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-RESEARCH ARTICLE-

SOCIOECONOMIC ANALYSIS OF INVESTMENT PROJECTS TO BUILD URBAN DRAINAGE WORKS WITH ODA OF THE WORLD BANK IN VIETNAM

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—Abstract—

Government capital and funding and World Bank (WB) donors account for most urban drainage projects in Vietnam. Selecting the most effective investment project is crucial to increase investment efficiency, which is considerably supported by choosing the suitable analysis approach. Due to the unique characteristics of donor-funded urban drainage projects compared to other types of projects, the content of the financial effectiveness study is less important than the socioeconomic analysis. The Socioeconomic Net Present Value, the Socio-Economic Internal Rate of Return (EIRR), and the Socioeconomic Benefit-Cost Ratio are now utilized in Vietnam for comparing and evaluating projects in terms of their socioeconomic impact (EBCR). When researching and evaluating urban drainage investment projects, consulting firms prioritize financial analysis above socioeconomic evaluation. One of the reasons is that the benefits and expenses are difficult to assess and quantify (in economic terms). This article employs qualitative research methods based on secondary data collected from reports, overview documents, and projects that have been and are being implemented in Vietnam and identifies the benefits and drawbacks of the current integrated criteria used for the socioeconomic analysis of urban water supply and drainage projects. It is then proposed to add three additional criteria: the socioeconomic net annual value (ENAV), the socioeconomic life cycle cost (ELCC), and the socioeconomic annual life cycle cost (EALCC). The paper combines the use of quantitative analysis based on primary survey data from a real project in Quy Nhon, Vietnam, with three general criteria (given by the authors) to demonstrate the applicability of the authors' solutions. This expands the alternatives for analyzing investment projects from the Vietnamese government's perspective and helps assess and evaluate projects more quickly and precisely.

Keywords: Urban drainage project, ODA, World Bank, socioeconomic analysis, cost-benefit analysis method

1. INTRODUCTION

In tandem with socioeconomic development, urban areas are expanding in number and size. By the end of June 2021, the urban system of Vietnam will consist of 867 municipalities. The urbanization rate is predicted to be 40.4%, with 2 special-type municipalities, 22 Class I municipalities, 32 Class II municipalities, 48 Class III municipalities, 89 class IV municipalities, and 674 Class V municipalities (Construction, 2021; Toan et al., 2020). The urban drainage infrastructure has been funded sporadically and insufficiently, and many sewage pipes have deteriorated, resulting in a diminished capacity to drain water. Sometimes, untreated wastewater is released directly into the city's general drainage system. Specifically, effluent from industrial parks contributes to the heavy contamination of large rivers such as the Dong Nai, Saigon, Thi Vai, To Lich, Cau, and Day rivers. (Bank, 2013).

Government capital and other financing sources, including World Bank (WB) donors, currently finance urban drainage projects. By 2020, about 32 Vietnamese cities will have

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drainage and sanitation projects from World Bank donors funded by ODA. In Vietnam's cities of Hanoi, Ho Chi Minh City, Da Nang, and Hai Phong, as well as other Vietnamese cities, many significant construction projects are now underway. In the first place, these projects have demonstrated their effectiveness by reducing urban flooding.

Table 1. Some Investment Projects Using Capital from WB Sponsors Have Urban Drainage Components

No	Project name	Governing body	Year of implementation	Total investment (million dollars)	IBRD /IDA Loans (million dollars)
1	Mekong transport and flood prevention project	Non-refundable aid	2001-2011	143,89	220,00
2	Urban water supply and wastewater drainage projects	People's Committee of Binh Duong Province	2011-2019	236,20	200,00
3	Urban upgrading project in the mekong river delta	Ministry of Construction	2012-2018	392,00	292,00
4	Thai Nguyen dynamic city development project	Thai Nguyen City People's Committee	2015-2023	100,00	80,00
5	Vietnam Coastal cities sustainable environment project	Binh Dinh, Quang Binh, Khanh Hoa, Ninh Thuan People's Committee	2017-2022	273,6	236,2
6	Vinh Long urban development project	Vinh Long People's Committee	2020-2025	202,20	126,90

Source: (Ministry of Construction, 2020a, 2020b)

To maximize investment efficiency, selecting the most effective investment project possible is essential, which is highly influenced by selecting the appropriate investment project analysis technique. When analyzing the project from the perspective of the host country, investment projects to construct urban drainage works using ODA capital from the WB combine the integrated criteria with a system of additional criteria; the indices commonly used are socioeconomic net present value (ENPV), internal socioeconomic rate of return (EIRR), and socioeconomic benefit-cost ratio (EBCR). The authors proposed adding three aggregate indicators to the project analysis: socioeconomic net annual value (ENAV), socioeconomic life cycle cost (ELCC), and socioeconomic yearly life cycle cost (SALC) (EALCC).

