IWRM Action Hub

IWRM TOOL - D1.01

Evaluating Water Investments

Summary

Achieving global water security in the context of climate change demands accelerating water investments by increasing both public and private investments and using innovative financing instruments. To evaluate investment opportunities, a formal economic and financial analysis must be carried out. This Tool discusses why evaluating water-related investments matters and for whom, compares financial and economic analysis, introduces the key concepts used to calculate returns on investments, and provides an overview of standard investment evaluation frameworks including Benefit-Cost Analysis, Cost-Effective Analysis, and Financial Evaluation.

The Case for Evaluating Investment Opportunities in Water

Evaluation of investment opportunities in the water sector requires different approaches depending on the goals of investors. Economic and financial evaluations are instruments that help provide valuable information to support NGOs, governments, development banks, and other interested stakeholders, including the general public in case of consultation activities, in their decision making.

For instance, water management in a river basin would require information on polluters, users, environmental impacts, costs and gains (European Commission, 2003) gained via economic assessment. On the other hand, private investors, such as fund managers or multinational utilities corporations, look for low-risk assets that yield a steady flow of profits over time. In that case, financial evaluation is the most pertinent analysis framework to assess the ability of the project to generate adequate incremental cash flows to recover its financial costs (capital and recurrent costs) without external support (ADB, 2017). Finally, in the booming decades of technology ventures, risk fund managers are keen on investing in new water technologies to solve global water challenges. Not only does this kind of investment require a financial valuation of the company but also a detailed review of its whole business plan to identify its potential market value.

Given the scarcity of both water resources and financial resources available in the water sector, rigorous evaluation assessment can help (European Commission, 2003):

- Make the most of the money spent on the projects.
- Optimise the use of limited resources understanding the economic issues and trade-offs when various economic sectors compete for using the same resource.
- Enumerate the potential costs and benefits of a programme, project, or policy initiative and assess the least-costly way to achieve the objectives defined in them.
- Assess the economic impact of proposed policies and programmes pointing out the need to develop supplementary measures (i.e. to compensate losers).
- Assess the potential need to make environmental objectives less demanding taking into account economic and social impacts.
- Support the development of tools and instruments, such as water pricing, pollution charges or environmental taxes.

Comparing Financial Evaluation and Economic Assessment

Financial evaluation is carried out from the perspective of the project and considers incremental cash flows (both revenues and costs) generated by the project. The purpose of financial evaluation is to assess the ability of the project to generate adequate incremental cash flows to recover its financial costs (capital and recurrent costs) without external support.

On the other hand, economic analysis is carried out from the perspective of the entire economy, and it assesses the overall impact of a project on the welfare of all the citizens of the country concerned. The purpose of project economic analysis is to assess whether a project is economically viable for the country from a macroeconomic standpoint (Lee, 1998). Economic analysis, unlike financial one, takes externalities into account and applies economic prices excluding taxes, tariffs and subsidies to reflect the value to society (Nielsen at al., 2016). For example, when the government introduces a tax to reduce water production (i.e., to correct for external environmental cost), this will be considered part of the economic cost. External costs of a project are often represented by environmental costs, thus making it worth integrating environmental assessment to economic evaluation (Tool C1.06; Tool C1.07) (ADB, 2002). The analysis can be extended further to include demand evaluation, institutional assessment, socioeconomic survey, as well as sensitivity and risk analysis (Tool C1.01) (ADB, 1997).

Despite conceptual difference, the two types of analysis apply similar methods. Project economic analysis and financial evaluation both involve the identification of project benefits and costs during the years in which they occur and converting all future cash flows to their present value using the technique of discounting. Both analysis generate net present value (NPV) and internal rate of return (IRR) indicators, termed economic NPV (ENPV) and economic IRR (EIRR) in the case of economic analysis and financial NPV (FNPV) and financial IRR (FIRR) in the case of financial evaluation.

Calculating Returns on Investments

Comparing benefits and costs of a project over time requires to bring them to present value by using a discounting method. It reduces a stream of costs and/or benefits to a single amount, termed the present value, by using the method of compound interest. The calculation of present value is thus a calculation of the net benefit that takes into explicit account the timing of costs and benefits. In the case of Benefit-Cost Analysis, the term net benefit is understood to mean the present value of the discounted stream of net benefits. The discount rate at which the present value of a project becomes zero is known as the internal rate of return (IRR).

For a yes-no decision on a single project, the choice criterion associated with this concept is to undertake a project if its internal rate of return is greater than the appropriate discount rate. The criterion assumes that a project should be undertaken if it offers a rate of return greater than the rate at which money can be borrowed that whatever interest rate the decision-maker feels to be appropriate. The corresponding criterion for choosing among competing projects is to choose the project with the highest internal rate of return. The use of the present value criterion and the internal rate of return criterion leads to accepting and rejecting the same projects only if: (1) there are no budgetary limitations; (2) if projects do not preclude one another; and (3) if streams of net returns are first negative and then positive. Therefore, the alternative criterion to circumvent these conditions is to choose the mix of projects that offers the highest present value (EU, 2014).

Return on investment (ROI) analysis are now commonly used to assess the business case for nature-based solutions (NBS) interventions so investors can objectively compare results with grey infrastructure investments that would provide similar benefits (Tool C3.04). A ROI analysis refers to a common financial metric of profitability that measures the return, monetary value of the benefits the stakeholder receives, for the money they invest (TNC, 2021). Application of this methodology can be found in the “Greater Cape Town Water Fund Business Case” which puts forward ecological infrastructure restoration as a critical component of efforts to enhance water security for all users of the Western Cape Water Supply System (South Africa) (TNC, 2019).

