# Basic concepts and rationale

**IFAD**
Investing in rural people

# 1

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IFAD

Investing in rural people

## Acknowledgements

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|---|---|
| B/C | benefit/cost ratio |
| BAU | business as usual |
| CBA | cost-benefit analysis |
| CDD | community-demand-driven |
| CF | conversion factor(s) |
| COSOP | country strategic opportunities programme |
| CPM | country programme manager |
| EFA | economic and financial analysis |
| ENPV | economic net present value |
| ERR | economic internal rate of return |
| FNPV | financial net present value |
| FRR | financial internal rate of return |
| HH | household |
| IFI | international financial institution |
| IGs | internal guidelines |
| IOE | Independent Office of Evaluation of IFAD |
| IRR | internal rate of return |
| M&E | monitoring and evaluation |
| MCA | multicriteria analysis |
| NPV | net present value |
| NRM | natural resource management |
| PMU | project management unit |
| PTA | Policy and Technical Advisory Division |
| QA | quality assurance |
| QE | quality enhancement |
| RMF | Results Measurement Framework |
| SA | sensitivity analysis |
| SP | shadow prices |
| SV | switching value (analysis) |
| TA | technical assistance |
| VC | value chain |
| WOP | without project |
| WP | with project |

# Introduction

## Background

Since the quality enhancement (QE) process was established in 2008, project reviewers at both the quality enhancement and quality assurance (QA) stages have identified areas of weakness in IFAD's use of economic and financial analysis (EFA) in project design. For example, of the 38 projects the QE process reviewed during 2011, 8 per cent had not submitted an EFA, and in 24 projects, EFA issues were identified. At the QA stage, EFA recommendations have surfaced for 20 per cent of the projects.

Specific areas of concern range from technical considerations regarding the *quality of the analyses and data* (poor assumptions, poor presentation of the analysis, and technical issues such as the use of shadow pricing, conversion factors and discount rates) to broader issues regarding the *use of EFA as a tool* in project design (activity selection, logical framework [logframe] design and risk analysis).

As a first step, the Policy and Technical Advisory Division (PTA), in collaboration with the QA secretariat, organized a workshop in October 2011 with international experts and practitioners involved in project EFA to establish a consensus regarding internationally accepted standards and best practice. The need for internal guidelines (IGs) for EFA of IFAD projects emerged as one of the workshop's main recommendations. It was suggested that the IGs should: (a) be directed to staff and practitioners in charge of carrying out EFA (including government officers), as well as to reviewers and advisers to familiarize them with these analyses; (b) be simple and hands on, including minimum criteria for EFA,

illustrated by good examples; (c) provide standards for presenting assumptions and findings, and for the information to be included in project design documents, their annexes and working papers; and (d) guide selection of, for example, the discount rate, inclusion of externalities, and application of shadow prices and/or conversion factors (CFs) and their justification.

## Scope

The main scope of these guidelines is to help country programme managers (CPMs) in their project design dialogue with governments, as well as to help mission leaders and EFA analysts in the performance of their tasks related to project EFA. The IGs should be considered an open and dynamic document, which will be regularly updated to introduce changes and/or complement information, following the needs of its main users.

These guidelines are, by definition, an auxiliary methodological tool in meeting EFA requirements at IFAD. They do not pretend to substitute for the large bibliography on EFA and cost-benefit analysis (CBA) developed by academics and other international financial institutions (IFIs) that analysts may consult.[1]

Finally, any project analyst should rely on his/her best judgment, refined through experience, when deciding on the methodology and assumptions to be used. These IGs, as with any guidelines, are not a substitute for these essential qualities. It is hoped, however, that they will help reduce the scope of subjective judgment in project EFA, as well as bring some standardization to the presentation of results.

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1    See list of references.

## Outline

The guidelines are divided into three volumes, as shown in Figure 1. **Volume 1** highlights the relevance of EFA to investment projects in general, presenting some basic technical concepts and briefly describing the process of classic EFA. It also explains the use of different EFA elements throughout design, implementation and supervision of development projects. A short presentation of alternatives methods to EFA, such as cost-effectiveness and multicriteria analysis (MCA) are also included in this volume. **Volume 2** is the core of these IGs and defines minimum requirements for the elaboration of comprehensive EFA of IFAD rural investment projects. All detailed steps of analysis are presented and illustrated through a hypothetical example, the Guideland Rural Development Project. An annex to volume 2 offers technical notes, practical tips, quality checklists and suggested tables for the presentation of results. **Volume 3** presents a set of practical examples on the assessment of quantitative benefits in cases in which project activities are not directly related to production or productivity objectives (e.g. rural finance projects, climate adaptation initiatives, community-demand-driven [CDD] or capacity-building projects).

## How to read the guidelines

These IGs are directed to two different audiences. The first includes CPMs, country programme officers, government officers, and anyone designing and/or implementing IFAD projects, who are making informed decisions and need to know the basic concepts of EFA. For this group, volume 1 will provide all the information needed to use EFA results, for example linking EFA outcomes and assumptions to define benchmark indicators for the logframe; or using sensitivity analysis to inform the risk assessment exercise. The second audience is the EFA analyst. In volumes 2 and 3, s/he will find: IFAD's minimum requirements for quality standards; a practical example illustrating all the steps required to perform analysis; and suggestions on the presentation of results. Answers to the most frequent questions and identification of the most common mistakes are provided in text boxes.

FIGURE 1
**EFA guidelines outline**



IFAD'S INTERNAL GUIDELINES

**Economic and Financial Analysis** of rural investment projects

**1** Basic concepts and rationale

**2** Minimum requirements

**3** Case studies

# Relevance of EFA

## Relevance of economic and financial analysis

EFA originated as a central tool in ensuring efficient allocation of government spending. It was meant to ensure that public funds were efficiently used in all major public reconstruction and infrastructure investments, mostly following World War II. Since the 1960s, CBA has been recognized as the major 'pre-investment tool' in facilitating investment decisions on public investments and policy.

EFA of investment projects is a basic requirement for investor and recipient decision-making in project investment and financing. Currently, most IFIs (e.g. the African Development Bank (AfDB), Asian Development Bank (AsDB), Inter-American Development Bank (IDB) and World Bank (WB)) require an EFA when deciding project financing, and they guide recipient governments accordingly.

IFAD has recognized the need to ensure the viability of its operations so that member states can borrow funds in the knowledge that repayments can be generated from project benefits and not place themselves in unsustainable debt situations. Consequently, IFAD acknowledged the relevance of economic and financial analysis as a requirement for project approval in its founding documents (see the Agreement Establishing IFAD, article 7, section I[d], [2] and the IFAD Lending Policies and Criteria [III (26)]).[3]

Initially, undertaking of EFA was very common in IFAD project designs, but a shift away from production-oriented programmes towards community-based and capacity-based projects in the 1990s changed the degree to which designs were able to produce robust EFA. With value chains now emerging as a focus – and more generally with greater attention given to the issue of project efficiency – the need is shifting back towards a more-classical approach to EFA. Today, it is considered a priority for IFAD, and, under IFAD10, [4] one of the indicators of the corporate Results Measurement Framework (RMF) is that loan-financed projects receive a published and verifiable economic analysis.[5]

These guidelines seek to demonstrate the utility of EFA analysis throughout the participatory planning, design, implementation and evaluation of projects. This is indispensable to good project appraisal and lets decision makers assess the overall value of a project, including the likelihood that target beneficiaries will adopt the interventions proposed.

The following sections demonstrate that EFA provides information both to understand the convenience of private investments for target beneficiaries and to prove to governments that public resources will be efficiently allocated.

## EFA as a decision-making tool in project planning

All the development programmes and initiatives are made of projects. Projects are the main tool governments use to encourage and shape development. They allow us to transform into practice ideas highlighted in the poverty reduction strategy papers.

A clear distinction can be made between projects and programmes, although the two concepts are tightly related:

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2 "… eligibility for assistance shall be on the basis of objective economic and social criteria…"

3 "The Fund, taking due account of … the principle of economic viability of projects…"

4 The Tenth Replenishment of IFAD's Resources.

5 Indicator 4.2.7: "share of projects with a published and verifiable economic analysis (yearly)". Revised IFAD10 RMF (2016-2018).

**Decision-making in project formulation**
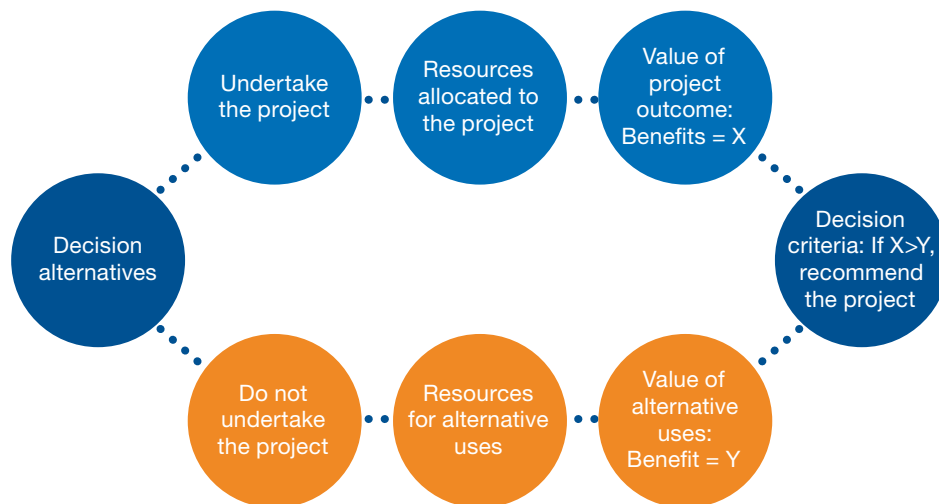


Programme: is a *portfolio comprised of multiple projects* that are managed and coordinated as one unit with the objective of achieving *common (often intangible) outcomes* and benefits at sector, country or even multi-country level.

Project: is a *temporary* entity established to deliver *specific (often tangible) outputs* in line with predefined time, cost and quality constraints. A project should always be defined and executed and evaluated relative to an approved business plan which balances its costs, benefits and risks.

Whenever a project involves the decision to use available economic resources (e.g. productive capital, infrastructure, human capital, knowledge) in the anticipation of future benefits, it is an 'investment project'. In brief, an investment project is the decision to make current expenditures in the anticipation of future benefits.

IFAD′s main activity is the financing of rural investment projects through loans and grants. EFA provides clear and simple indicators to ensure that a project's investments generate the anticipated benefits at household and project levels. Thus IFAD requires this analysis in its project formulation documents. Apart from country-level decisions, EFA results are also used to inform approval decisions in QE/QA processes and by the Executive Board.

In summary, the main purpose of EFA is to ensure an efficient allocation of resources, proving to governments the benefit of implementing one particular investment rather than another option, which could be the 'do nothing' alternative (Figure 2). EFA is the most appropriate tool in appraising the convenience of carrying out a project, for both the direct beneficiaries and the national economy as a whole.

Thus, when appraising the economic and financial viability of any project, one must first examine the 'business as usual' (BAU) or 'without project' alternative, and then compare it with proposed options. What the analyst needs to assess is the value added (incremental approach) of the project.

As a major methodological tool, EFA makes use of CBA, but it also allows for other approaches and studies, such as cost-effectiveness and multicriteria analyses. Because costs and benefits do not occur at the same time – with costs generally preceding and exceeding benefits during the first years of the project, and benefits, especially in the agriculture sector, being realized gradually over a longer time period – the comparison is not straightforward. Hence, 'discounting techniques' are applied. This issue will be further developed in the following sections.
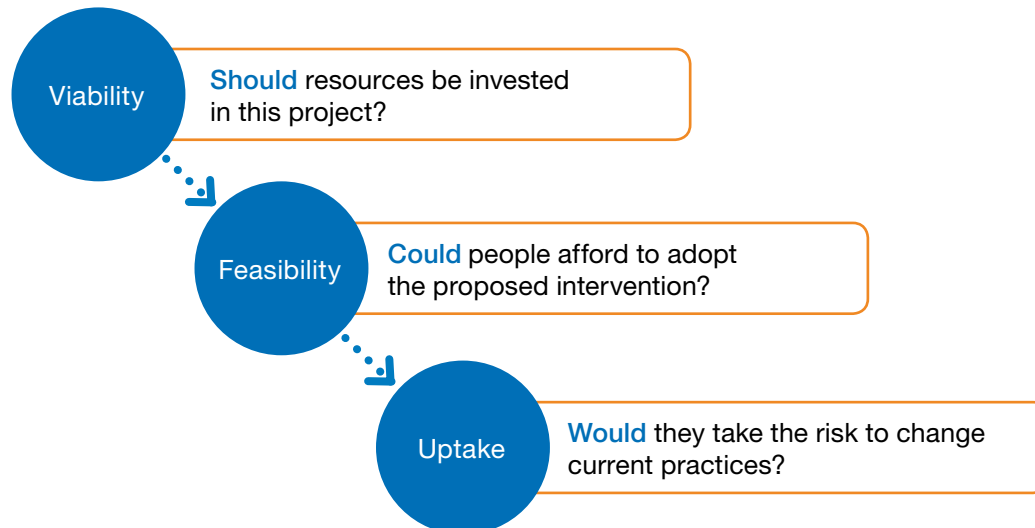
CBA was created as a 'pre-investment tool' to facilitate investment decisions. In these types of ex ante decision-making tools, there is a trade-off between the amount invested in the ex ante studies and the probability of making a wrong investment decision.

The ability to support decision-making is a key element of EFA. It provides solid indicators for answering questions regarding 'the best alternative' from the points of view of different actors.

Figure 3 shows guiding questions for the assessment of any investment project, and box 1 provides more information on how these can be used.