To enhance investment efficiency, selecting the most effective investment project using an appropriate analysis method and accurate input data is vital. For the investment construction project of urban drainage works utilizing ODA funds from a WB donor, the socioeconomic analysis is crucial in deciding whether or not to accept the investment option.

For the investment mentioned above projects using the capital mentioned above source, the method of using integrated criteria combined with a system of additional measures, namely: socioeconomic net present value (ENPV), internal socioeconomic rate of return (EIRR), and socioeconomic benefit-cost ratio (EBCR) simultaneously with using economic prices is typically applied. However, identifying the benefits and costs in the socioeconomic analysis is difficult due to the difficulty of quantifying intangible benefits.

On the other hand, only a few requirements are met in the practical input data of any project. Therefore, the authors propose adding the socioeconomic net annual value (ENAV), socioeconomic life cycle cost (ELCC), and socioeconomic annual life cycle cost (EALCC) as integrated criteria in project analysis to reduce input requirements, reduce the pressure of input data in analysis, and expand application for analysis of numerous projects.

2. LITERATURE REVIEW

Hutton et al. (2007) have calculated the economic advantages and costs of various measures designed to increase access to water supply and sanitation facilities in developing nations. The results were presented to eleven WHO subregions and on a worldwide scale. At least 80% of the full economic benefit can be attributed to the time savings associated with improved access to water and sanitation services. Even with pessimistic data assumptions, the potential economic gains outweigh the costs in all emerging regions of the world, according to a one-way sensitivity analysis (Hutton et al., 2007). Špačková et al. (2015) utilized Cost-Benefit Analysis (CBA), a common method for determining risk protection. CBA enables the identification of risk mitigation solutions that strike the optimal balance between the cost of mitigation measures and the level of risk reduction. In the actual applications of CBA, efficiency indicators such as the benefit-cost ratio (BCR) and marginal cost criteria (MC) are frequently used to evaluate solutions (Špačková et al., 2015).

Cuong (2012) has systematized criteria and methodologies to evaluate the qualitative and quantitative effectiveness of development investment projects funded by the state budget, highlighting the causes and drawbacks. In the context of economic transformation and integration, design solutions based on this information to enhance the efficacy of investment activities funded by the state budget (Cuong, 2012).

According to Khan (2019), governments receive a large number of financing requests for projects each year from various organizations and municipalities; however, the government's actual capacity to meet these requests is far lower (Khan, 2019). This necessitates that decision-makers assess each project thoroughly before determining which to accept and which to reject. Whether initiatives are picked independently or in collaboration with others, each project must first and foremost be validated based on the government's pressing demands. In addition, the government's resource base, the project's expenses, and advantages to the government and political authority it serves must be examined. The government has utilized cost-benefit analysis more than any other method due to its adaptability and long history of use.

Rodriguez (2021) assessed the costs and benefits of enhancing cleanliness in Vietnam's diverse economic and geographical contexts, resulting in policy suggestions that aid in selecting the most successful and sustainable hygiene programs and initiatives. To compare choices, a variety of financial performance measures, including the benefit-cost ratio (BCR), internal rate of return (IRR), and net present value (NPV), as well as socioeconomic variables, have been added (Rodriguez, 2021). When investing in drainage and wastewater treatment works, Anh et al. (2013) also employed a benefit-cost ratio and annual expenditure per family to evaluate the success of this drainage project (Anh et al., 2013).

In the research of N. T. T. Dung, Khuong, T. T., Trang, V. P. L (2019), various quantitative analysis techniques for assessing the safety of investment projects are examined. This study identifies the conditions for their implementation in an economic evaluation of construction investment projects under risk conditions to assist managers and investors in making the best decisions in construction investment activities (N. T. T. Dung, Khuong, T. T., Trang, V. P. L, 2019). Toan et al. (2020) has developed a model to assess the completion of an investment project in Vietnam, including the construction of transport infrastructure using official development assistance (ODA) funds. The author provides 32 criteria for evaluating the factors influencing building investment activity (Hai, 2020).