Benefit-Cost Analysis (BCA)

This approach requires the enumeration of all benefits and all costs, tangible, intangible, whether quantifiable or difficult to measure, that will accrue to all members of society if a particular project is adopted (Stokey and Zeckhauser, 1978). BCA is based on a set of predetermined project objectives, giving a monetary value to all the positive (benefits) and negative (costs) welfare effects of the intervention. Any external effects affecting the rest of the economy but not reflected in market transactions by the project itself—such as adverse or beneficial environmental impacts—where they can be identified, must also be included (Tool D1.02). These values are discounted and then totaled in order to calculate a net total benefit.

The project overall performance is measured by indicators, namely Benefit Cost Ratio (BCR), Incremental Cost Benefit Ratio, Net Present Value (NPV) or the Payback Period (PP). For BCR, when the costs exceed the benefits, the project should not proceed and vice versa. Incremental BCR helps to compare alternative options to decide which one is more feasible. Projects with positive NPV (the difference between the total discounted benefits and total discounted costs) are considered viable and the other way round. Finally, PP is used to assess the time required for the discounted costs and benefits to reach the point of break-even (Chadburn et al., 2013).

Estimating economic benefits and costs associated with the proposed project requires establishing the "with-the-project" and "without-the-project" scenarios and comparing the two (ADB, 2017). The without the project or "Business-as-Usual" (BAU) is defined as what would happen in the absence of the project. BCA only considers the difference between the cash flows in the with-the-project and the BAU scenario. The financial and economic performance indicators are calculated on the incremental cash flows only (EC, 2014).

Taking those considerations into account, carrying out a BCA process may be summarised by the following 5 step process (Stokey and Zeckhauser, 1978):

1. The project or projects to be analysed are identified.
2. All impacts, both favourable and unfavourable, present and future, on all society are determined.
3. Values, in monetary units, are assigned to these impacts. Favourable impacts will be registered as benefits, unfavourable ones as costs.
4. Net benefit (total benefits minus total costs) is calculated.
5. The choice is made, that is, select the alternative that produces the greatest net benefit (Fundamental Rule).

Even though BCA recommends the adoption of a project in terms of economic efficiency (adopt the project if it generates net benefits for society, otherwise do nothing), there may be instances where the current position is untenable (i.e., communities highly affected by waterborne diseases due to lack of water access or sanitation services). In such cases, based on other distributional criteria (such as equity or equality) or political will, the "with-the-project" scenario or other mitigation measures might be adopted amid low or negative return for society as a whole.

A number of BCA frameworks have been applied and specifically tailored to the water and sanitation sub-sector. For instance, the Asian Development Bank's "Guidelines for the economic analysis of projects" (ADB, 2017) offers focused advice for water supply and sanitation projects economic analysis. This institution also developed a study case on willingness-to-pay (demand analysis) for a water supply project in Sri Lanka (ADB, 2013). The European Commission's "Guide to Cost-Benefit Analysis of Investment Projects" (EC, 2014) also developed a BCA framework for water supply and sanitation projects with practical cases for review (although only relevant for mid-size cities in developed countries).

Cost-Effectiveness Analysis (CEA)

This method applies when the total expenditure for a given purpose is fixed and alternative projects are evaluated to see which is most effective in achieving that purpose. CEA is applicable when:

- Costs of alternative projects are identical and hence only benefits need to be compared.

- Benefits are identical and hence only costs need to be compared.

The fundamental rule of choice is to select the alternative that produces the maximum effectiveness. If decision makers know what they want to achieve, or what they are allowed to spend, it is an appropriate criterion that reduces the complexity of choice (Stokey and Zeckhauser, 1978). Details on how to conduct a cost-effectiveness analysis, including how to calculate cost-effectiveness ratios, is provided in the EU “Guide to Cost-Benefit Analysis of Investment Projects” (EC, 2014, 345-347).

Financial Evaluation

It focuses on the ability of the project to generate sufficient incremental cash flows to cover its financial costs. In the water sector, water tariffs are meant to compensate water operators for the costs they incur. Two types of costs can be distinguished: capital costs (CAPEX) and operational costs (OPEX). CAPEX consists of two components: (1) the depreciation of assets, which is related to the aging of the assets; and (2) the opportunity costs of the investments in these assets. The opportunity costs consist of the benefits that investors could have received if they had invested in an alternative (the second-best) portfolio of assets. The return on the best alternative option is based on the return in markets for similar activities. This return is called weighted average cost of capital (WACC), which is the calculated return that investors might be able to achieve by investing both debt and equity capital in similar projects in the market (ACM, 2016; for derivation of WACC from investors’ perspective, see GuruFocus).

Figure 1. Approach to financial analysis (Adapted from Nielsen et al., 2016).

Therefore, analysis of the cost-recovery objectives and mechanisms of the project is important. In the case of full cost recovery, the financial net present value discounted at the project’s WACC must be greater than zero, and the financial internal rate of return (FIRR) must be greater than WACC (ADB, 2017). As the WACC is a forward-looking value it incorporates a degree of forecasting with the values and derivation of some of the components subject to ongoing debate between academics, regulators, economists, and finance practitioners. Consequently, the appropriate value and method to derive the WACC component may involve a degree of professional judgement (OTER, 2018).

Thematic Tagging
Private Sector