FIGURE 3
## Guiding questions during project assessment

**Viability** — **Should** resources be invested in this project?

**Feasibility** — **Could** people afford to adopt the proposed intervention?

**Uptake** — **Would** they take the risk to change current practices?

BOX 1
## Guiding questions

**Should the government invest** its scarce resources in this particular intervention? Should the producer adopt the proposed intervention?
Replying to these questions will ensure that the proposal is solid from a technical, financial and economic point of view. Analysis should assess the viability of the investment and compare it with alternatives (at least with the present/BAU situation) to ensure that the project is generating additional value. This information is also used to ensure the economic profitability of the project as a whole.

**Could the producer afford** the proposed technology?
From a purely financial point of view, are available resources adequate for the producer to invest in the proposed intervention? If these resources are not sufficient, alternative financing schemes should be assessed by the project (e.g. loans, savings schemes, insurance, grants). In addition, other context-specific restrictions should be considered at this stage – such as input availability, labour requirements and legal restrictions – that could be a barrier to modifying current practice.

**Would the producer** take the risk? **Would the government** take a loan to finance this project?
This is one of the most relevant questions for all project implementers. Are incentives high enough to convince producers to change their current situation? Here, not only monetary incentives should be considered, but also social, cultural and environmental ones.

A proper risk analysis would identify the critical economic parameters the government should consider when making its investment decisions.

The various steps in EFA provide information to respond to these questions, taking into account that the decision is not simple: projects require time to develop and one wants to make certain that the improvements in people's lives are permanent.

## EFA requirements: technical and institutional viability

EFA is only one part of the overall analysis of a project; it assumes that the project is technically sound and that its institutional arrangements will be effective during implementation. In other words, EFA of investment projects requires, at the least, that the project under analysis be feasible from the technical and institutional points of view. Projects can be implemented through different institutional arrangements and using different technical solutions. For a project to be viable, at least one of these institutional arrangements needs to be valid and at least one technical solution needs to be viable. As will be seen, the application of EFA during project formulation will also help identify and select the 'best' project technical and institutional alternatives. This is a strong assumption, as the review of numerous cases has shown many inconsistencies in project technical formulation.

Commonly identified inconsistencies include: (a) incomplete or inadequate description of the institutional arrangements for carrying out the proposed project components; (b) incomplete or inadequate identification of constraints on productive development. For example, the project: (i) proposes a new technology, but there is no assessment of the on-farm working capital requirements for adopting it and, consequently, the project lacks the required financing component (e.g. grants, credit); (ii) plans huge investments in irrigation facilities, but no provision has been made for the required technological transfer services and working capital needs; (iii) proposes improvement of rural financial services, but there is no description of the expected productive activities and technologies to be adopted through the support of these facilities.

Thus reviews of the technical proposals and institutional arrangements for project implementation are steps prior to EFA. They involve preparation of an adequate project logframe (reviewed at each stage of the project cycle), which is essential in confirming institutional viability.

# Basic concepts in undertaking EFA

This section illustrates basic concepts so that the non-specialist can become more familiar with the terminology and purpose of EFA. However, detailed information on carrying out EFA of projects is provided in volume 2 of these guidelines.

EFA is based on comparison of the net[6] cash flows of investment alternatives. The present, or BAU, cash flow is compared with at least one other investment alternative, which according to the project's technical specialists will result in amelioration of the producer's situation.

However, in order to assess if the project is making good use of public funds, the costs of implementing it (including the institutional setting and capacity-building of both implementers and producers) must be compared with the benefits produced. In other words, the value added by the project is compared with the incremental costs of implementing it.

In practical terms, the analyst models diverse beneficiary livelihood strategies to compare BAU situations with the project proposal. Description of the BAU, or without project (WOP), situation, although simple at first sight, can confuse the analyst regarding many aspects (box 2).

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**BOX 2**

**With project (WP) and without project (WOP) scenarios: common issues**

Accurate description of both WP and WOP scenarios is essential to a realistic assessment of incremental benefits:

1. WOP equal to zero. When the project proposes development of a new activity, many analysts represent the WOP as a null scenario because the activity wasn't present in the past. However, the correct approach is to realistically represent the alternative activities (e.g. off-farm employment).

2. Static or unrealistic WOP. Generally, WOP scenarios are presented as a static situation that repeats itself through the years. This is often underestimating the capacity of people to adapt and progress. Projects generally assist these processes and accelerate their returns.

3. An inaccurate WP fails to assess the incremental net value of the project. In a woodlot project in Malawi that aimed to produce firewood, analysts spent a great deal of time studying how to value the incremental wood production, since there was no market for the wood. Finally, they decided on an international valuation of the energy created. They missed the point. In the without situation, women spent a great deal of time travelling to procure firewood; with the project, they could spend their time producing more maize. If the analysts had developed realistic WOP and WP situations, they would have realized that the benefits of the project came from incremental maize, not wood, production.

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6   Net cash flows defined as: Benefits discounted cash flow net from costs discounted cash flows.

Next, one needs to formulate the WP situation, defining expected outcomes in the future by identifying the requested investment and operating costs, as well as projecting estimated benefits.[7] In order to convert future costs and benefits, which do not occur at the same time, into today's values for comparison, discounting techniques are applied. Discounting permits comparison of the value of money in different time periods, considering that a dollar today is worth more than a dollar received tomorrow (i.e. the fact that we have to postpone consumption makes tomorrow's dollar less valuable than today's). How much is $1 received in 'n' years worth today? The answer depends on the adopted discount rate (r) and the discount period (n).[8]

Thus the aggregation of project flows occurring in different years requires adoption of an appropriate discount rate to calculate the present value of future flows. As a guiding principle, discount rates should represent the opportunity cost of capital for the agent (producer or government).[9] The other essential element in discounting is definition of the discount period (also called 'project economic life' or 'time horizon analysis').

Usually, the discount period is equivalent to the lifespan of the largest investment components of the project.[10]

Finally, the project net cash flows (i.e. financial and/or economic)[11] are based on the incremental approach, which results from comparing the WP and WOP situations. With these elements, it is possible to calculate the corresponding project 'profitability indicators'.

## Investment criteria: profitability indicators

Generally speaking, a project is considered 'viable' if the sum of expected incremental benefits is larger than the sum of all costs accrued in project implementation. This can be assessed through profitability indicators.[12] The most relevant indicators for these IGs are the net present value, internal rate of return and benefit/cost (B/C) ratio.

- The **net present value (NPV)** indicator is defined as the sum that results when the expected costs of the investment are deducted from the discounted value of the expected benefits (revenues). Whenever **NPV > 0**, the project is considered worthwhile or profitable. Among mutually exclusive projects, the one with the highest NPV should be chosen.

- The **internal rate of return (IRR)** indicator is defined as the discount rate (r*) that produces a zero NPV. This represents the maximum interest rate that a project could face and still not waste resources.

For the project to be profitable, the IRR has to be greater than the interest rate that could be earned in alternative investments; thus when **IRR > r the project is considered viable**. If the (alternative) interest rate ($i^{mkt}$), also called opportunity costs of capital, is lower than the IRR, the NPV is positive, and vice versa.

$$IRR > r = i^{mkt} \rightarrow NPV > 0$$
$$IRR < r = i^{mkt} \rightarrow NPV < 0$$

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7   The analysis is looking at future investments and outcomes, thus sunk costs are irrelevant.

8   The present value (PV) = future value/(1+r)n. If r = 10% and n = 8 years, the present value of $1 would be $0.51.

9   For the producer, a realistic alternative is an average of the passive deposit rate of local commercial banks. The government should instead consider the interest rate at which the country can actually borrow capital from a relevant international capital market; alternatively, the return on long-term public treasury bonds is also a suitable option. More information on determining a relevant discount rate is provided in volume 2.

10   This rule might change when: (i) technological progress would make the investment obsolete before the end of its useful life; (ii) the investment period is 'too long' (i.e. very common in environmental projects, ship construction, etc.); or (iii) other factors exist (i.e. legal, institutional, etc.) that justify another specific choice for the discount period.

11   See the following subsection for differences between the two.

12   Formulas can be found in the technical annex.

Both, NPV and IRR are calculated on the same project cash flows of incremental net benefits.

However, in certain cases, the calculation of IRR is not possible, and thus it cannot be used as a profitability indicator.

This is the case when: (a) the flow of net incremental benefits does not have a negative element; or (b) it presents more than one IRR, complicating the decision as to which one to consider as the profitability indicator.

Moreover, IRR is an indicator that should not be used to rank or select mutually exclusive project options, as it cannot provide a measure of the size or magnitude of project value[13] (box 3).

The NPV, on the other hand, is an indicator that can always be calculated, as is the case with the benefit/cost ratio.

- The **(B/C) ratio** indicator is the ratio of the present value of benefits to the present value of costs over the time horizon. The B/C ratio provides some advantages when a ranking of alternative investment projects is needed under budget constraints.
  If **B/C ≥1** the project is **accepted.**
  If **B/C <1** the project is **rejected.**

These IGs consider that the most appropriate indicator for appraising an investment project is the NPV, as the investment decision criterion is straightforward: if NPV is > 0, the project is viable. It means that the proposed investment is a profitable alternative in terms of resource allocations. It is better than the present and WOP situations and also better than allocating the same resources to other economic activities that will yield the average profit rate.

## Economic and financial analysis: the differences

All investment projects include a number of stakeholders, and this has implications for the valuation of the benefits and costs accrued by project interventions. *Whose costs and benefits count?*[14] Governments and society as a whole will consider and value costs and benefits differently from producers or any other private actor individually. From the perspective of a development agency such as IFAD, both points of view are relevant to a reply to the guiding questions stated before: *Should* the government invest in this project? *Will* the producer take the risk?

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**BOX 3**
## IRR or NPV?

Although the most appropriate indicator for appraising an investment project is the NPV – as it can always be calculated and will provide information on the magnitude of the return – the IRR is the most commonly used. This is probably due to the fact that IRR is expressed as a percentage, which is often wrongly associated with other rates of return such as interest rates (r) or profit rates in alternative allocations. In fact, the **IRR has no meaning in terms of project value or size**.
To prove this, let's suppose a project is one thousandth the size of another project. Simply multiply each side of the equation by 1,000. The calculated IRR will not change, but the small project entails less value. The project to be chosen from a social point of view would be the one producing the bigger returns to the economy, and the **NPV will clearly show this, while the IRR will not**.

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13  Where a project is the only alternative proposal to the status quo, the issue is whether the IRR provides worthwhile additional information. Views differ in this respect. Some argue that there is little merit in calculating a statistic that is either misleading or subservient to the NPV. Others see a role for the IRR in providing a clear signal as regards the sensitivity of a project's net benefits to the discount rate. Yet, whichever perspective is taken, this does not alter the broad conclusion on the general primacy of the NPV rule.

14  In the CBA/EFA literature, the question of 'whose costs and benefits count?' is known as the 'standing' issue (i.e. whose welfare counts in the aggregation of net benefits?).

In order to consider these points of view, analysis will be conducted on two levels: (a) financial analysis will consider private stakeholders' interests[15] and (b) economic analysis will consider government and society perspectives. These two viewpoints will require the analyst to consider different items when looking at the benefits and costs of a project, valuate them differently and, in some cases, even use different rates to discount the streams of costs and benefits.

The private investor exclusively considers the costs and benefits related to the productive/market aspects of the project, while analysis from an economic point of view considers that benefits are defined as an increase in social well-being.[16] The costs are defined as reductions in social well-being. For a project to be economically viable, its social benefits must exceed its social costs.

Thus, from the perspective of a private stakeholder (financial analysis) participating in the investment with risk capital, the wealth created by a project in 'n' periods of time is defined as the financial NPV (FNPV). The economic or cost-benefit analysis looks at the overall impact of the project and takes the point of view of the collective agent (e.g. society), and the wealth created by a project in 'n' periods of time is defined as the economic NPV (ENPV) of the investment produced by the project.

In **financial analysis**, all costs and benefits should be valued at market prices. Only cash inflows and outflows are considered (depreciation, reserves and other accounting items not corresponding to actual flows are excluded).

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**BOX 4**
## Steps in financial analysis

The **typical sequence** of tasks to be undertaken in financial analysis is the following:

1. Develop farm/enterprise models and identify benefits and costs (investment and recurrent) for WOP and WP scenarios (based on crop budgets).
2. Compare the discounted flows of benefits and costs and calculate the differences between the obtained results and the WOP scenario in order to determine the net incremental benefits (NIB) of the proposed interventions.
3. Calculate the project financial profitability indicators of each model (i.e. financial NPV, financial IRR and B/C ratio), applying these investment criteria to make an investment decision (positive or negative).
4. Assess family incomes and establish financing/credit needs by performing a 'sustainability analysis'.

**Financial sustainability is ensured if the accumulated generated cash per year is positive or, at most, equal to zero**[17] **for all years considered.** On the contrary, if this figure is negative at any point in time, the project is not sustainable, meaning that there are not enough financial resources to cover all the costs, and it will be necessary to reassess project financing mechanisms.

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15   This point of view is also applied to the executing agency of a public project.

16   The term 'social welfare' or 'well-being' is used in these IGs as a simple monetary measure. The definition is taken from neoclassical economics and prevailing economic theories of well-being. No attempts are made to include any type of measurement of subjective happiness or to develop any well-being indexes or social indicators.

17   In rural development projects, where the agent is a subsistence farmer, accumulated generated cash per year must be at least equal to or higher than the BAU situation that was ensuring his/her family's survival.

