministries and provinces are less effective than other financial sources, such as bilateral and multilateral funds and funds of the private sector. However, the difference in scores between different financial sources in Vietnam is not very clear.

To be precise, Table 1 shows the consistency ratio of (0.005) – less than 0.10, meaning that the AHP analysis is acceptable.

Next, the importance of criteria that are assessed by experts is shown in Figure 4. It can be seen that the adaptive effectiveness and sustainable impact on the natural environment is the most important criterion at 15.77%. The second place belongs to the criterion of accessibility of capital with a rate of 15.12%. Financial support policies accounted for 14.96%, putting it in third place. Finally, climate finance’s ability to raise sustainable capital accounts for 12.60%, which is classified as the least important criterion. Moreover, there is not a big difference in the roles among the criteria.

Table 1: Calculation of CR in the AHP Approach

Weighted Sum	Priority	
1.28	0.16	7.94
0.91	0.14	6.68
0.89	0.13	6.61
0.94	0.14	6.82
1.12	0.15	7.44
1.12	0.15	7.43
0.82	0.15	6.34
Total		49.27
Divide the total by 7		7.04
	CI	0.01
	RI	1.32
	CR	0.005

Finally, Table 2 summarizes the results of the AHP and ranks financial resources by their effectiveness. Accordingly, capital from the private sector has the highest value of 0.212. The next place belongs to multilateral funds (0.207) and then bilateral funds (0.203). Meanwhile, the budgets used by ministries and provinces have the lowest indexes (0.191 and 0.184, accordingly).

5. Discussion

The research shows some main points about the effectiveness of climate finance in Vietnam, including (i) The equivalent role of seven criteria used to assess the effectiveness of financial sources for responding to climate change in Vietnam (ii) All five financial sources for climate finance in Vietnam are currently efficient; (iii) Funds from

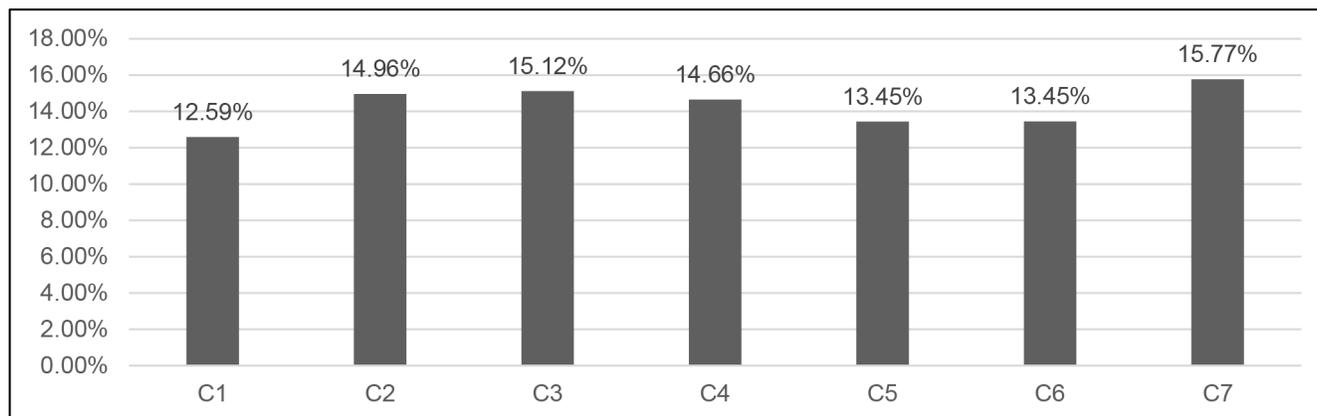


Figure 4: The Importance of Criteria

Source: Research Results Extracted from Excel.

Table 2: Summary of AHP Results and Ranking of Climate Funds by Their Effectiveness

Climate Funds	C1	C2	C3	C4	C5	C6	C7	Value	Ranking
	A1	0.16	0.14	0.13	0.14	0.15	0.15		
A2	0.21	0.20	0.17	0.17	0.18	0.17	0.18	0.194	4
A3	0.19	0.20	0.21	0.20	0.20	0.18	0.18	0.203	3
A4	0.19	0.19	0.21	0.21	0.20	0.21	0.21	0.207	2
A5	0.20	0.19	0.21	0.21	0.21	0.22	0.21	0.212	1

the private sector are considered to be the most effective financial sources for climate finance in Vietnam.