Using a cost-benefit analysis, Kiên et al. (2021) has examined the efficacy of the planned garbage recycling project in Hanoi. The monetary value of the project's economic, social, and environmental benefits will be discussed. The study's findings indicate that the project is entirely financially feasible, notwithstanding the low value of the efficiency evaluation indicators. The net present value of the socioeconomic impact ranges from 2.2 to 2.5 times, depending on whether the financial analysis is defined from an equity perspective or a total investment perspective (Kiên et al., 2021).

Phuong (2021) presents a variety of methods for determining the economic rate for the socioeconomic analysis of an investment project, taking into account the costs of borrowing capital, the political climate, the instability of domestic economic policies and international capital markets, as well as the potential financial risks associated with the investment process. In particular, calculating the socioeconomic rate is based on the costs of borrowing foreign money and the supply and demand for investment capital (N. T. T. Dung, Trang, V. P. L, 2021).

There have not been many studies conducted in Vietnam on ODA- and state-funded environmental initiatives and those undertaken have not evaluated the projects' effectiveness. Cost-benefit analysis is the identification, measurement, and comparison of the costs and benefits of an investment project or program. This strategy analyzes private initiatives from a social interest perspective and evaluates public investment projects (Campbell et al., 2003). Therefore, the article employs the method of project analysis suited for the actual conditions of each project's input data, enabling investors and competent state agencies to choose the most effective project with more tools and approaches.

3. RESEARCH METHODOLOGY

Works for drainage, collection, and treatment of wastewater are part of the system of technical infrastructure works that constitute urban drainage. An investment project for building urban drainage works is a construction investment project whose assets are works under the city's drainage and wastewater treatment system. Due to the distinctions mentioned above between urban drainage projects and conventional projects, the analysis contents of this type of project will be modified to place less emphasis on financial efficiency and more on the socioeconomic performance of the task.

Therefore, the article employs qualitative and quantitative research techniques to establish broad criteria for analyzing the socioeconomic circumstances of investment projects to construct urban drainage works in Vietnam using ODA funds from the World Bank. Applying three general criteria (which the authors propose) to a specific investment project demonstrates the authors' solutions.

3.1 Funding for Urban Drainage Projects in Vietnam

The funding for urban drainage projects in Vietnam comes from two key sources: ODA loans from the World Bank and the state budget. Specifically, the total investment capital required to accomplish the project consists of the following:

- **ODA, in which:**

\+ ***IDA*** (International Development Association): (about 70-80% non-refundable issuance, 30-20% interest-free loans, proportion is depending on localities). In Vietnam, this funding has been declining since 2015.

\+ ***IBRD*** (International Bank for Reconstruction and Development): Provides low-interest loans to governments of middle-income countries or low-income countries with high debt service capacity. In Vietnam, this source of capital is mainly borrowed from the World Bank.

Reciprocal Capital:

Priority should be given to programs and projects utilizing ODA and concessional loans when allocating reciprocal capital. That is fully allocated by the state budget from the 5-year medium-term and annual public investment capital plan according to the schedule specified in the international treaty, agreement on ODA, and concessional loans for programs and projects, as well as the actual disbursement of this capital sources during implementation (Government, 2021a; K. R. Government, 2016).

3.2 Integrated Criteria in the Analysis of the Effectiveness of the Project

Currently, in Vietnam, the effectiveness of the project is evaluated according to the method of using integrated criteria combined with a different system of criteria. The integrated criteria are often used as follows (Chọn, 2003):

- ***Socioeconomic Net Present Value (ENPV)*** (Unit: VND)

$$ENPV = \sum_{t=0}^{n} \frac{EB_t - EC_t}{(1+er)^t} \qquad (1)$$

In which: EBt: Economic benefits in the year of the project from the point of view of the state and the community.

ECt: Economic cost in the year of the project from the point of view of the state and the community.

er: Minimum acceptable rate of return from the point of view of the state and the community.

n: The number of analysis years.

