

APPROACH TO ECONOMIC ANALYSIS OF WATER SUPPLY AND SEWERAGE INVESTMENT PROJECTS

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Abstract: *The project economic analysis covers the justification of investment from the view point of use of scarce resources of the economy i.e. capital and labor. The fundamental aim of the economic evaluation of water infrastructure projects is to establish whether the proposed project's contribution to future improvements in social and economic welfare of the community is of greater value than the resource costs incurred by the national economy. Thus other specific factors such as the environmental and social impact of the proposed project also have to be taken into consideration in assessing its viability. This paper provides more detailed view to such analysis.*

Key words: *economic analysis, water infrastructure projects*

1. INTRODUCTION

The municipal water sector infrastructure projects (water supply and waste water) envisage to:

- Increase access to the water supply system and to the potable water supply;
- Increase the efficiency of water supply;
- Increase access to the wastewater system and to the sewer network;
- Increase the efficiency of wastewater collection;
- Ensure that all wastewater flows can be treated in accordance with legislative requirements (i.e. national and EU).

Such measures are mostly to be implemented at the local administration level, often where economy has a limited base and has been significantly affected by the economic downturn following the recent recession crisis. The project therefore has a high social component of providing vital infrastructure to households, to provide potable water supply and treated waste water discharge into the rivers and providing the necessary base to attract new and retain existing economic enterprises (U. S. EPA, 2000). It is thus seen and promoted by the local authorities as a vital component of economic regeneration of the area, which will provide the necessary infrastructure to attract economic investment and will at the same time ensure the integrity of the environment. Such projects are also said to be in compliance with the 2000 Millennium development goals, more specifically Goal 7, target 10 ("to ensure environmental sustainability and reduce by half the proportion of people without sustainable access to safe drinking water"), so as with the EU's *Aquis communautaire*.

Evaluation of project financial sustainability, which is relating only to financial costs and benefits, for such infrastructure projects is insufficient, since it does not take into account all future improvements in social and economic welfare of the local community, which may influence that the total project value could be higher than the resource costs incurred (Boardman *et al.*, 2006). Researchers specifically wanted to assess and value other factors of the project that has to be taken into consideration in assessing its viability, such as economic, environmental and social impacts, effectively crucial for making an investment decision.

2. WITHOUT PROJECT SCENARIO

The water environment is an important part of the human environment and indicators of the present impact on the water environment of the existing situation include health risk, overflowing wastewater, dilution in the receiving water (Tietenberg, 2003). As is the case in many environmental projects, it is very difficult, if not impossible, to place monetary value on environmental parameters or public amenity and its future improvement, or impact on local economy.

Under the "without" project scenario local utility continues to operate in the same manner as in the past, with all the consequences like continue operating loss at enterprise, not delivering potable water to part of the population thus being at health risk, river discharge of untreated waste water, continued deterioration of existing infrastructure and civil works due to deferred maintenance, with occasionally repair and rehabilitation investments from own source revenues.

The cumulative effects of foregone maintenance and rehabilitation repair costs and with falling service quality would cause decrease in willingness-to-pay and force consumers to undertake their own investment in coping with the deteriorating mechanism to offset service gaps. The thrust of the project is to increase the willingness-to-pay by increasing the availability of waste water services through rehabilitation and expansion of the water supply and sewerage network and the establishment of waste water treatment plants (WWTP). The economic evaluation is primary based on these elements.

3. PROJECT BENEFITS

The benefits of such project are to be estimated following the methodological guidelines of the major international financing agencies and donors and within EU or candidate countries should be in compliance with the EU's "Guide to cost benefit analysis of investment projects". Benefits can result directly from implementing the project whilst others are indirect consequences of the project. Furthermore, benefits can be categorized into the following sectors:

- Economic,
- Health,
- Amenity/environment,
- Ecology.

Specific economic benefits include improved water services, paid recreational activities, fish farming, long term job creation, short term job creation (direct), or avoided cost of water source or septic tanks construction and maintenance, tourism, improved development potential, enhanced institutional & capacity building capability, increased property value (indirect).

Health benefits include decreased mortality rate and increase in life expectation, morbidity as disability adjusted life years, so as avoided cost of medication, improved quality of life, or improved bathing water quality.

Amenity benefits include increased public recreational value, reduction of odors, reduction of septic tank overflows, or avoided cost of environmental damage.