FIGURE 4
## Economic and financial analysis links
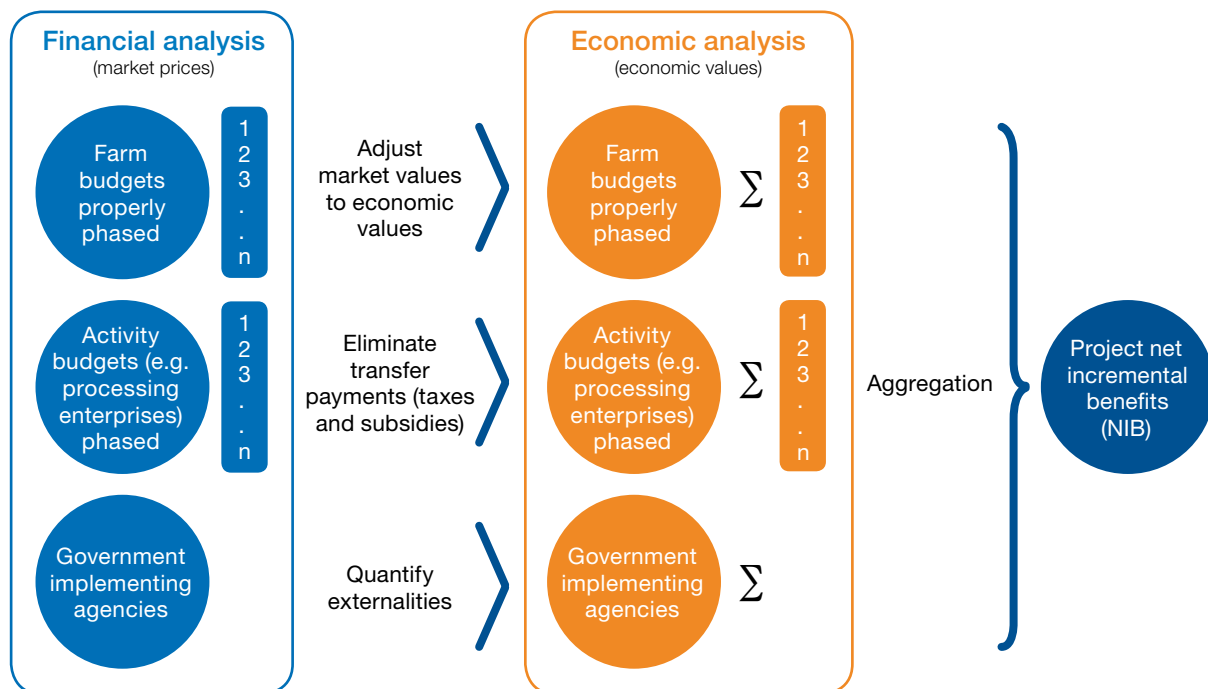


Economic analysis or cost-benefit analysis builds on the results of financial analysis, with the additional consideration of impacts and benefits not directly captured by the latter. These analyses are strictly related, as shown in Figure 4.

The main steps in financial analysis are summarized in box 4. A detailed description of building economic analysis from financial models is provided in volume 2, which illustrates each step in EFA of a typical IFAD production-oriented project.

In economic analysis, the analyst needs to complement financial analysis by considering all project impacts on the society. The private actor is generally not interested in considering all negative or positive impacts that his actions may have on the rest of society. In terms of environmental impact, for example, polluting rivers through production

discharges or emitting $CO_2$ are social costs generally not considered by the private agent. These are called 'externalities', as, in practical terms, the private agent is 'externalizing' a production cost, making the whole society pay for it. On the other hand, there also exist positive effects not counted by the private agent, such as the introduction of new pastures by a single producer, which can increase honey production in the area and benefit neighbouring beekeepers.

These aspects are known as positive and negative externalities. In addition, economic analysis must eliminate all transfer costs between national and private actors (i.e. subsidies and taxes). Lastly, all costs and benefits need to be valued at their social opportunity cost, rather than at their market price.

Many times, for example when trade barriers are in place or when currencies are controlled, market prices do not reflect the social value of goods. In order to account for these distortions, one of the most critical tasks is the calculation of economic or shadow prices. Another critical aspect is the establishment of a social rate of discount that realistically reflects an investment alternative (opportunity cost) for the government.[18] Detailed explanations and guidelines for these calculations are also included in volume 2.

Table 1 illustrates the process of going from financial to economic analysis.[19] The financial analysis section at the top shows revenues and production costs (operating and investment) of a hypothetical enterprise. The enterprise is experiencing several years of negative net cash flows, resulting in a negative NPV and IRR. This is caused by high operating costs, as well as recurrent needs for investment. Economic analysis converts market prices into economic prices. As reflected by the application of conversion factors (CF), market prices of outputs and inputs are different from their social value. For example, the CF applied to wages reflects the presence of high unemployment (20 per cent) in the area, which would push people to work for lower than market wages (thus CF = 0.8).[21] In the same way, the CF applied to investments reflects the presence of high transport costs or duties that make the product's market price overestimate its social value. In fact, the market price is 8.3, while the economic price is 7.5, and thus the CF is 0.9.

**BOX 5**
## Steps in economic analysis

Economic analysis requires assessment of a project's net impact on economic welfare by considering:

5. Convert all market prices into economic/shadow prices (SP) that better reflect the social opportunity cost of the good.

6. Remove transfer payments (taxes and subsidies) and quantify externalities (positive and negative).

7. Aggregate all model's NIB cash flows respecting incorporation phasing patterns of targeted beneficiaries into project's activities.

8. Compare aggregated benefits with other project costs to obtain incremental discounted cash flows. Calculate economic performance indicators adopting a social discount rate: ENPV, ERR, B/C ratio.

9. Perform sensitivity analysis (SA) in order to deal with the main risks and uncertainties that could affect the proposed project.[20]

Critical parameters are: (i) SP for tradable and non-tradable goods; (ii) SP of foreign exchange; (iii) SP for labour costs (shadow wage); and (iv) the social discount rate.

18   As a general rule, when a country is a capital borrower, the social rate of discount should be no less than the actual rate of interest on the capital market from which the capital is borrowed.

19   Clicking on the table reveals the formulas.

20   See section on: "Use of SA to assess project risks: an example".

21   Market wage (mW) = US$100; unemployment = 20%; economic wage(eW) = US$80 (observed given the high unemployment): CF = eW/mW = 80/100 = 0.8.

Fiscal corrections are also applied, and 10 per cent VAT is deducted from all inputs and outputs with indirect taxes. Finally, externalities are accounted for and quantified, both negatives (increases in noise) and positives (decrease in pollution).

The project under analysis resulted not profitable from a financial point of view, but viable from an economic point of view. This means that the overall impact for society is positive (also reflected by the positive externalities), but there are no sufficient incentives for the private/individual agent to undertake these activities. This conclusion suggests that, if the development objectives achieved through this investment are significant enough for the government, then the project should develop an incentive scheme to attract the private agent.

These results may be used in policy dialogue, suggesting that the government could reduce the level of targeted import duties and thus make this investment proposal financially profitable.

## TABLE 1
## From financial to economic analysis: an example

| Financial analysis (market prices) Thousands of United States dollars | Years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Total operating revenues* | 0 | 42 | 115 | 119 | 126 | 126 | 126 | 126 | 126 | 126 |
| Total Inflows | 0 | 42 | 115 | 119 | 126 | 126 | 126 | 126 | 126 | 126 |
| *Total operating costs* | 0 | -56 | -75 | -98 | -101 | -101 | -101 | -101 | -117 | -117 |
| *Total investment costs* | -165 | -4 | -4 | -25 | -3 | 0 | -25 | 0 | 0 | 12 |
| Total outflows | -165 | -60 | -79 | -123 | -104 | -101 | -126 | -101 | -117 | -105 |
| Net cash flow | -165 | -18 | 36 | -4 | 22 | 25 | 0 | 25 | 9 | 21 |

| | |
|---|---|
| Financial rate of return | -6% |
| Financial NPV@10% | US$(89) |

| | |
|---|---|
| Economic rate of return | 36% |
| Economic NPV@10% | US$473 |

1. Adjust market values to economic values applying CF
2. Eliminate transfer payments (taxes and subsidies)
3. Quantify externalities

| Economic analysis | CF | Years | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| *Output X* | 1.2 | 0 | 49 | 134 | 139 | 147 | 147 | 147 | 147 | 147 | 147 |
| Total operating revenues | | 0 | 49 | 134 | 139 | 147 | 147 | 147 | 147 | 147 | 147 |
| *Labour costs* | 0.8 | 0 | -18 | -18 | -26 | -26 | -26 | -26 | -26 | -30 | -30 |
| *Operating costs* | 1.1 | 0 | -36 | -57 | -73 | -76 | -76 | -76 | -76 | -87 | -87 |
| *Total investment costs* | 0.9 | -149 | -4 | -4 | -22 | -3 | 0 | -22 | 0 | 0 | 11 |
| Fiscal correction outputs[a] | 0.9 | 0 | 44 | 121 | 125 | 132 | 132 | 132 | 132 | 132 | 132 |
| Fiscal correction inputs[a] | 0.9 | -134 | -36 | -55 | -85 | -71 | -68 | -88 | -68 | -78 | -68 |
| Externalities | | 0 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| *Decreased pollution* | | 0 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 | 23 |
| *Increased noise* | | 0 | -3 | -3 | -3 | -3 | -3 | -3 | -3 | -3 | -3 |
| Net cash flow | | -282 | 39 | 161 | 98 | 144 | 149 | 107 | 149 | 124 | 145 |
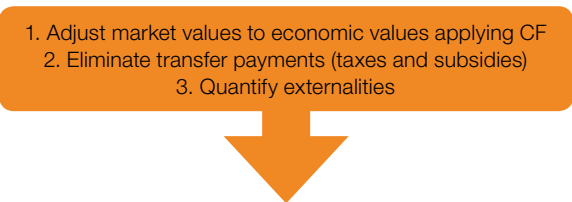
[a] VTA of 10% has been eliminated.

# EFA of IFAD rural investment projects

IFAD rural investment projects include projects in integrated rural development, irrigation, rural finance, value chain development, natural resource management (NRM), climate-change adaptation and mitigation, community development and institutional strengthening.

As IFAD follows its main mandate of focusing its projects on benefiting poor rural people,[22] projects are characterized and designed through identification of a target group composed mostly of rural people. Poor rural people represent different productive and economic categories, the main one being smallholders. Others include the landless population engaged in rural, non-agricultural microenterprises, rural workers, fishers and, finally, special vulnerable groups such as women, indigenous minorities and youth. All IFAD projects must be formulated on the basis of benefiting one or more of the above-mentioned poor rural groups.

The increased number of value chain projects in IFAD's portfolio[23] – aiming to integrate IFAD's traditional target groups into these chains to improve their access to secure markets and sustainably raise their incomes – has expanded the definition of IFAD's target group to all rural people, including small- and medium-scale entrepreneurs in rural areas. However, for the purposes of EFA, the impact on poor rural people is the one that matters the most to IFAD[24] and to the poverty-reduction development objectives of each government.

This IFAD specificity has direct consequences for CBA discussion of the 'standing' issue. As previously stated, investment projects include a number of social stakeholders. However, for IFAD rural investment projects, this is not a major issue, as the formulation of IFAD projects is focused on benefiting a specific target group: poor rural people.[25]

## Focusing on 'typical' IFAD rural investment projects and their main benefits

The typical IFAD project is usually production oriented,[26] and its main outcomes (i.e. financial and economic benefits) are frequently net production increases. In other words, most IFAD projects will have a direct impact on the production levels of target groups, which, in turn, will lead to net income increases.

IFAD projects have an impact on the incomes of poor rural people by increasing their access to inputs and services that will subsequently increase their production volumes and/or productivity. The most common areas of intervention include: technical assistance (TA) for crops and livestock through extension services; rural finance services

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22   See IFAD Lending Policies and Criteria, I (5): "IFAD will concentrate its resources upon activities that promise to achieve in a cost-effective way a reduction of poverty in rural areas, where most poor people live and work. The Fund's major target groups, irrespective of the stage of economic development of the country, will be the small and landless farmers."

23   From only 3 per cent in 1999 to 46 per cent in 2009 (Raswant and Heinemann, 2012).

24   However, when possible and relevant, distribution of benefits among value chain actors is a complement to CBA.

25   There might be exceptional situations in which other social groups could benefit from an IFAD project. These cases might require additional analyses (e.g. distributional effects analysis) when undertaking EFA.

26   Of 114 projects reviewed by QE from 2009 to 2011, 73 per cent were agriculture- or rural development-related, while in 16 per cent, the core objective was to strengthen financial services. The rest focused on capacity-building or NRM. These data show that most IFAD projects can be characterized as production-oriented, that is, designed to have direct impact on production and productivity increase.

to support on-farm investments and increased access to working capital through credit/loan[27] or grant facilities; improved water management through the construction of irrigation structures; provision of storage, drying and cooling facilities to enhance post-harvest preservation; and technical advisory and financial resources to support entrepreneurs in starting small and microenterprises – as well as combinations of the above.

This IFAD specificity leads to some straightforward requirements when analysing its financial and economic results. First, the project should be assessed in terms of the financial feasibility and sustainability of targeted beneficiaries; second, the project should be assessed in terms of economic profitability for the whole national economy.

Thus, in IFAD production-oriented projects, the main household-level goal in financial analysis is to determine whether the producer[28] will have enough incentives to participate in the project.

In simple terms, analysis needs to establish whether the farmer should undertake the proposed intervention under the criterion that it is financially viable (i.e. the benefits over time are higher than the investment and recurrent costs), and that these net benefits exceed present returns (i.e. incremental benefits are positive).

However, even if the new situation (WP) is more appealing than the present one (WOP), *could* the farmer afford to adopt improved practices? Although viable, the investment may still not be profitable if it does not generate enough returns (mostly during the first years) to cover the farmer's needs. Where the producer is living under the poverty line, the project should at least generate the same net income each year as in the BAU situation (subsistence system), to ensure his/her participation. Where poverty levels are lower, incomes should be adequate to cover investment and working capital needs, in addition to

the farmer's living expenses. The lack of initial capital to invest is generally a huge barrier to engaging in a new activity. A *financial analysis* will determine if farmers' cash flows are adequate to undertake the activities (i.e. it will clearly identify a farmer's financial needs and his/her repayment capacity).