→ Worthwhile option when ENPV ≥ 0

→ Best option when ENPV → max

- ***Socio-economic Internal Rate of Return by Macroscopic (EIRR)***

$$ENPV = \sum_{t=0}^{n} \frac{EB_t - EC_t}{(1+eIRR)^t} = 0 \qquad (2)$$

→ The plan is worth it when EIRR (%) ≥ er

- ***Socio-economic Benefit-Cost Ratio (EB/C or EBCR)***

$$EB/C = \frac{\sum_{t=0}^{n} \frac{EB_t}{(1+er)^t}}{\sum_{t=0}^{n} \frac{EC_t}{(1+er)^t}} \geq 1 \quad (3)$$

→ The option is worth it when EB/C ≥ 1

- ***ECt - economic Costs Include:***

- Initial investment costs: Compensation and clearance costs; Construction costs; Equipment costs; Project management costs; Consulting costs; Other costs; Contingency costs.

- Operating and maintenance costs: usually calculated for 25 years corresponding to the loan period. These costs include:

○ Operating and maintenance costs for drainage networks: Dredging cost, the periodic maintenance cost of sewer lines, ditches, and manholes; Costs for collection, transportation, and treatment of sludge in discharge system; Regular repair costs, high repairs costs.

○ Operating costs for wastewater treatment plants: Operating chemical costs; Operating electricity costs; Clean water costs; Operating labor costs; Maintenance costs; General operating costs; Regular repair costs, and high repairs costs.

- ***EBt - economic Benefits Include:***

- Economic benefits from reducing flood damage;
- Damage reduction benefits due to improved environmental sanitation;
- Tourism benefits are increased thanks to the project being put into operation;
- Benefits from cost savings and traffic time reduction due to flood mitigation.
- Reducing flooding increases the value of the real estate

3.3 Socioeconomic Criteria Proposed by Authors

(1) Socioeconomic net Annual Value (ENAV) (Unit: VND)

The socioeconomic net annual value is the difference between benefits and costs, which are calculated according to the socioeconomic perspective over the project's entire life and equalized for the operation year of the project at the society's minimum acceptable rate of return (Chọn, 2003).

$$ENAV = \sum_{t=0}^{n} \frac{EB_t - EC_t}{(1+er)^t} * \frac{(1+er)^n * er}{(1+er)^n - 1} \quad (4)$$

In which: EB_t, EC_t, er, n are interpreted as formula No. (1)

→ Worthwhile when ENAV ≥ 0

→ The best option when ENAV → max

Advantages of the ENAV criterion:

- The efficiency is expressed in terms of absolute efficiency; - When the life cycles of the options are different, it is not necessary to find the available comparison time for the options as three criteria; - The fluctuation of criteria over time and for the duration of the project is taken into account.
- Taking the time value of money into the account under a market economy
- Taking inflation and uncontrolled price increases into account by modifying the EBt, ECt, and er criterion
- Range of applicability:
- Appropriate for projects in which the costs and outcomes of urban drainage improvements may be estimated;
- Applicable to projects with comparable and dissimilar alternatives.

(2) Socioeconomic Life Cycle Cost (ELCC) (Unit: VND)

The socioeconomic life cycle is the total annual investments and repair and maintenance costs of the project according to the socioeconomic perspective over the project's entire life, which is attributed to the initial time at the society's minimum acceptable rate of return (Chọn, 2003).

$$ELCC = \sum_{t=0}^{n} \frac{EC_t}{(1+er)^t} \quad (5)$$

In which: ELCC: the total cost of the socioeconomic life cycle in terms of the present time

Ect, er, n are explained as formula No. (1)

→ The best option when ELCC → min

* Advantages of the ELCC criterion:

- The criterion displays the total cost incurred over the entire project's life converted to the initial time; - To be applied when the projects have the same investment results;
- Highly suitable for projects where the results are difficult to quantify in monetary terms, such as for the project with social and environmental results.

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- Taking the time value of money into the account under the market economy;
- Adjusting the ECt and er indicators to take inflation and uncontrolled price increases into account;

* Limitations of the ELCC indicator:

- This criterion is difficult to apply if there is only one investment choice for a project. However, this issue can be circumvented by defining the effective level of the criterion as the overall loss to the economy and society across the entire project's life cycle if the project is not completed.
- Suppose the life expectancy of the options differs. In that case, it is important to determine the common comparison time, which makes it challenging to calculate the same criterion as ENPV, EIRR, and EBCR.
- Appropriate for urban drainage projects where monetary quantification of benefits is problematic
- Appropriate for projects with the same life cycle; if the alternatives have different life cycles, it is required to compare them.