Environmental benefits include improved public use of natural resources, so as protection of biodiversity, preservation of natural resources and avoided cost of unknown adverse effects.

Some of the benefits are quantifiable. However, many benefits such as environmental, ecology and economic development are extremely difficult to quantify due mainly to lack of in-depth investigation, empirical data and sometimes complete lack of scientific knowledge.

4. EXAMPLES OF METHODS FOR VALUATION OF PROJECT BENEFITS

Economic benefits increase value added cash flow in the local and national economy through increased production of goods (agriculture, fish farming, etc.), increased services (recreational services, tourism), job creation, etc. (Markandya *et al.*, 2002). Such benefits must not include transfer payments such as asset appreciation, subsidies or taxes.

The following are specific examples of valuation of potential project benefits:

Economic Benefits

- Paid Recreational Activities/Sports, Fishing or Rafting - check for the activity of local Fishermen Association, membership fee paid, other activities they also implement attracting domestic and international tourist. Assume percentage of increase in membership for economic benefits.
- Paid Recreational Activity/Rafting - improvement in water quality in the local river (after improvements in sewerage network and construction of WWTP) will increase the attractiveness of rafting as an adventure sport. Assume percentage of increase in rafting trips for economic benefits.
- Long Term Job Creation - similar infrastructure projects often necessitate an increase in the number of staff employed. Value increase and estimate its value for economic benefits (direct employment benefits per year, for continuous duration).
- Short Term Job Creation - construction of the new infrastructure will result in employment of construction workers during the period of construction (direct employment benefits per year, for limited duration).
- Avoided Cost of construction of water sources and septic tanks (and related maintenance) - assess number of housing construction permits provided each year, and evaluate percentage of the houses which will not build new water sources and septic tanks after project implementation and number of houses which will not need maintenance on existing ones. Use numbers to value total avoided costs.
- Tourism - cleaner water environment will assist the development of the tourism sector. Development will lead to increased tourism arrivals and length of stay, improved tourism product, increased investment in the tourism supporting infrastructure, increased tourism attractions and water activities. Value increase and estimate its value for economic benefits.
- Improved Development Potential - availability of improved water and wastewater services will improve attractiveness for industrial and commercial activities to project area. This enhanced investment climate will lead to improvement in future regional economic development. Such development potential benefits are not quantifiable, and should be checked if the benefits to society will be double counted.
- Capacity Building and Institutional Strengthening - organization and management of the project increase the skills, knowledge, leadership capabilities, organizational and planning capacities of local administration and of water utility staff, leading to more productive and efficient results. Such institutional benefits are intangible and

unquantifiable, could eventually be estimated by the comparison with the value of equivalent education.

- Property Values - availability of new services result in increase in property values due to improved overall amenities. This benefit is a form of transfer payments and does not add value.

Health Benefits

- Morbidity - poor sanitation results in diseases and reduced earnings during sickness. The loss to the economy because of the diseases is commonly evaluated using the concept of disability adjusted life years (DALYs). Assess improvement of DALYs/year, so as financial value of DALY in the project region.
- Avoided Costs Of Medication - persons suffering from diarrhea often visit the doctor and take medication to alleviate the symptoms. The cost of the visit and medication can be estimated per case, and average number of such cases can be assessed.
- Improved Bathing Water Quality - local river might be used for recreational bathing and improved water quality (by wastewater projects) will reduce the risk of catching a water-borne disease. The benefits for other downstream communities may be estimated by decrease of days off work for these reasons.
- Improved Quality of Life - health benefits from improved quality of life are very tangible but hardly quantifiable.

Amenity/Environmental/Ecological Benefits

- Increased Public Recreational Value - assess by "willingness-to-pay" socio-economic surveys, average per household to be multiplied with number of households.
- Reduction of Odors - intangible environmental benefits difficult to quantify (except eventually also with "willingness-to-pay" survey).
- Protection of Biodiversity - such infrastructure projects assist in the protection of biodiversity in the local water resources. These are unquantifiable but tangible benefits for future generations (Freeman, 2003).
- Preservation of Natural Resources - reduce groundwater pollution lead to reduced cost of protection of potable water resources, which might be estimated.

5. CONCLUSION

In order to make appropriate economic evaluation of water infrastructure projects aiming to assess its' net present value and therefore its economic justification, researchers have clearly shown that other factors such as the environmental and social impact of the proposed project also have to be taken into consideration in assessing its viability, using specific methods for their economic valuation presented in the paper.

6. REFERENCES

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