Even when a financing scheme will prove the feasibility of the investment, there are many risks involved in changing a farmer's practices (business as usual), above all if it involves taking out a loan in an uncertain agricultural environment. Thus the last question to be answered is would the farmer take the risk, are there enough incentives? Risks faced by farmers are many and extremely difficult to manage.[29] The only measure of their willingness to change habits/technologies will be by comparing their returns to the opportunity costs of remaining in the actual situation. If, for example, the returns to labour of the new activity prove to be much higher than the average rural wage, it is probable that a farmer would be willing to invest his time in his own farm and take the risk.

In other words, *financial analysis* will establish: whether farmers will obtain a net incremental benefit (financial viability and profitability analysis); if they'll have enough working capital to buy the additional farm inputs or to bear the costs of stocking processed goods (financial sustainability); and, finally, if financial incentives are enough to convince them to change existing practices.

The practical way to undertake this analysis is by developing different beneficiary productive profiles – considering several types of productive activities, 'farm-systems' and 'activity-models' – as well as how many and which types of people generally engage in these activities in this particular area.

On the basis of the individual models of financial analysis – and once the three steps in converting market prices into their economic value have been

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27   Comprising inclusive innovative/adapted rural finance products and services, including risk management strategies, savings, financial literacy/education programmes, etc.

28   The terms 'farmer', 'producer' or 'private stakeholder' will be used throughout the IGs as synonyms for the term 'private agent' in financial analysis.

29   For example, risks in the areas of production, prices, casualties, technology, climate – to name just a few.

completed – *economic analysis* of the project as a whole can be undertaken.[30] This is done by means of the aggregation that, in project analysis, is the process of adding together the costs and benefits of all the entities participating to reach a summary account from which a measure of project worth can be derived. The result of the aggregation is the net incremental benefit or cash flow of the project.[31]

Lastly, the goal of economic analysis is to answer the question of whether it is worthwhile to invest public resources in the overall project proposal (*should* the government invest?). It will focus on the perspective of the entire country, and it measures the effects of the project on the economy as a whole.

## Unquantified benefits: alternative methodologies to CBA

The majority of IFAD's projects are production-oriented interventions in which expected outcomes are tangible and easily quantifiable; however, due to IFAD's typical target group, many of these projects are complemented by activities seeking an impact on less-tangible aspects of rural poverty alleviation. Women's empowerment; increased access to assets and services; enhanced capacities; ownership and land titling are examples of this important part of IFAD's overall project impact. However, these types of benefits, which are more difficult to measure or not measurable in monetary terms (*intangible* benefits), are often excluded from CBA.

In addition, environmental and social benefits resulting from the promotion of resilient agricultural practices or social infrastructure such as rural roads, irrigation schemes or market infrastructure are also seldom included in CBA. In order to change this trend, these IGs will provide some ideas on how to allocate value through the use of valid proxies to measure the impact of these intangible social and/or environmental benefits.

In the particular case of CDD projects, where communities collectively decide on the allocation of project resources, it is very difficult to foresee which productive activities will be targeted. However, markets and agronomic conditions in the project area will limit the scope of activities that can be successfully undertaken. In these cases, the fact that communities are making participatory decisions will grant the additional benefits that ownership provides, ensuring higher adoption rates than average and increasing the sustainability of the chosen interventions.

In cases where the identification and valuation of benefits is difficult, simple and sensible ways of estimating tangible benefits should be applied. Table 2 presents an overview of suggested approaches to transforming such benefits into tangible values, so as to include them in overall project cash-flow analysis from the most common complementary activities in IFAD's projects. Additionally, the IGs will introduce two methods alternative to CBA for those cases where not even proxies could be measured: cost-effectiveness and MCA.[32] The latter has not yet been tested as a suitable tool in IFAD project designs, but is suggested as an alternative in cases of complex decision-making.

### Cost-effectiveness

When tangible benefits from a given investment are difficult to quantify, but the costs are easily identifiable, the most commonly used valuation method is cost-effectiveness, which is used to select the least-costly alternative among a set of options that will achieve the same result (a given set of predetermined objectives). Once the purpose of the project has been decided, for example construction of a market storage facility, cost-effectiveness would be used to compare scale, location, technology, etc. in order to choose between investment

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30   Some analysts proceed by aggregating the financial analysis and then converting the aggregated results into their economic value. It can be argued that this stage of analysis is useless, as the financial profitability indicators for the project as a whole have no use in terms of investment decisions.

31   See volume 2 and its annex for more details on the 'aggregation issue' and common mistakes.

32   See the technical annex for more details.

TABLE 2
## Simple, sensible ways of valuing different types of benefits

| Project components/activity | Quantifiable benefits |
| --- | --- |
| **Productivity enhancement** (including irrigation, post-harvest and processing): Storage, drying, cooling facilities; irrigation | • Reduced post-harvest losses<br>• Increased value and volumes of production due to investments in storage, cooling or small processing facilities (drying or milling)<br>• Increased production and productivity due to water provision |
| **Value chain (VC):** Collective marketing; warehouse receipt systems; increased market information | • Increased value of final product owing to increased quality and access to markets, improved handling, packaging and commercialization<br>• Financial benefits to all actors along the VC<br>• Microenterprise and employment creation<br>• Creation of internal and external markets that did not exist before investments |
| **Rural roads** | • Reduced transport and vehicle maintenance costs (incl. vehicle operating costs [VOC] and travel-time costs [TTC])<br>• Access to areas not accessible before, hence increased total production<br>• Increased volume of transported agricultural products for sale (reduced losses)<br>• Reduced transport costs due to better access to sales points |
| **Domestic water supply** | • Time saved in procuring water<br>• Reduced sickness through better water quality<br>• Reduced water losses due to leakage<br>• Increased productivity through small-plot crop irrigation and through provision of water for livestock<br>• Introduction of backyard gardening |
| **Climate adaptation and resilience practices:** Changes in tillage practices, crop rotations, land/soil conversion, afforestation, energy-efficient systems, flood prevention | • Reduced land erosion: an estimate of saved nutrient content can be valued at price of fertilizer needed to replace that nutrient content<br>• Increased crop, timber and livestock yields through soil preservation, conservation tillage and agriculture<br>• Increased final product value due to labelling as organic agricultural practices<br>• Avoided rehabilitation costs for public infrastructure destroyed by natural disasters<br>• Energy savings owing to replacement of old practices by eco-friendly artefacts (eco-stoves, solar panels, etc.) |
| **Land registration** | Land tenure security may translate into increased land value explained by:<br>• Long-term Investments in land fertility<br>• Improved access to credit, as land can be used as collateral<br>• Greater dynamism of land markets<br>• Environmental benefits as a result of better NRM (people improve or maintain forest and/or tree cover) |

| Project components/activity | Quantifiable benefits |
|---|---|
| **Rural finance** | • Efficiency gains in financial system can lower operational costs and ensure self-sufficiency and sustainability of financial services supply<br>• Shifts in portfolio composition of financial service providers (productive loans versus consumption)<br>• Incremental taxation revenues to government<br>• Potential productivity increases through financing of working capital (incremental benefits to clients/borrowers)<br>• Economic benefits of transfer effects |
| **Community development (CD)** | • Improvements in lives of beneficiary households (value these in money equivalents if possible)<br>• CD activities result in high empowerment and ownership of project activities, which could translate into greater sustainability |
| **Indigenous peoples' (IPs) knowledge** | • When IPs are supported in applying their knowledge, ownership of project activities is ensured, as well as sustainability of activities. This can translate into low implementation risk and high uptake (adoption rates)<br>• Generally IP practice are environmentally friendly thus reducing stress on natural resources<br>• Nutritional aspects are also part of the positive impacts |
| **Institutional strengthening** | • Improved institutional capacity has generated or will generate benefits for target groups<br>• Losses avoided by strengthening the institution: looking at the sensitivity analysis, assess how delays in implementation (due to institutional weak capacities) affect project outcomes and use that data to calculate losses avoided |

Source: PTA – EFA desk elaboration.

options (e.g. open storage, location of a facility, construction materials). Unfortunately, the results of this method, which can justify project investment decisions, cannot be integrated into the streams of incremental net benefits resulting from classic CBA, thus underestimating the overall benefits of the investment.

## Multicriteria analysis
MCA is a decision-making tool for evaluating complex decision problems, where the options entail many different objectives. Unlike CBA, MCA allows consideration of aspects other than economic and financial ones, for example both quantitative and qualitative data. It builds trade-offs between criteria that in complex decision-making are usually in conflict (efficiency and equity for example), [33] and is an important instrument in ranking different options and discriminating between acceptable and unacceptable possibilities.

The main advantages of MCA are its openness, explicitness and power to simplify complex situations. This process eases the discussion and promotes communication, first, within the decision-

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33   Another example would be when production objectives are in contraposition to environmental ones. For example, to increase livestock production for food security and at the same time reduce $CO_2$ emissions.

making body, and later between that body and stakeholders. MCA can be an ex ante ('before the fact') and an ex post ('after the fact') evaluation tool. This type of analysis also presents some difficulties. One concerns definition of the comparative criteria. Use of MCA requires knowledge of mathematical notions, data aggregation methodologies and computer applications to perform analysis following a structured process and to avoid weak conclusions. It is often costly and time-consuming.

## EFA data sources, collection and coherence

The value of EFA as a decision tool hinges on the *quality of the data and assumptions* that underpin it. Data availability is a widespread problem for EFA analysts, who should always work in close collaboration with expert colleagues (agronomy, livestock and rural infrastructure experts) who will provide or validate the key technical parameters of the analysis.[34]

Data regarding project costs should be collected during design missions in consultation with the rest of the team. Once the first results from EFA are reached, they should also be shared with the team to discuss how they affect expected outcomes and assumptions. For example, planned investment costs may not be sufficient to reach the number of target beneficiaries; outcomes of specific components may not be appealing from a financial point of view, etc.

Although it is the responsibility of the EFA analyst to gather and ensure data consistency among sources, the mission leader should promote and facilitate dialogue among mission members and provide sufficient time for the analyst to collect and process data to ensure EFA quality and coherence.[35]

For the other parameters of EFA analysis, such as conversion factors and discount rates, one of the most important sources of data is always the national planning offices. If these data are not available, evaluations of completed operations by the Independent Office of Evaluation of IFAD (IOE) can be used as a reference.[36] These can provide reference values for similar projects or projects in the same country (and region), for example on uptake (adoption rates) of a specific technology or constraints on input availability.

Moreover, economic and financial analysis in appraisal reports for the same country (and/or region and/or sector) – from IFAD and other IFIs such as the World Bank or regional development banks – are potential sources of information on key parameters such as discount rates.[37]

However, any project analyst should rely on his/her best judgment, accumulated through experience, when deciding on the assumptions to be used.

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34   Alternatively, FAOSTAT is the most reliable and recommended source of data (http://faostat.fao.org).

35   It is estimated that at least five weeks are needed for elaboration of a complete EFA: one week for data gathering, two weeks of mission and two weeks for data processing.

36   Evaluations by country and region are available at www.ifad.org/evaluation/public_html/eksyst/doc/prj/index.htm.

37   FAO's Monitoring and Analysing Food and Agricultural Policies (MAFAP) programme develops estimates for standard conversion factors, the social exchange rate (SER) for different countries and currencies, and other important parameters for estimating shadow prices, such as the transport costs, duties and taxes instrumental in calculating parity/border prices for tradable goods (www.fao.org/mafap/home/en/. Country reports can be found at www.fao.org/mafap/products/country-reports-technical-notes/en/).

# EFA role throughout IFAD's project cycle

To increase the efficient use of EFA, it is important to view this analysis as an *integral part of project design information* and not only as a mandatory study done for compliance with IFAD quality requirements.

To do so, there should be continuous review and refinement of EFA at all stages of the project cycle. It is part of the monitoring and evaluation (M&E) and knowledge management functions to inform decisions on adjustments to design and implementation modalities in pursuit of project objectives.

As a first step, *the data used for EFA in project design should be periodically updated* by the project's M&E system, and supervision/ implementation support missions should verify that this has taken place. If significant changes occur in the data – particularly those for which the sensitivity analysis showed higher sensitivity – the IRR, NPV and cost-benefit ratio should be recalculated.

In the light of new data (e.g. prices for inputs and outputs, demand forecast for project outputs, and/or adoption rates) – and taking into account the results of updated EFA, including identified risks and suggested mitigation measures – it may become appropriate during project supervision and/or implementation support missions to decide to reallocate resources among activities and/or components, shifting from those that contribute less, according to the new constellation of data, to those that would contribute more to the project's objectives.

Moreover, the EFA spreadsheet prepared during project appraisal should remain available for review during project implementation and evaluation. This serves as an indicator of compliance with the EFA requirement for design documents and the new RMF indicator as stated in the relevance section. It would also facilitate the updating process indicated in the preceding paragraph.

The purpose of EFA in each phase of the project cycle, including evaluation, is indicated in the following table:

TABLE 3
## EFA at different stages of project cycle

| Project cycle stage | Role of EFA | Form of analysis |
|---|---|---|
| Concept | Definition of investment criteria | • Purely ex ante – all benefits and costs are based on estimates of future values |
| Project design | Resource allocation decisions | • Purely ex ante – all benefits and costs are based on estimates of future values |
| Supervision – early stage | | • Mainly ex ante – some costs may be ex post, but most benefits will still be based on future estimates |
| Midterm review (MTR) | Resource *reallocation* decisions | • Mainly ex ante – some costs will be ex post, but estimation of future benefits will be based on evidence accrued during first half of project |
| Supervision – later stages | Newly Identified risks | • About 50% ex post/50% ex ante – costs will be increasingly based on actual results, but benefits are generally lagged by several years at least and will continue to accrue over life of investment |
| Project completion report (PCR) | Assessment of results | • Mainly ex post – all costs and some benefits will be based on actual results, but benefit stream for residual life of investment will remain an estimate of future values |

Table 3 also describes the form of analysis undertaken at each stage of the project cycle, which ranges from purely ex ante during project design; to partly ex post, initially with regard to costs and later to benefits; and, finally, purely ex post for investment costs, but only partly ex post for recurrent costs and benefits. In this example, a fully ex post analysis would only be possible after 20 years, which lies more in the realm of policy analysis than project EFA.