(3) Socioeconomic Annual Life Cycle Cost (EALCC) (Unit: VND)

The socioeconomic annual life cycle costs are the yearly investments and repair and maintenance costs of the project according to the socioeconomic perspective over the project's entire life, which is equalized for the operation year of the project at society's minimum acceptable rate of return (Chọn, 2003).

$$EALCC = \sum_{t=0}^{n} \frac{ECt}{(1+er)^t} * \frac{(1+er)^n * er}{(1+er)^n - 1} \quad (6)$$

In which: EC_t, er, n are explained as formula No. (1)

→ The best option when EALCC → min

The effective level of the project is the loss caused by flooding and poor drainage in cities, which are not invested in research projects annually.

* Advantages of the EALCC criterion:

- If the criterion demonstrates that the cost incurred over the project's lifetime is distributed over the years of project operation, investment decisions will be easier to justify.

- Used when investment options yield identical investment returns; highly applicable to initiatives whose results are difficult to measure in monetary terms, such as social and environmental programs.

- When the life cycles of the alternatives differ, it is not necessary to determine their common comparison time.

- Taking into consideration the variety of criteria over time and throughout the project, under market economics

* Reasonable application scope

- Appropriate for urban drainage projects where project outcomes are difficult to define in monetary terms or for projects with identical outcomes

3.4 Calculation for Coastal Cities Sustainable Environment Project - Subproject on Drainage for Quy Nhon City, Vietnam

The Sustainable Environment Project of Coastal Cities is a big project that uses ODA from the WB to invest in sustainable development for coastal cities. The components of the project are placed in numerous provinces and subdivided into public administration reform projects, road projects, clean water transplant initiatives, and drainage projects, among others. This project includes the drainage sub-project for the city of (Committee, 2017). The article calculates using the project's secondary data.

3.5 Cost of the Project

(1) Investment Capital for the Project

Investment capital and capital structure of the project "*Sub-project on drainage for Quy Nhon city*" are compiled in Table 2 (table expressed under the Law on Construction (Assembly, 2014, 2020) and Decree No.10/2021/ND-CP dated 09/02/2021 on the management of construction investment costs (Government, 2021b).

(2) Investment Capital Disbursed over Time

Investment capital is converted from financial to economic expenses over time, as shown in Table 3.

The analysis of the project "Sub-project drainage for the city of Quy Nhon" indicates that the calculation of the effective criteria (all six criteria) led to the same conclusion. Still, the three extra criteria given by the authors have the following benefits:

(1) The computation is simplified since it is not necessary to determine a general comparative time for the alternatives; rather, the total cost incurred over the project's life is translated to the initial time. It will be simple to persuade others to invest. (2) Reducing the complexity of input data, reducing the pressure of data to provide for project analysis (since it is not required to quantify the project's efficiency criteria, but only the cost of the project), which is ideally suited for projects whose results are difficult to quantify in monetary terms. (3) Accelerating the development of the project's study and evaluation.

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Table 2. Total Investment and Project Capital Structure

No	WORK CATEGORY	COST (million)	CAPITAL (million VND)			
			%WB	WB		CF
				IDA	IBRD	
I	**Part 1:** Construction of drainage infrastructure					
1.1	Phu Hoa Ditch	87.430	100%	87.430		
1.2	The upstream ditch of Bau Sen Lake	23.438	100%	23.438		
1.3	Hoc Ba Bep area and Tran Hung Dao road	25.488	100%	25.488		
1.4	Bach Dang Road	61.103	100%	61.103		
1.5	Level 3 network	15.426	100%	15.426		
1.6	Nhon Binh wastewater treatment plant	12.716	100%	12.716		
1.7	SCADA operation and maintenance equipment	246.287	100%	246.287		
1.8	Design, supervising, and supporting the Part 1 implementation	33.032	100%	33.032		
	Total capital for construction	504.921	100%	504.921		
II	**Part 2:** Project Implementation Support					
2.1	Institutional reform	6.683				6.683
2.2	Technical support for the management board	2.005				2.005
2.3	FS/Bid documents/ Construction drawings Preparation	7.385				7.385
2.4	Project management costs	21.518				21.518
2.5	Cost of verification. appraisal; establish Bid documents and evaluate Bidding documents	1.537				1.537
2.6	Other costs	748				748
	Total capital for project implementation support	39.875				39.875
	Total capital without contingency costs	544.797	90,08%	504.921	0	39.875
III	Contingency costs	108.546	90,70%	90.994	10.378	7.173
5.1	The additional quantity of work: 10%*(I+II)	54.273	90,08%	45.497	5.189	3.587
5.2	Inflation: 10%*(I+II)	54.273	91,34%	45.497	5.189	3.587
IV	**Total cost before VAT**	653.343	90,18%	595.916	10.378	47.048
	VAT (10%)	65.128	91,23%	54.597	6.227	4.304
V	**Construction costs**	718.470	90,28%	650.513	16.605	51.352

