



Original research article

An impact evaluation framework based on sustainable livelihoods for energy development projects: an application to Ethiopia



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ABSTRACT

Within the current global challenges, energy plays a key role for the achievement of basic human needs, socio-economic development, environmental protection and global security. At the light of this interconnection, a proper impact evaluation metric able to assess the main effects of energy projects at local level becomes necessary in order to highlight successful strategies. Relying on the Sustainable Livelihoods concept, this study proposes an Impact Evaluation Framework (IEF) to measure project impact as changes of target community's livelihoods. First, the IEF establishes a Capitals-Based Evaluation Hierarchy, taking its rationale from the literature: this first step responds to the needs of providing a standard and harmonized structure applicable to different projects. Secondly, the IEF develops a further Five-Step Procedure to respond to the concurrent need of flexibility and customization of specific projects. The conceptual methodology of the IEF might be used at different stages of project design: as a supportive methodology donors use in their programme of funds allocation or as an instrument experts use to quantitatively support their ex-post project evaluation. In the paper, the IEF is presented in the light of this second application and the procedure applied to a real project in Ethiopia. The set of information obtained with the IEF is compared to the final expert evaluation, commissioned by the donor and performed at the end of the project, showing the usefulness of IEF as a supportive methodology in the evaluation process.

1. Introduction

Energy is essential to development and it should be a right for all at global level. A reliable energy access is pivotal not only to economic growth but also to foster human promotion, social inclusion and environmental protection [1,2]. On this basis, the international community has recently launched a number of initiatives, such as the UN's *Decade of Sustainable Energy for All (2014–2024)* [3] and the new 2030 Agenda, in which the seventh of the new 17 Sustainable Development Goals is fully dedicated to energy (“*Ensure access to affordable, reliable, sustainable and modern energy for all*”) [4].

Due to the key role of energy for sustainable development, it is essential to conduct an appropriate evaluation of energy projects, able to detect all the possible effects on social, economic and environmental dimensions [5,6]. Project evaluation enables international agencies, NGOs and policymakers to learn from already concluded projects, measure achievements of implemented activities and better manage future interventions [7]. *Evaluation* is a systematic and final

examination of a completed project, useful to judge the overall value of an intervention and supply lessons to improve future actions. It gives an useful feedback to key stakeholders and may guide future programmes design [8].

2. Evaluation of energy development projects

The evaluation is the last step of the Project Cycle Management (PCM), intended as an “*assessment, as systematic and objective as possible, of an on-going or completed project, programme or policy*” [9]. It aims at determining the fulfilment of objectives and understanding the real project impact on recipients' daily life. Inadequate evaluation leads to a limited learning about project progress, as well as to a poor accountability in terms of stated goals and consumed resources. However, evaluation has yet to overcome a number of limitations, because it requires transversal and extended data compared to project boundaries and timing. Many issues make the evaluation challenging at practical level, such as an inadequate attention to it in project design, a lack of

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Nomenclature	
<i>Acronyms</i>	
M&E	Monitoring and evaluation
IEF	Impact evaluation framework
NGOs	Non-governmental organizations
PCM	Project cycle management
UNDP	United nations development programme
MDGs	Millennium development goals
DAC-OECD	Development assistance committee – Organisation for economic cooperation and development
LFA	Logical framework approach
MDGs	Millennium development goals
SLF	Sustainable livelihoods framework
SL	Sustainable livelihood
UNCED	United nations conference on environment and development
DfID	Department for international development
IDS	Institute for development studies
SLF	Sustainable livelihoods framework
RESURL	Renewable energy for sustainable rural development
SURE DSS	Sustainable rural energy multi-criteria decision support system
EA	Ex-ante
EP	Ex-post
OVI	Objectively verifiable indicator
AHP	Analytic hierarchy process
MCA	Multi-criteria analysis
GGII	Gilgel Gibe II
LFM	Logical framework matrix

commitment by project staff, poor quality information and poor use of participatory approaches. Other important challenges related to evaluation are listed in Table 1.