In terms of the seven criteria used to assess the effectiveness of financial sources for addressing climate change in Vietnam, experts indicate that their values range approximately from 13% to 15%, meaning that there is no difference in the importance of these criteria.

With regard to the effectiveness of financial sources for responding to climate change, experts agree that state budgets for climate change measures used by both ministries and provinces are not effective. Bilateral and multilateral funds, as well as financial sources from the private sector, are considered to be more effective than other funds. It is however notable that experts consider their value to be only slightly higher than the overall average, which means that they are still not particularly effective. This result is totally consistent with the evidence given by Tirpak et al. (2014) and Nakhoda et al. (2014) when these authors discussed challenges that developing countries like Vietnam were likely to have to cope with to mitigate and adapt to climate change. This issue primarily originates from the difficulty of defining the roles and responsibilities of stakeholders such

as the Government and funding organizations, as well as difficulties supervising financial instruments.

To be precise, the ineffectiveness of the state budget used by ministries and provinces can be considered to result from the inappropriate allocation of the state budget. This issue is mainly attributable to weaknesses in the planning and budgeting processes (ADB, 2017). There has been a big difference between planned and real public expenses, leading to confused budget statistics. Besides this, there are still various problems related to the transparency of budget data. Furthermore, Yang et al. (2015) showed that difficulties in financial capacity and limitations related to human resources also cause the bad performance of agencies that are responsible for activities to respond to climate change. For the private sector, it is insufficiently straightforward to find out precise data about climate change and climate finance, making firms hesitant to invest in climate projects.

Regarding the conclusion that the private sector finances the climate change response the most effectively in Vietnam, this result is consistent with evidence on the importance of the private sector mentioned by the OECD (2017) and the Department of Climate Change (2020). It can be seen

that private firms' active participation in the mitigation and adaptation of climate change results from the encouragement of the Government and raising awareness of social and environmental responsibilities amongst corporations. Decision No.167/QĐ-TTg has just been signed to approve the programs, aiming to increase sustainable development in the private sector and ensure harmony between economic efficiency and corporate social responsibility and environmental protection, thus contributing to the country's fulfillment of the 17 UN Sustainable Development Goals (SDG) by 2030. Qualifying businesses will be supported with training, strategy building, business plans, technology support, human resources development, finance, production, marketing, internal governance, and more. In addition, corporations are aware of their social and environmental responsibilities. For instance, in the period 2010–2019, there was a significant increase in the number of non-state enterprises investing in energy and the environment, especially in respect of renewable energy production, clean water, health services, and treatment of wastewater and solid waste (CIEM, 2021).

6. Conclusion

The research provides a comprehensive picture of Vietnam's current climate finance sources. Based on seven criteria proposed by Sherifdeen et al. (2020) which are combined with the AHP approach, the study provides evidence of the effectiveness of all five financial sources for addressing climate change in Vietnam. Furthermore, the research ranked the state budget used by ministries as the least effective source of funds, followed by the state budget used by ministries. The third and fourth places belong to bilateral funds and multilateral funds accordingly. The most effective source of financing for responding to climate change in Vietnam comes from the private sector.

This research contributes in part to the development of methods for assessing the effectiveness of financial sources for climate finance. Given the context that information and data on climate finance have not been widely published and are insufficiently transparent, the AHP approach is considered an appropriate method.

This research has some limitations, the most significant of which is related to the quality and quantity of expert surveys. Although the experts selected in this study are those who have extensive experience working in the field of state management of climate change activities and climate finance, their comments may not be comprehensive and objective enough because the number of experts is limited. Therefore, there is a need for further follow-up studies with a richer sample of data collected from more relevant stakeholders. The results of such studies can better assess the effectiveness of different sources of financing for the climate

change response as well as provide highly feasible specific recommendations to use them effectively.

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