Given its purpose, EFA is currently used mostly as an ex ante tool to guide project formulation and justify investment decisions. Nevertheless, it could make a bigger contribution to IFAD's mandate for rural poverty reduction if it were used in some of the following ways:

### At concept

- At COSOP[38] and/or project conception: previous evaluation ex post reports, elements from previous EFAs or speedy financial assessments of intended investments could serve as screening criteria for the validation of proposed investment ideas. For example, a previous study on the investment requirements for a specific irrigation technology may help establish a minimum area to be covered by projects in order to produce sufficient benefits to overcome project investments.

### At design

- For component selection: ex ante assessment of component viability during design.
- For cost validation: EFA will confirm whether estimated project investment costs are sufficient to cover proposed interventions, as well as define beneficiaries' contributions and their financial needs.
- In the logframe: EFA can provide realistic and consistent outcome indicators.
- For risk management: EFA will provide grounded information for the effective design of mitigation measures applied to changing circumstances in order to understand and manage risk.

### At implementation

- To terminate or modify activities that are not generating satisfactory financial results for the intended beneficiaries and economic impact for the country as a whole.
- For M&E: Updating EFA to changing circumstances will provide up-to-date evidence of realistic outputs, outcomes and impacts. As an M&E and knowledge management tool, it can facilitate learning within and between countries about what works and what doesn't in terms of financial and economic impact. This knowledge can also be used to guide the design of country programmes through the COSOP.
- EFA can also be used as a risk management tool during implementation. Where new risks are identified, or design assumptions are found to be incorrect, remedial action may be needed, including reallocation of resources among components and/or expenditure categories. Early in implementation, EFA could contribute to adaptation to changing circumstances, such as commodity prices, production technologies and institutional and policy changes, which may suggest that different or better approaches be adopted, modifying the design and/or implementation arrangements.

### At evaluation

- As an ex post impact assessment tool, by incorporating EFA in IOE's PCR and country or project evaluations in order to compare expected and actual project results.
- To inform decisions on scaling up or replication of successful initiatives, including the scaling up of grant-funded activities into full-scale, loan-funded projects.
- Ex post EFA assessment may suggest discontinuation of approaches that are not working and scaling up of those that are.

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38   Country strategic opportunities programme.

## EFA in project design: Links with the logframe and M&E

In addition to a complete EFA assessment, IFAD's mandatory design documents require presentation of a logframe; detailed cost tables disaggregated by component, financier and expenditure categories; and formulation of an M&E system.

These three elements should be closely linked. The *logframe* provides a global picture of project objectives and describes, through components, the activities that will be put in place to achieve them, along with measurable indicators to monitor progress and achievements. The *cost tables* assign a cost to each of these activities, and *M&E* measures their impact. EFA is the *technical vehicle* that attaches an expected benefit or outcome to the costs of each envisaged activity. It defines the causal chain of effects between a project's inputs and outcomes.

Logframe  Project costs  Impact (M&E)

**EFA defines the causal chain**

In other words, many of the logframe sections can and should be completed with information coming from EFA. These indicators should also be used as part of the M&E system in order to maintain coherence between planned interventions and expected outcomes from the very beginning.

In order to illustrate this causal chain, a clarifying example is provided in Figure 5 to explain how, through EFA, certain inputs will be transformed into outcomes as a result of the project. The example has been extracted from an ongoing IFAD project with a total project cost of US$119 million to finance three main components: C1, value-chain market linkages development; C2, improved agricultural practices and infrastructure; and C3, the project management unit (PMU).

As shown in Figure 5, uptake indicators (i.e. number of expected beneficiaries) and overall project impact of 20% increased incomes in 29,000 HH have been directly estimated through EFA (shown by the visible arrow). The same has been done for expected outcomes from productive interventions – such as improved crops and cropping techniques complemented by irrigation infrastructure under C2 – that will result in an average increase in yields of 15 per cent. However, there are some project activities for which it is more difficult to
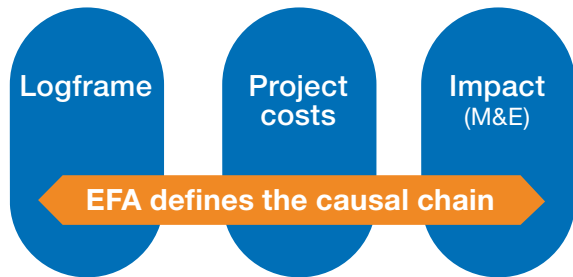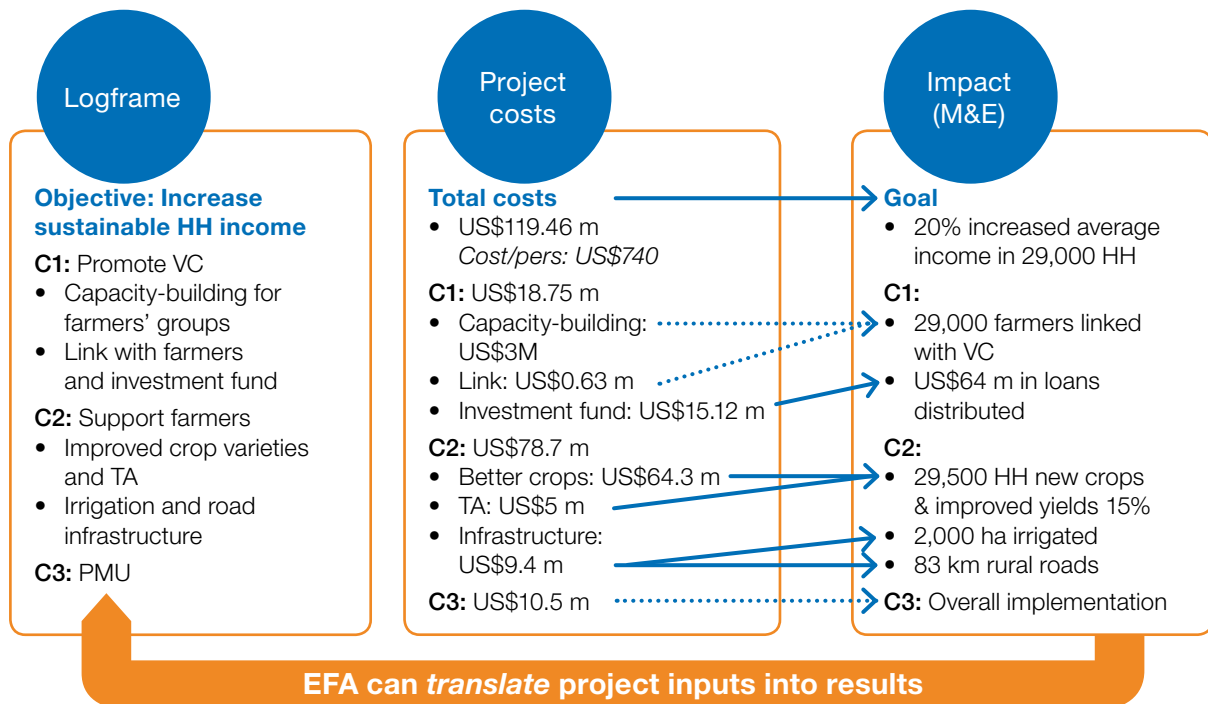
FIGURE 5

**Practical example of linking EFA with the logframe, costs and M&E:**
*With what? For what?*

Logframe  Project costs  Impact (M&E)

**Objective: Increase sustainable HH income**

**C1:** Promote VC
- Capacity-building for farmers' groups
- Link with farmers and investment fund

**C2:** Support farmers
- Improved crop varieties and TA
- Irrigation and road infrastructure

**C3:** PMU

**Total costs**
- US$119.46 m
  *Cost/pers: US$740*

**C1:** US$18.75 m
- Capacity-building: US$3M
- Link: US$0.63 m
- Investment fund: US$15.12 m

**C2:** US$78.7 m
- Better crops: US$64.3 m
- TA: US$5 m
- Infrastructure: US$9.4 m

**C3:** US$10.5 m

**Goal**
- 20% increased average income in 29,000 HH

**C1:**
- 29,000 farmers linked with VC
- US$64 m in loans distributed

**C2:**
- 29,500 HH new crops & improved yields 15%
- 2,000 ha irrigated
- 83 km rural roads

**C3:** Overall implementation

**EFA can *translate* project inputs into results**

measure impact (represented by the fading arrow). In the example, the development of stronger links between farmers and agribusiness and improved market access through construction of rural roads will certainly have an impact on beneficiary access to markets, but this is not easily quantified by measuring the number of meetings held by these groups. It would be better reflected in increases in volumes sold and the prices received by farmers.

Moreover, indirect benefits from project activities should also account for other rural people that will benefit from the roads and are also not included in the analysis. Finally, several project costs will not produce any direct benefits, but the activities they fund are fundamental in the delivery of the overall project. For example, all costs regarding the PMU, as well as awareness-raising campaigns and other types of 'soft' interventions.

In summary, the logframe provides a structure that can help organize the data and assumptions used in EFA elaboration. Key data for estimating costs and benefits, and assumptions made concerning incremental yields, adoption rates, etc., should be incorporated into the logframe and used as indicators in the M&E system.

While useful, EFA cannot provide all relevant indicators required in the logframe. For example, third-level indicators (e.g. on reduced stunting or increased HH assets) in IFAD's Results and Impact Management System (RIMS) will still need to be collected through baseline surveys in the early phase of implementation.

Finally, it is important to distinguish output from outcome indicators in the logframe.[39] During the initial years of a project, supervision should focus on the output indicators. As project implementation proceeds, the focus should shift to (or at least include) outcome indicators, which provide key data to compare with the initial EFA assessment.

# EFA in project design: Risk analysis

Economic analysis of projects is by definition built on uncertain future events. Estimation of the basic elements of this analysis (costs and profits) inevitably involves explicit or implicit probability judgments. In order to contain and measure the impact of these uncertainties on project results, there are some techniques that help detect the 'critical variables' or sources of major risks and set the basis for introducing effective mitigating measures.

The most common tools used in EFA are the *sensitivity analysis (SA)* and the *switching value (SV) analysis*.[40] Both enable testing and measurement of the effect of changes in key project variables on the final outcomes of our project, and hence its economic indicators (NPV and IRR). Although SA is frequently used to assess the robustness of projects and their resilience to shocks, its outcomes are seldom linked to risk analysis.

In other words, the most relevant question at this stage is to know *how* fluctuation in critical parameters (e.g. increases in costs, delays in implementation) will affect project performance, and *which* of the identified risks are the ones that need close monitoring.

Considering the effects of risks and mitigation measures identified at the project design stage on EFA results would not only represent a more realistic approach to assessing the project's profitability, but would also help identify the nature of those risks – acknowledged but not mitigated by the project – whose existence is regarded as acceptable.

In practical terms, the SA tests percentage increases and decreases in estimated benefits and costs to assess their impact on NPV and IRR, while the SV provides the percentage change in cost or benefits that will cause project outcomes to fall below the minimum level of acceptability (NPV < 0).

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39    A good practice example of a logframe distinguishing between output and outcome indicators is the Project for Agricultural Development and Economic Empowerment in Cambodia (EB 2012/105/R.15/Rev.1, www.ifad.org/gbdocs/eb/105/e/index.htm). It should be noted that Annual Reports on Quality Assurance in IFAD's Projects and Programmes (e.g. document EB 2009/98/R.57) have called attention to imprecise development objectives and lack of quantified final and intermediate outcome indicators to track progress towards achieving objectives. This deficiency also affects the quality of EFA and the possibility of using it during project supervision and implementation support. Thus improved quality of the logframe can contribute to improving the quality of EFA and to enhancing its use during this phase.

40    In volume 2, the IGs also provide information on more sophisticated tools using probabilistic approaches, such as Crystal Ball and @Risk.

Both analyses are extremely useful if linked to identified project risks. For example, SV can identify benchmarks (maximum percentage increases in costs or decreases in benefits) for 'trigger values' to activate specific mitigation measures (e.g. if the internal price of a specific input increases to 30 per cent, activities should shift to an alternative crop).

Another way of looking at this analysis is through the graphic in Figure 6. Here, variations in expected benefits and costs are represented in the vertical and horizontal axes respectively. Calculation of the switching values of our project identifies the maximum reduction in benefits ($B_{min}$) and the maximum increase in costs ($C_{max}$) that would result in an NPV of zero. Thus the *switching value frontier (SVF)*, represented by the black line between $B_{min}$ and $C_{max}$ encloses all possible combinations of reduction in benefits and increase in costs that would bring the NPV to zero. Implicitly, the area (O $B_{min}$ $C_{max}$) represents the set of all the different combinations of decrease in benefits and simultaneously increase in costs that would not endanger project viability.

Once the SVF has been identified, and after a proper evaluation of the country context and project risks and mitigation measures, we could eventually assume that benefits and costs are very unlikely to attain the levels represented by the two dotted lines ($B_0$; $C_0$). As a result, we narrow down our uncertainty area, defining a 'safe zone' identified by the blue area (A) and a 'risky zone' identified by the orange area (R). Area A represents the set of combinations that falls into the viable cases, where increases in costs or decreases in benefits are not jeopardizing the overall outcome of the project. Area R represents all the diverse combinations of costs and benefits that will render the project unprofitable (NPV < 0).

An analysis including probabilistic approaches could provide a better understanding of the likelihood that the project would fall into one of the two areas, and thus assess how much at risk it would be if certain events occurred. Details of these types of analysis can be found in volume 2.