Today the evaluation phase still does not include a standardized approach. Despite of some general best practices for project evaluation [10–15], applications to real cases appear to be limited. Evaluators usually use different investigation processes, which allow to obtain evaluation reports containing the summary of general impressions rather than systematic and thorough analyses [16]. Literature offers a vast amount of practical cases about project M&E, mainly grey literature from NGOs. Their evaluations are based on data gathered through different techniques, such as documentation review [17], measurement on field and direct observation [18], questionnaires and surveys [19,20], interviews [21] and group discussions [22,23]. All these cases present a wide collection of data that give a general picture of a situation, without proposing any structured process aimed to aggregate and interpret data in order to get a comprehensive final assessment.

In the last decades, donor countries and international aid agencies have highlighted the necessity to develop a standardized evaluation methodology, and some initiatives have sought to regularize the evaluation process [25]. Among these, the Paris Declaration on Aid Effectiveness of 2005 has proposed a set of guidelines to monitor aid projects [26]. Based on these guidelines, few toolkits have been developed for evaluation included in more broad framework, such as the World Bank’s Result-based M&E [27–29], the Outcome Mapping [30] and the M&E of Energy for Development [31]. Without providing any evaluation criterion, all these methods propose step-by-step procedures to gather data, useful to build a Theory of Change caused by a project, i.e. a conceptual map which identifies its causal steps. Specifically, they all adopt the *Results chain*, proposed by the Development Assistance Committee of the Organisation for Economic Cooperation and Development (DAC-OECD). It sets out a logical outline of how a sequence of *Inputs*, *Activities* and *Outputs*, for which a project is directly responsible,

establishes pathways through which *Outcomes* and *Impact* are achieved (Fig. 1) [32,33]. The five DAC-OECD Criteria, used by the majority of NGOs and international organizations for the evaluation phase, are measured along this chain (Fig. 2). However, the interest of international community has recently moved to capture not just data related to immediate *Outputs*, but rather to measure a broader *Impact* [34–36]. Impact assessment presents some challenging issues, since it requires a more comprehensive and holistic approach, extended in timing, space and resources [37].

2.1. Impact assessment of energy projects: literature review

When discussing impact assessment in general terms, literature offers evaluation models used in other sectors, mainly regarding the Environmental Impact Assessment (EIA), which involves the identification, prediction and evaluation of the potential effects of energy interventions on environment. Many studies [38–43] examine implemented energy solutions or compare new technologies with conventional ones, with the aim to measure their environmental impact through a Life Cycle Assessment (LCA). LCA allows the evaluation of the potential environmental impacts of a product or service throughout its entire life cycle, from raw materials extraction to end-of-life. Similarly, a complementary approach which combines the assessment of the overall amount of resources consumed with a quantitative risk analysis on human health, is proposed in [44]. Other studies analyse the social impact with methods such as the Social Impact Assessment (SIA) and the Social Return of Investment (SROI). SIA is used to qualitatively measure acceptability of certain development schemes and projects before they go ahead, by estimating whether the intervention fits with the local needs [45,46]. However, a specific scientific foundation still misses and few publications and applications are available. Instead, SROI is a methodology for assessing the social effects of a project. It takes its rationale from the Cost Benefit Analysis (CBA), and provides a

Table 1
Main challenges related to evaluation.

Challenge	Description	Reference
Lack of data	It limits the possibility to monitor changes accurately in many key development outcomes	[6]
Limited readership	Different stakeholders with different interests are involved and the challenge often consists in the possibility of modifying ongoing project plans with shared acceptance based on monitored data	[24]
Attribution gap	The project long-term impact is not likely to be immediately evident, and the more general objectives are far from the specific ones, the more difficult it is to attribute an impact to an intervention	[6,12]
Counterfactual	It results quite difficult to find a reliable counterfactual, i.e. what would have happened in the absence of the project, against which to assess the effect that project has entailed, in order to test the effective benefits of the intervention	[13,14]

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