Source: (Phuong, 2021)

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Table 3. Investment Capital Converted into Economic Prices of Water Drainage Infrastructure

Unit: million VND

Year of implementation	2017	2018	2019	2020	2021	2022	SUM
Financial expenses for implementation	65.334,27	130.668,55	163.335,68	163.335,68	98.001,41	32.667,14	653.343
Financial expenses excluded contingency for inflation	59.906,98	119.813,95	149.767,44	149.767,44	89.860,47	29.953,49	599.069,77
Conversion coefficient from financial price to economic price	0,916	0,916	0,916	0,916	0,91	0,916	
Economic costs	54.874,79	109.749,58	137.186,98	137.186,98	82.312,19	27.437,40	548.747,92

Source: (Phuong, 2021)

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(3) Operating Costs of the Project

The project's operating costs include annual maintenance and large repair costs after 10 years of operation, shown in Table 4.

Table 4. Economic Maintenance Costs for Drainage Infrastructure

Unit: million VND

No	Content	Annual repair operation costs	Large repair operation costs (once every 10 years)
1	Cost at a financial price	7.698,87	27.012,20
2	Conversion coefficient to economic price	0,909	0,909
3	Cost at an economic price	**6.998,27**	**24.554,09**

Source: (Phuong, 2021)

3.6 Economic Benefits

(1) Benefits from Flood Mitigation

The benefit gained from reducing underground flooding for the city is shown in Table 5

Table 5. Benefits Achieved by Reducing Production Stagnation Losses Caused by Flooding

Unit: million VND

Savings from avoidable business losses	Unit	Value
The population of Binh Dinh Province 2015	Person	1.508.266
Flood damage in Binh Dinh province	Million/year	502.645
Average flood damage	Copper/person/year	333.260
Average income (2023)	Million/month	2,24
Time of flooding causes production stagnation (flooding >10cm)	day	1,00
The average frequency of flooding causes stagnation.	times per year	2,00
Damage caused by production stagnation	million/year	194.450
Damage caused by flooding	copper/person/year	527.710
The number of people directly get benefits from the project	Person	6.100
The number of people indirectly get benefits from the project	%	20%
Project efficiency	%	80%
Reduce production stagnation losses caused by flooding	**million/year**	**3.090**

Source: (Phuong, 2021)

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The total benefits saved by flood reduction of VND are 3,090 million per year.

(2) Economic Benefits from Reducing Economic Losses due to Poor Sanitation

Table 6. Savings from Reducing Damage due to Poor Sanitation for Drainage Infrastructure

No	Save from reducing damage due to poor sanitation	Value	Unit
1	The number of people who get benefits in	85.088	person
2	Economic losses due to poor sanitation (2)	0,188	
3	Damage recovery rate (3)	80%	
4	Cost savings (4) = (2)*(3)	0.121	Million
	Total (I) = (4) * (1)	**12.826**	Million VND/year

Source: (Phuong, 2021)

(3) Economic Benefits from Reducing Losses of Tourism due to Poor Sanitation

Table 7. Benefits due to Reduced Losses of Tourism due to Poor Sanitation

No	Savings from reducing losses of tourism due to poor sanitation	Value	Unit
1	The average number of tourists (1)	4.400.000	Visitor's Day/Year
2	Tourism damage due to poor sanitation	0.018	Million VND/Guest
3	Damage recovery rate (3)	20%	
4	Cost savings (4) = (2)*(3)	0.004	Million/Guest Day/year
	Total (II) = (4) * (1) * 12	**15.913**	**Million VND/year**

Source: (Phuong, 2021)

3.7 Calculating the Socioeconomic Effects of the Project

(1) The Project's Cash Flow

From the above calculations, with the project's life expectancy being 40 years, the project's cash flow is calculated in Table 8.

(2) Calculation Results

- Choose the original calculation time (original 0) is 2022, which is the end year of the construction time and begins to put the project into operation.