### Use of SA to assess project risks: an example

SA provides grounded information to the design team to develop effective mitigation measures for each identified potential risk. The first step, then, is to add a proxy to the classic table or section on project risk of the project design report (PDR) – a proxy that responds to the question: *How will this risk affect project performance?* For example: if

FIGURE 6
## Identification of the risk zone
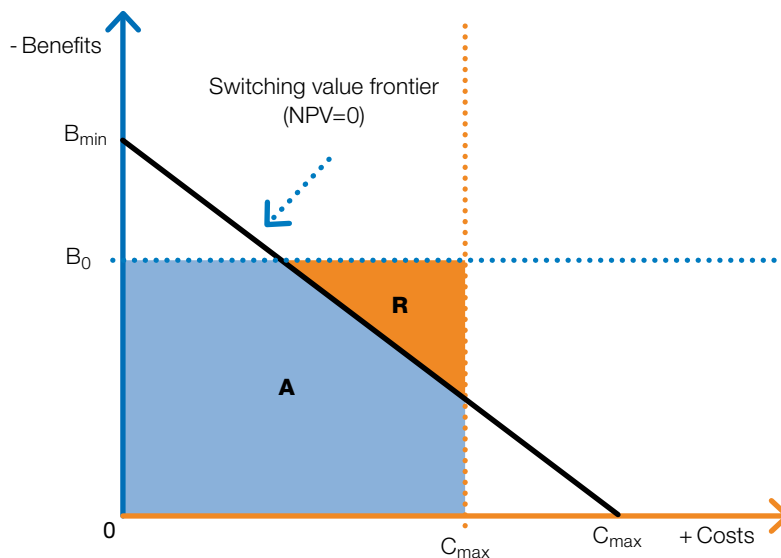
local implementation capacities are low, SA can test how a delay in implementation of one or more years (a realistic possibility of this risk occurring) will affect project outcomes. Similarly, if there is a high probability of the introduction of import taxes, this can be tested by increasing input costs.

The next step is to closely observe the SA results in order to assess to what extent these events will change the profitability indicators (i.e. project performance). By answering the question: *Which variables need to be closely monitored?*, the project team can easily identify the 'critical risks' and better allocate resources for their mitigation.

In the example below (Table 4 and Table 5), SA shows that this project is more sensitive to decreases and delays in benefits than to cost increases. Thus, although there is a high risk of the introduction of import taxes on fertilizer, this will not drastically affect project performance. On the other side, delays in implementation are a high risk that could compromise overall project outcomes. Project teams should allocate more efforts and resources to mitigate this risk rather than others.

To summarize, EFA analytical tools can contribute to risk assessment and informed decision-making for the efficient allocation of project resources when designing mitigation measures.

### TABLE 4
### Risk analysis and mitigation measures (classic table prepared for the PDR)

|  | Risk description | Probability of occurrence | Mitigation measure | Proxy to compare with SA results |
|---|---|---|---|---|
| Institutional risks | Low local implementation capacity | High | Capacity-building | Delays in benefits |
| Market risks | Import duties on fertilizer | High | Local production | Increased costs |
| Climate risks | Floods | Low | Infrastructure | Reduced benefits |

### TABLE 5
### Sensitivity analysis for informed decision-making

| SA | Base case (@ 12%) | Costs increased | | | Decrease in benefits | | | Delay of benefits | |
|---|---|---|---|---|---|---|---|---|---|
|  |  | +10% | +20% | +50% | -10% | -20% | -50% | 1 year | 2 years |
| IRR | 28% | 27% | 25% | 21% | 22% | 20% | 18% | 23% | 19% |
| NPV ('000 US$) | 37 160 | 8 068 | 6 895 | 3 376 | 4 047 | 2 949 | 1 564 | 5 173 | 1 984 |

TABLE 6
**Application of general principles of EFA**

| Key principle | Methods of application | |
| --- | --- | --- |
| | Ex ante EFA | Implementation |
| With and without project comparison | Prepare 'business as usual' scenario on the basis of 'do nothing' option | • Conduct baseline survey to define pre-project status<br>• Estimate what would have happened without the project<br>• Paired comparisons can help (e.g. in/outside project area) |
| Financial analysis | Construct farm models showing expected revenue and expenditure for beneficiaries | • Survey beneficiaries to estimate actual revenue and expenditure<br>• Validate and/or adjust farm models accordingly |
| Discounting future benefits and costs | Discount future costs and benefits back to year zero | • Discount future and previous benefits and costs back to year zero |
| Accounting for externalities | Identify and quantify all externalities where possible | • Check for signs of positive and negative externalities emerging during implementation |
| Adjusting for distortions | Deduct taxes, add subsidies, use shadow prices, estimate conversion factors | • Check for changes in tax and subsidy rates and adjust prices accordingly<br>• Update conversion factors on the basis of trade and/or tariff data |

## EFA in project supervision, implementation and ex post evaluation

The underlying principles for the use of EFA in project implementation are no different from those for project design and are detailed in a number of old and well-known sources: Squire and van der Tak (1975), Gittinger (1985), Belli et al. (1998) and IFAD's draft EFA guidelines of September 2012. However, although the principles are the same, the methods of application differ to some extent, as shown in Table 6.

The approach to EFA both before and during project implementation should be tailored to the nature of the project. What to look for in the field and the type of analysis undertaken vary considerably among different project categories. More detailed information is provided in Table 7 in the technical annex.
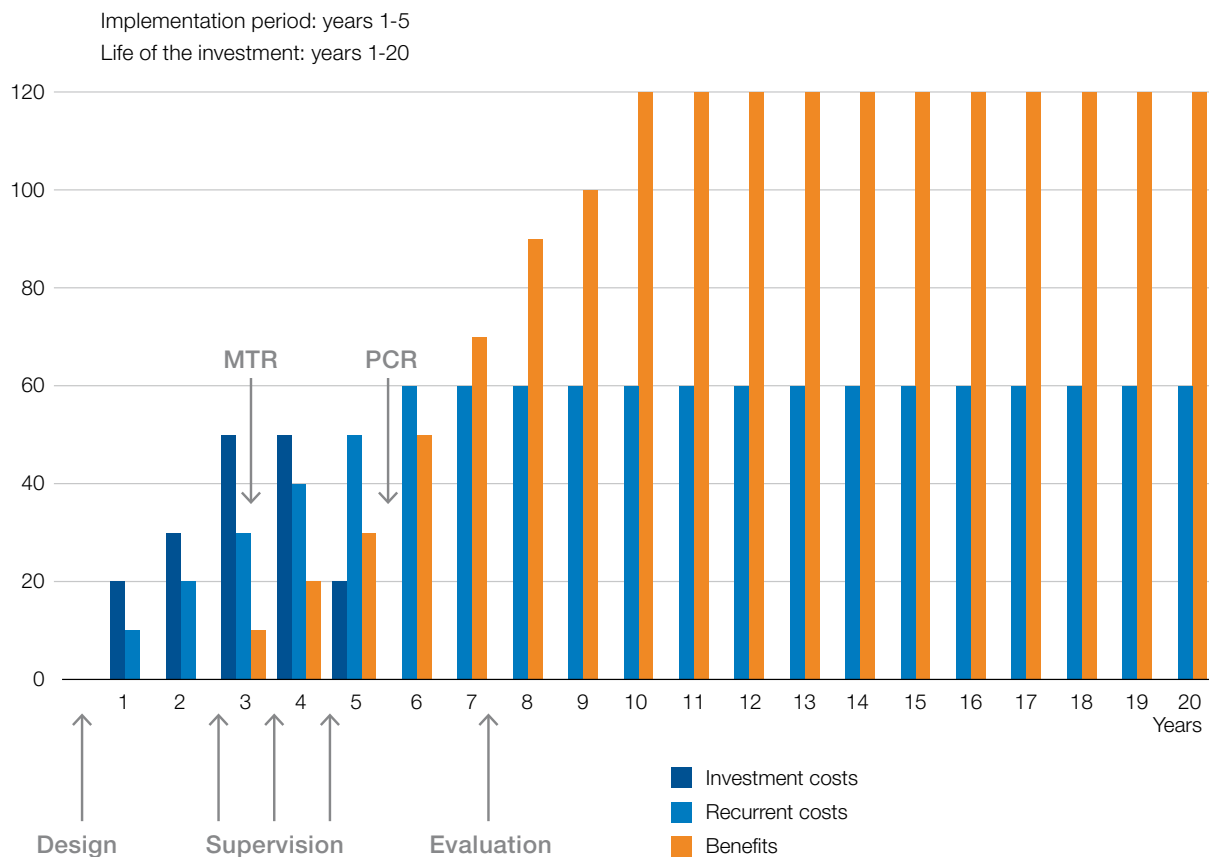
### Ex ante and ex post EFA
It is important to distinguish between ex ante and ex post EFA and to appreciate their roles in the various stages of the project cycle. Ex ante is the more familiar form of EFA. Undertaken as a key part of the project design process, it is used to inform decision-making on the nature of the project and its expected financial and economic impacts. Ex post EFA is undertaken after an investment project has been completed. There are also intermediate forms of analysis undertaken during project implementation, which are partly ex post and partly ex ante.

It is important to distinguish between the implementation period and the life of the investment. The implementation period, typically five to seven years, is the period in which project activities are undertaken and IFAD funds disbursed. The life of the investment is much longer, typically 20 years or more, during which economic and financial benefits are expected to accrue. Figure 7 shows a typical IFAD project profile, with the investment costs incurred during years 1-5, recurrent costs over the 20-year project life, and benefits beginning to flow in year 3 and reaching a plateau from year 10 onwards.

**Profile of costs and benefits over the project cycle**



Implementation period: years 1-5
Life of the investment: years 1-20

## Methodological issues of ex post and ex ante analysis

The key aspect to understand when performing this analysis is that, as shown in Figure 7, project costs and benefits will occur in different moments of project life.

Methodologically speaking, if this analysis will be used for comparison of appraised (ex ante) and real impacts (ex post) (as is generally the goal), we need to 'place' the comparison in the same point in time. The point in time could be at the beginning or completion of the project or any other point. What is important is to bring all cash flows to that point in time using discount techniques. Then calculate the NPVs and compare. You will be able to use IRRs only if the cash flow allows it mathematically (i.e. if there is a negative Figure in the first year).

But this is not the only consideration to bear in mind. Other issues arise, such as:
• Attribution effects of achieved results: given IFAD's scale of intervention, it could claim

contribution, but not full attribution, of increased beneficiary incomes or decline in food insecurity.
• At completion could be too early to capture all expected benefits (see Figure 7).
• A mixed approach, in order to compensate for this second issue, is to try to estimate benefits yet to be produced, include them in cash flows and then perform the discounting (however, the results could be questioned).
• In order to make a realistic comparison, CBA should be done 10 years after implementation, and this has rarely been done.

On a more positive note, the alternative would be to choose some activity/farm models effectively put in place by the project. Perform a financial analysis at completion and compare it with appraisal estimations (models developed at design for the WOP situation), in order to estimate how things have changed. This analysis will not be based on cash flows, but on annual bases, thus comparing

annual financial indicators such as total sales, total production costs, employment created. Hopefully, full development of the model would have been achieved by completion so as to provide information on how adequate project interventions had been. This could also potentially provide information on the reasons underpinning adoption rates.

## Ex post EFA and scaling up

Confronted with the large-scale problem of reducing rural poverty, which it is mandated to address, and the limited resources available from official development assistance (ODA), IFAD is compelled to increase the impact of every dollar it invests in agriculture and rural development. For this reason, scaling up the results of successful development initiatives is an overarching priority that directly supports the achievement of IFAD's mandate. To deliver on this priority, IFAD's operational practices must be geared towards supporting all concerned actors and institutions – including poor rural women and men and their organizations – in achieving impact at scale.

The formal IFAD definition of 'scaling up' is: expanding, adapting and supporting successful policies, programmes and knowledge in order to leverage resources and partners to deliver larger, more sustainable results for a greater number of poor rural people. Scaling up results means that IFAD interventions will not be viewed as a way of expanding small projects into larger ones. Instead, they will focus on how successful local initiatives will sustainably leverage policy changes, additional resources and learning to bring the results to scale.

EFA has an important role to play in informing scaling-up decisions, since evidence of favourable financial and economic impacts should be a key criterion for deciding whether or not to scale up. Thus the framing questions must incorporate an economic and financial dimension as follows:

- **Idea.** If a project is referred to as one that is being scaled up or otherwise further developed from previous interventions in the host country or region, what were the economic and financial outcomes of the activity to be scaled up? Have economic and financial impacts been estimated or measured?
- **Vision.** How many poor rural men and women will benefit financially and to what extent? What will be the overall economic impact?
- **Drivers.** Are the economic and financial benefits sufficiently attractive to drive the expansion and sustain the initiative over the long term?
- **Spaces.** Is there sufficient capacity to finance the proposed expansion? Is the local, regional or national economy large enough to accommodate it? Can markets absorb the level of production envisaged?
- **Pathways.** What are the financial and economic implications of alternative scaling-up pathways? Is a gradual or a fast-track approach preferred?
- **IFAD's role.** How will IFAD ensure that economic and financial impacts of the expansion are properly monitored and evaluated?

Scaling-up issues often need to be addressed during COSOP formulation or country portfolio reviews, especially where grant-funded pilot programmes have been implemented and are being considered for scaling up into full-scale investment projects. In these cases, EFA of pilot programmes during and after implementation becomes an important part of the strategic process.