From the data in Tables 2, 3, 4, 5, 6, 7, and 8 above, the authors calculate the criteria of socioeconomic efficiency of the project with the cases er = 5% and er = 2% shown in Table 9, 10 as follows:

- With er = 5% (inflation of Vietnamese currency against US dollar)

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Table 8. Cash Flow of Investment Projects

Unit: million VND

Calendar time	Year of project	Costs				Benefits				EBt - ECt
		Investment capital	Regular repair costs	High repair costs	ECt	Reduce production loss due to flooding	Reduce losses due to unsatisfactory sanitation	Reduce tourism loss caused by unsatisfactory sanitation	EBt	
2017	-5	54.874,9			54.874,79					-54.874,79
2018	-4	109.749,58			109.749,58					-109.749,58
2019	-3	137.186,98			137.186,98					-137.186,98
2020	-2	137.186,98			137.186,98					-137.186,98
2021	-1	82.312,19			82.312,19					-82.312,19
2022	0	27.437,40			27.437,40					-27.437,40
2023	1		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
….	2-8		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
2031	9		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
2032	10		6.998,27	24.554,09	31.552,36	3.090,00	12.826,00	15.913,00	31.829,00	276,64
2033	11		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
……	12-18		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
2041	19		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
2042	20		6.998,27	24.554,09	31.552,36	3.090,00	12.826,00	15.913,00	31.829,00	276.64
2043	21		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
….	22-28		6.998,27		6.998,27	3.090,00	12.826,00	15.913.00	31.829,00	24.830,73
2051	29		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
2052	30		6.998,27	24.554,09	31.552,36	3.090,00	12.826,00	15.913,00	31.829,00	276,64
2053	31		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
…	32-39		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73
2062	40		6.998,27		6.998,27	3.090,00	12.826,00	15.913,00	31.829,00	24.830,73

Table 9. Project Performance and Evaluation Indicators (with er = 5%)

Indicator	ENPV (million VND)	EIRR (%)	EBCR	ENAV (million VND)	ELCC (million VND)	EALCC (million VND)
Value	-231.298,79	2,5%	0,7	-13.479,67	777.455,35	45.308,66
Efficiency threshold	0	5,0%	1,0	0	546.156,56	31.829,00
Conclude	**The project is not worth it.**					

- With er = 2% (less than the inflation rate of Vietnamese currency against the US dollar, the State compensates for losses of 3%)

Table 10. Project Performance Indicators and Evaluation (with er = 2%)

Indicator	ENPV (million VND)	EIRR (%)	EBCR	ENAV (million VND)	ELCC (million VND)	EALCC (million VND)
Value	49.942,05	2,5%	1,06	1825,67	820.755,50	30.003,33
Efficiency threshold	0	2,0%	1,00	0	870.697,55	31.829,00
Conclude	**The project is worth it.**					

(2) Enhance the criteria for studying and selecting investment choices for projects to construct urban drainage works with ODA funds from a WB contributor.

In the future, the authors will investigate and propose a framework of input and output elements for urban drainage projects, from which it will be feasible to standardize input data and program the framework to compute and analyze the projects.5 swiftly.

4. CONCLUSIONS

Given that ODA attraction is declining, the efficient application of ODA is a pressing concern; the key is to increase the effectiveness of ODA re-lending. The analysis of socioeconomic performance influences credit institutions to take steps to improve the effectiveness of ODA re-lending activities in general and the World Bank in particular. The "cost-benefit analysis" method must quantify the project's efficiency indicators when examining construction investment projects sponsored by the World Bank. In reality, it isn't easy to quantify the results of this initiative. With the advantages of the offered methodologies, there is no need to measure the project's efficiency; it is sufficient to quantify the project's cost. This study implemented the suggested methodology for socioeconomic analysis of the project: Sustainable environment in coastal cities, Quy Nhon, Vietnam. Comparing currently used integrated criteria such as ENPV, EIRR, and EBCR with three proposed integrated criteria (ENAV, ELCC, and EALCC) reveals:

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Calculating the efficiency criteria yields the same result, but the computation is faster, the input data is simpler, and it is easier to quantify.

These strategies apply to all phases of project implementation, particularly the proposal phase. During this time, numerous technical solutions are available, and numerous analytical approaches are proposed to overcome the problem of locating a general comparison time when assessing and evaluating options with varying life expectancies. The findings of this study contribute to the enrichment of criteria and the reduction of review time when analyzing and selecting investment choices for investment projects to construct urban drainage works, including projects financed with ODA funds from the World Bank in Vietnam.

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