# Technical annex

## Formulas for profitability indicators

**The net present value (NPV)** indicator, defined as the sum that results when the expected costs of the investment are deducted from the discounted value of the expected benefits (revenues), is calculated through the following formula:

$$NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1+r)^t} - I_t$$

Where:

$B_t$ = benefits at time $t$     $C_t$ = costs at time $t$

$I_t$ = investment costs     $n$ = project economic life

$r$ = interest rate used as indicator of opportunity cost: discount rate

**The internal rate of return (IRR)** indicator is defined as the discount rate ($r^*$) that produces a zero NPV. This represents the maximum interest rate that a project could face and still not waste resources. This is called the internal rate of return (IRR). It is calculated through:

$$0 = NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1+r^*)^t} - I_t$$

IRR = (r*, NPV = 0).

For the project to be profitable, the IRR has to be greater than the interest rate that could be earned in alternative investments, thus, whenever IRR > r, the project is considered viable. If the (alternative) interest rate ($i^{mkt}$) is lower than the IRR, the NPV is positive, and vice versa.

$$IRR > r = i^{mkt} \rightarrow NPV > 0$$
$$IRR < r = i^{mkt} \rightarrow NPV < 0$$

**The benefit/cost ratio (B/C)** indicator is the ratio of the present value of benefits to the present value of costs over the time horizon. The B/C ratio provides some advantages when it is necessary to formulate a 'ranking' of alternative investment projects under budget constraints.

$$\frac{B}{C} = \frac{\displaystyle\sum_{t=1}^{n} \frac{B_t}{(1+r)^t}}{\displaystyle\sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - I_0} = \frac{PV(B)}{PV(C)}$$

If B/C ≥1, the project is **accepted**.
If B/C <1 the project is **rejected**.

## Cost-effectiveness

When tangible benefits from a given investment are difficult to quantify, but the costs are easily identifiable, the most common valuation method is cost-effectiveness. It is used to select the least costly alternative among a set of options that will achieve the same result (a given set of predetermined objectives). Once the purpose of the project has been decided, for example construction of a market storage facility, cost-effectiveness would be used to compare scale, location, technology, etc., to choose among investment options (e.g. open storage, location of the facility, construction materials).

The methodology consists in, first, listing and measuring in monetary terms the costs of the options available and then comparing them with the costs occurring in the base scenario (without the project). Total costs are then discounted at year 1 and the results compared to identify the cheapest intervention. In other words, valuation by cost-effectiveness consists in comparing, on a present-worth basis, all alternatives that can achieve the same benefit (Gittinger, 1985) and selecting the least costly.

Unfortunately, the results of this method, which can justify project investment decisions, cannot be integrated into the streams of incremental net benefits resulting from classic CBA – thus underestimating the overall benefits of the investment.

## Multicriteria analysis[41]

MCA is a decision-making tool used to evaluate complex decision problems. With this tool, it is possible to identify overall preferences among alternative options, where the options entail many diverse objectives. Unlike CBA, MCA allows consideration of aspects other than economic and financial ones, for example social, technological and environmental issues. Its use is particularly relevant when other, single-criterion approaches cannot provide monetary valuations.[42]

In the same model, thanks to these techniques, it is possible to consider quantitative and qualitative data. It builds on trade-offs between criteria that in complex decision-making are usually in conflict (efficiency and equity for example). Choices are classified aggregating various items of information in a common index of utility value. Since policy decisions may be influenced by both monetary and non-monetary objectives, it offers a technique capable of ranking diverse outcomes.

MCA establishes preferences among options referring to a set of objectives identified by decision makers. It is an important instrument for ranking options and discriminating between acceptable and unacceptable possibilities. Decision makers must define quantifiable criteria to judge how an objective has been achieved, and MCA allows them to aggregate the data on individual criteria in order to provide indicators of the overall performance of the options. It brings out the points of view of the actors involved in the judgment, and is characterized by the subjectivity related to the opinions of the decision-making group.[43]

The main advantages of MCA are its openness, explicitness and its power to simplify complex situations. In fact, it splits the components of intricate situations and organizes them so as to find a solution step by step and clearly. Objectives and criteria chosen by the decision group can in fact be analysed and changed if they are not considered suitable. This process eases the discussion and promotes communication within the decision-making body, first, and later between that body and the stakeholders. MCA can be both an ex ante and an ex post evaluation tool.

This type of analysis also presents some difficulties. One concerns the choice of the activities or variables to be studied and definition of the comparative criteria. These operations are often very complicated and require much time spent in discussions and negotiations. Use of MCA requires knowledge of mathematical notions, data aggregation methodologies and computer applications in order to perform analysis following a structured process and to avoid weak conclusions. It is often costly and time-consuming.

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41   MCA has not yet been tested as a suitable tool for IFAD project design, but is suggested as an alternative in the extreme cases mentioned above of complex decision-making.

42   One example would be when production objectives are in contraposition to environmental ones. For example, to increase livestock production for food security and at the same time reduce $CO_2$ emissions.

43   Indeed, the opinion team establishes objectives and criteria, assesses relative importance weights and judges the contribution of every option to each performance criterion. MCA can be preceded by strengths, weaknesses, opportunities and threats (SWOT) analysis for the choice of criteria; it can be supported by an expert panel to help the negotiating group develop an assessment of a specific topic; or it can be assisted by focus groups, questionnaires and case studies to choose criteria and rate them. In addition, criteria can be evaluated using cost-effectiveness analysis.

## Types of projects and EFA activities

Aspects to look for in the field and the type of analysis undertaken vary considerably among project categories, as shown in Table 7.

TABLE 7

## Main EFA tasks by type of project

| Project category | Main EFA tasks during implementation |
|---|---|
| **Productivity enhancement (including irrigation)** | • Estimate number of beneficiaries and technology adoption rates by target group households<br>• Monitor productivity changes, product quality and prices<br>• Estimate gross margins (per unit of land and labour) for project and non-project households<br>• Update farm models based on observed/actual results, revise economic analysis as necessary and consider adjustments to project design to improve results |
| **Rural infrastructure** | • Review construction schedule and costs relative to design estimates<br>• Estimate utilization rates for new or upgraded infrastructure<br>• Assess arrangements for operation and maintenance<br>• Estimate benefits derived by target group households (e.g. reduced costs, increased prices, improved market access)<br>• Update farm models based on observed/actual results, revise economic analysis as necessary and consider adjustments to project design to improve results |
| **Natural resource management** | • Undertake a comparison of NRM activities with and without project<br>• Review with and without project scenarios of agricultural productivity<br>• Seek evidence of more sustainable and responsible NRM practices<br>• Identify, and if possible quantify, value of environmental benefits<br>• Update farm models based on observed/actual results, revise economic analysis as necessary and consider adjustments to project design to improve results |
| **Community development** | • Determine number of target group beneficiaries participating in community development activities<br>• Identify what has changed in the community and individual households as a result of these activities<br>• Describe improvements in the lives of beneficiary households and value these in monetary equivalents if possible<br>• Revise economic analysis as necessary and consider adjustments to project design to improve results |

| Project category | Main EFA tasks during implementation |
|---|---|
| **Institutional strengthening** | • Prepare inventory of actual institutional-strengthening activities undertaken<br>• Complete assessment of institutional capacity and project's impact on it<br>• Identify how improved institutional capacity has or will generate benefits for target groups<br>• Revise economic analysis as necessary and consider adjustments to project design to improve results |
| **Marketing and value chain development** | • Review value chain analysis undertaken during project preparation to update data on volumes, costs, prices and value addition<br>• Identify ways in which improvements in value chain efficiency have improved, or are likely to improve, market access and farmgate prices for beneficiaries<br>• Estimate financial benefits accruing to target group farmers and other value chain actors<br>• Update farm models based on observed/actual results, revise economic analysis as necessary and consider adjustments to project design to improve results |
| **Rural financial services** | • Estimate number of beneficiaries with improved access to financial services, types of services offered and acceptance rates<br>• Monitor cost of financial services at different levels (cost of loanable funds, retail service costs at client level) and compare with project design estimates<br>• Assess actual or likely changes in farm and non-farm economic activities arising from improved access to rural financial services<br>• Estimate the net financial benefits accruing to target group beneficiaries from these changes<br>• Update farm models based on observed/actual results, revise economic analysis as necessary and consider adjustments to project design to improve results |

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# Glossary

**Aggregation, 15, 16, 20:** in project analysis the process of adding together the costs and benefits of all the entities participating in a project to reach a summary account from which a measure of project worth can be derived. Often the result of the aggregation is the Incremental Net Benefit or Cash Flow of a project.

**Appraisal, 7, 24, 31:** A before the fact (ex- ante) evaluation of a proposed investment project to determine its merit and acceptability in accordance with established decision-making criteria.

**Benefit/cost ratio (B/C ratio), 13, 33:** a discounted measure of project worth. The ratio of **benefits** to **costs**. It should be calculated using the present values of each, discounted at an appropriate discount rate. Most often the opportunity cost of capital. The ratio should be at least 1 for the project to be acceptable. It may give incorrect ranking among independent projects and cannot be used for choosing among mutually exclusive alternatives.

**Border price, 23:** The border price is the unit price of a traded good at the country's border. For exports, it is the FOB (free on board) price, and for imports, it is the CIF (cost, insurance, and freight) price.

**Business as Usual (BAU), 8, 9, 11, 14, 19:** a reference scenario which assumes that future evolution is an extension of the current trends. See also 'do nothing scenario'.

**Cash flow, 11, 12, 16, 19, 20, 31:** The funds generated or used by the project. Reflects the costs and benefits over time from a stated point of view. Income/benefit is a positive cash flow and expenses/costs are negative flows.

**Constant price:** A price that has been deflated to real terms by an appropriate price index. They should be distinguished from current or nominal prices. Often used as synonym of **real prices**.

**Contingent valuation:** A method of inferring the value of benefits and costs in the absence of a market. What people would be willing to pay to gain a benefit (or willing to accept in recompense for a loss) if a market existed for the good.

**Conversion factor, 5, 16, 23, 30:** the factor that converts the domestic market price to an economic price. Conversion factors are the ratios of economic to financial prices. Thus, a conversion factor is a number that is used to convert the domestic market price of an item into its economic opportunity cost to the economy by multiplying the market price of the item by the conversion factor.

**Cost:** An expense related to purchase of inputs, including capital equipment, buildings, materials, labour and public utilities. Costs such as environmental damage or injuries to health are sometimes referred to as negative **externalities**.

**Cost Benefit Analysis (CBA), 7, 8, 18, 31:** conceptual framework applied to any systematic, quantitative appraisal of a public or private project to determine whether, or to what extent, that project is worthwhile from a social perspective. Cost-benefit analysis differs from a straightforward financial appraisal in that it considers all gains (benefits) and losses (costs) to social agents. CBA usually implies the use of economic/social prices.

**Cost effectiveness analysis (CEA), 20, 33:** an appraisal technique used in projects and programs in which benefits cannot be reasonably measured in money terms. Cost-effectiveness analysis is used in one of two forms to select least-cost alternatives: either holding constant the level of benefits and varying the level of costs or holding constant the level of cost and varying the level of benefits. In either form, the ratio of cost to benefits is known as the **cost-effectiveness ratio**.

**Current prices:** (Nominal prices) prices as actually observed at a given time. They refer to prices that include the effects of general inflation and should be contrasted with constant prices.

**Cut-off rate:** the rate below which a project is considered unacceptable. It is often taken to be the opportunity cost of capital. The cut-off rate would be the minimum acceptable internal rate of return for a project or the discount rate used to calculate the net present value, the net-benefit investment ratio, or the benefit-cost ratio.

**Depreciation, 14:** Not a term used in **cost-benefit analysis**. In other financial frameworks, depreciation is the allocation of the cost of an asset over time. Depreciation is a method of allocating the cost of a tangible asset over its useful life. For accounting purposes, depreciation indicates how much of an asset's value has been used up. For intangible assets amortization is the correct term. However these are accounting concepts that makes no sense in financial analysis. Here, the full investment costs will be computed every time the asset needs replacement.

**Direct transfer payment, 15-17:** Transfer payments are transfers of money among residents of a country without a corresponding exchange of goods and services. Taxes are transfer payments from individuals to the government. Subsidies are transfer payments from the government to individuals. Gifts are transfers "in kind" from one individual to another. Because transfer payments are not made in return for goods and services, they do not add to total output. When transfer payments occur in the context of projects, they redistribute project costs or benefits from the project entity to some other group or individual in the country.

**Discount rate, 12, 14, 16, 23:** the interest rate at which future values are discounted to the present. It usually represents the cost of capital for the person or entity calculating the net present value of the stream. The **financial discount** rate and **economic or social discount rate** may differ, in the same way that market prices may differ from economic prices. The selection of the discount rate in **financial analysis** is a relative straightforward process, and that is calculated as the potential gains of alternative safe investments on the market. In **economic analysis**, where project viewpoint is overturned toward the socio-economic context, this parameter needs to be estimated properly so as to: i) reflect the public nature of the investment; ii) account for scarcity of resources; and iii) ensure good use of public funds. (See also **social discount rate**).

**Discounted cash flow, 14:** The **costs** and benefits (**cash flows**) discounted to present values to give a common basis for comparison.

**Discounting, 12, 31:** The process of adjusting future values to an equivalent present value at a stated point in time by a **discount rate**.

**Distortion, 16, 30:** A difference between market prices and true values (economic prices). A distortion is any interference with market forces that renders the resulting quantity produced and price different from the price and quantity that would result under conditions of perfect competition.

**Distributional effect:** A change in the income or wealth of the people from whose point of view the benefit-cost analysis is done.

**Do nothing scenario**: the baseline scenario, 'business as usual', against which the additional benefits and costs of the **'with project scenario'** can be measured (often a synonym for the '**without project**' **scenario**).

**Economic analysis, 7, 14-17, 20, 30:** analysis that is undertaken using economic values, reflecting the values that society would be willing to pay for a good or service. In general, economic analysis values all items at their value in use or their opportunity cost to society (often a border price for tradable items). It has the same meaning as social **cost-benefit analysis**.

**Economic cost:** The economic cost of an activity or resource is the cost to society of that activity or resource. Economic costs include the private costs borne directly by economic agents undertaking the activity, and all other costs borne by other economic agents. For example, the economic costs of driving automobiles include the private costs of petrol plus the additional costs of congestion, borne by other users of the roads, plus the costs of pollution, borne by society in general.

**Economic impact analysis:** the analysis of the total effects on the level of economic activity (output, income, employment) associated with the intervention. This kind of analysis focuses on macroeconomic indicators and forecasts the influence of the project on these indicators. It goes beyond **CBA** when very large projects are considered in relatively small economies.

**Economic net present value (ENPV), 16:** The net present value of a project, calculated using true or economic values. Synonymous with social net present value.

**Economic price, 16:** Price that reflects the relative value that should be assigned to inputs and outputs if the economy is to produce the maximum value of physical output efficiently. There is no consideration of income distribution or other non-efficiency goals in such a price. Synonymous with efficiency price and true price.

**Economic rate of return (ERR), 16:** An internal rate of return based on economic prices and social opportunity costs of capital, expressing the socio-economic profitability of a project. (See internal rate of return).

**Environmental impact analysis:** the statement of the environmental impact of a project that identifies its physical or biological effects on the environment in a broad sense. This would include the forecasting of potential pollution emissions, loss of visual amenity, and so on.

**Export parity price, 23 footnote:** The export parity price is the FOB price of a good or service valued at point of export, net of taxes and subsidies, and suitably adjusted for internal transport costs to a location in a country. The export parity price is the net-of-taxes-and-subsidies price that exporters would need to receive for a good or service sold in the domestic market in order to make them indifferent between selling in the domestic market or exporting.

**Externalities, 5, 15-17, 30:** A **benefit** or **cost** falling on third parties who normally cannot pay or be compensated for it through a market mechanism. An external benefit is a positive externality; an external

cost is a negative externality. A positive externality may reduce the costs of a production process of an unrelated economic agent, as when the bees of a bee grower pollinate a neighbour's apple orchard. They may also increase the enjoyment of another economic agent, as when musicians playing for their own pleasure delight those around them. A negative externality increases the production costs or reduces enjoyment for another economic agent. Traffic congestion and the numerous forms of environmental pollution, such as the pollution created by a manufacturing plant, are examples of negative externalities. Externalities are not reflected in the **financial** analysis. For **economic** analysis, however, it is necessary to take such externalities into account and place a value on them.

**Ex-ante evaluation, 24-25, 30:** the evaluation carried out in order to take the investment decision. It serves to select the best option from the socio economic and financial point of view. It provides the necessary base for the monitoring and subsequent evaluations ensuring that, wherever possible, the objectives are quantified.

**Ex-post evaluation, 24-25, 30-32:** an evaluation carried out a certain length of time after the conclusion of the initiative. It consists of describing the impact achieved by the initiative compared to the overall objectives and project purpose (ex-ante).

**Farm gate price:** The price received by farmers for their products, net of transport costs to the market where the products are sold.

**Feasibility study, 9, 19:** a study of a proposed project to indicate whether the proposal is attractive enough to justify more detailed preparation. It contains the detailed technical information necessary for the financial and economic evaluation.

**Financial analysis, 7, 14-17, 19, 30, 31:** the analysis carried out using market prices and taking a commercial point of view. It allows one to 1) verify and guarantee cash balance (verify the financial sustainability), 2) calculate the indices of financial return on the investment project based on the net discounted cash flows.

**Financial sustainability analysis, 14, 19, 20:** analysis carried out in order to verify that financial resources are sufficient to cover all financial outflows, year after year, for the whole time horizon of the project. Financial sustainability is verified if the cumulated net cash flow is never negative during all the years considered.

**Financial rate of return.** An **internal rate of return** based on **market prices** and opportunity costs of capital.(See internal rate of return).

**Human capital:** Human capital is the stock of skills and productive knowledge embodied in people. The purpose of investing in human capital is to improve the productivity of human beings.

**Impact, 25-27:** a generic term for describing the changes or the long term effects on society that can be attributed to the project. Impacts should be expressed in the units of measurement adopted to deal with the objectives to be addressed by the project.

**Import parity price, 23 footnote:** The import parity price is the CIF price of a good or service valued in a specific geographical location. It includes the CIF price of the good suitably adjusted for transport costs, net of taxes and subsidies. The import parity price aims to measure the price that producers in the country would receive for a good or service produced in the country for sale in the domestic market under conditions of free trade.

**Incremental, 11-14, 19-20:** Additional or marginal.

**Inflation:** A general increase in market price levels (a fall in the general purchasing power of the currency unit).

**Input, 26, 28:** That which is consumed by the project (as opposed to the project's output). Usually refers to the physical inputs used by the project, including materials, capital, labour and public utilities. Inputs like environmental quality, foreign exchange and workers' health are usually termed **externalities**.

**Internal rate of return (IRR), 12, 33:** The yield or profitability of a project based on **discounted cash-flow** analysis. The IRR is the **discount rate** at which a stream of costs and benefits has a net present value of zero. It is equivalent to the discount rate $r$ that satisfies the following relationship:

$$\sum_{t=1}^{n} \frac{B_t - C_t}{(1+r^*)^t} = 0$$

where $B_t$ is the benefit stream, and $C_t$ is the cost stream. The internal rate of return is compared with a benchmark in order to evaluate the performance of the proposed project. The internal rate of return is then compared with the market rate of interest to determine whether or not a proposed project should be undertaken. (See **cut-off rate**).

Financial Rate of Return is the internal rate of return calculated when all the inputs and outputs are calculated using financial values, Economic rate of Return is based on economic opportunity costs.

**Logframe, 10, 25-27:** is a management tool mainly used for designingand M&E of development projects. It consists of four steps: (1) establishing objectives, (2) establishing cause-and-effect relationships (causal linkages) among activities, inputs, outputs, and objectives, (3) identifying assumptions underlying the causal linkages, and (4) identifying objectively-verifiable measures for evaluating progress and success.

**Market price, 14-17:** (a) The price of a good in the domestic market (see financial prices); as opposed to the economic price, shadow price or social price; (b) the cost of a good, including indirect taxes and subsidies. It is the price relevant for financial analysis.

**Model:** A representation or simulation of a system or process showing how parameters, benefits and costs interact to produce a bottom-line result by which the project can be judged.

**Monitoring, 25-27:** the systematic examination of the state of advancement of an activity according to a pre-determined calendar and on the basis of significant and representative indicators.

**Multi-criteria analysis, 22, 34:** MCA is an evaluation methodology that considers many objectives by the attribution of a weight to each measurable objective. In contrast to CBA, that focuses on a unique criterion (the maximisation of social welfare), Multi Criteria Analysis is a tool for dealing with a set of different objectives that cannot be aggregated through shadow prices and welfare weights, as in standard CBA.

**Mutually exclusive, 8, 12, 13:** Alternatives that cannot be undertaken simultaneously: if one alternative is carried out, the other cannot be. The alternatives may be mutually exclusive because they represent alternative times of beginning the same project, because funds are limited, or because if one is carried out the other will not be required (for example, a choice between a thermal and a hydro power station).

**Net present value (NPV), 12, 13, 27-29, 33:** The net value of an investment when all costs and benefits expressed in standard units of value (**numeraires**) are summed up. The sum that results when the discounted value of the expected costs of an investment are deducted from the discounted value of the expected revenues. The net present value of a stream of costs and benefits is a number that results from discounting the values of the stream at a given discount rate. It is equivalent to the number that results from the following expression:

$$NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1+r)^t} - I_t$$

where:

$B_t$ = benefits at time $t$      $C_t$ = costs at time $t$

$I_t$ = investment costs      $n$ = project economic life

$r$ = discount rate

**Net revenues:** the amount remaining after all outflows have been subtracted from all inflows. Discounting the incremental net revenues before financing gives a measure of the project worth of all resources engaged; discounting the incremental net revenues after financing gives a measure of the project worth of the entity's own resources or equity.

**Nominal prices:** Prices prevailing in a particular year. Synonymous with budget-year dollars.

**Non-tradable good, 16, 23 footnote:** good or service that by its very nature cannot be exported or imported. Land, and buildings are examples of a non-tradable good.

**Non-traded good, 16, 23 footnote:** A non-traded good or service is one that is neither exported nor imported in a particular country for a variety of reasons, including quotas and prohibitions. Common examples of non-traded items are certain drugs, haircuts, etc. In project analysis, non-traded refers to goods and services not traded by the country in which the project is located.

**Numeraire:** a standard unit of value. Money is a numeraire, by which the values of different commodities can be compared. In cost-benefit analysis, the numeraire is the common denominator for measuring benefits and costs. Widely used numeraires are: the willingness to pay or aggregate consumption numeraire, and the foreign exchange numeraire.

**Operational and maintenance costs, 21, 35:** The recurring costs for operating and maintaining the value of physical assets.

**Opportunity cost, 12, 16, 19:** The best alternative return foregone elsewhere by committing assets to the project. The value of something foregone. For example, the direct opportunity cost of a person-day of labour is what the person would otherwise have produced or being paid for that day of work. The value of a resource in its best alternative use. For the financial analysis the opportunity cost of a purchased input is always its market price. In economic analysis the opportunity cost of a purchased input is its marginal social value in its best non-project alternative use.

**Output, 27:** That which is produced. Usually refers to the physical product of the project. Other effects of the project, such as housing for workers, employment, training of labour, and foreign-exchange savings, are usually called externalities.

**Payback period:** The time required for the cumulative present value of benefits to become equal to the cumulative present value of costs.

**Programme, 8:** is a portfolio of multiple projects that are managed and coordinated as one unit with the objective of achieving common (often intangible) outcomes and benefits at sector, country or even multi-country level.

**Project, 8:** is a temporary entity established to deliver specific (often tangible) outputs in line with predefined time, cost and quality constraints. A project should always be defined, executed and evaluated relative to an approved business plan which balances its costs, benefits and risks.

**Project analysis, 8, 20:** the analytical framework for the evaluation of a project's feasibility and performance. It includes the analysis of the context, the objectives, technical aspects, demand forecasts and financial and economic costs and benefits. Project analysis is needed to determine if, given the alternatives, a proposed project will sufficiently advance the objectives of the entity from whose standpoint the analysis is being undertaken to justify the project.

**Project cycle, 24-25, 30-31:** a sequence of the series of necessary and pre-defined activities carried out for each project. Typically it is separated into the following phases: conceptualization, inception, formulation, appraisal, ex-ante evaluation, financing, implementation and ex-post evaluation.

**Real prices:** calculated by adjusting market prices by an appropriate price index to eliminate the effects of inflation. Prices of goods and services change over time either because the general price level rises, that is, because of inflation, or because the underlying conditions of supply and demand change. Real prices refer to prices of goods and services that reflect changes in the underlying conditions of supply and demand, but that do not reflect the effects of inflation. The terms real prices and **constant prices** are used interchangeably, but referring to real prices as constant prices is misleading. Real prices do not necessarily remain constant over time, as they change in response to changes in supply and demand. Real prices should be distinguished from current prices, which reflect inflation as well as changes in supply and demand.

**Relative prices:** the exchange value of two goods, given by the ratio between the quantity exchanged and their nominal prices.

**Risk, 10, 25-27:** The degree to which outcomes are uncertain. The extent of possible variation in the outcome.

**Risk analysis, 10, 25-27:** Risk analysis is a technique for assessing the expected net present value of a project in relation with project risks. By taking into account the probability distribution of critical variables and the correlations among them, it enables analysts not only to assess the expected net present value of a project but also its associated probability distribution. In cost-benefit analysis, it recognizes the simultaneous variation of the values of several inputs, according to specified ranges and probabilities, and analyses the resulting variability in the bottom line.

**Scale, 31-33:** The size of a project.

**Scenario, 11, 14, 30:** An outline or portrait of a possible future; usually portrays unfolding events, rather than being static in time.

**Sensitivity analysis, 16, 27-29:** Sensitivity analysis is an analytical technique to test systematically the effects on a project's outcome of changes in its basic assumptions. Sensitivity analysis is carried out by varying one element or a combination of elements and determining the effect of that change on project's profitability indicators (NPV and IRR).

**Shadow price, 16, 23 footnote, 30:** A shadow price of a good or service is the economic opportunity cost to society of that good or service. The true or economic value of a good (as opposed to the market price, which might be distorted). Synonymous with **economic** or **social price**.

**Social price, 16:** A price that reflects the true value to the country of inputs and outputs of the project. Synonymous with **economic price** and **shadow price**.

**Social discount rate, 12 footnote, 16:** It attempts to reflect the social view on how the future should be valued against the present. (See Discount rate).

**Socio-economic costs and benefits, 13:** opportunity costs or benefits for the economy as a whole. They may differ from private costs and benefits to the extent that actual prices differ from **economic prices**.

**Switching value, 27-28:** The switching value of a variable is that value that it would have to attain in order for the outcome of the project to fall below the minimum level of acceptability (net present value of the project equal to nil).

**Time value of money:** Time value of money refers to the concept that money received in the present is more valuable than money received in the future. It is the concept underlying **discounting**.

**Tradable, 16, 23 footnote:** Referring to a good that could be traded internationally in the absence of restrictive trade policies.

**Traded good, 16, 23 footnote:** A traded good is a good that is either exported or imported by some country.

**Transfer payments, 15-17, 22:** Payments that redistribute wealth but do not use up resources or create them.

**Willingness to pay:** What consumers are willing to pay for a good or service. Consumers willing to pay substantially more than the actual market price enjoy a consumer surplus (the amount they would pay minus the amount they actually have to pay).

**With project scenario (WP), 11 Box 2:** estimation, simulation, modelling of project envisaged costs and benefits.

**Without project scenario (WOP), 11 Box 2:** the baseline scenario against which the additional benefits and costs of the **with project** scenario can be measured (e.g. business as usual).

# Summary steps in financial and economic analysis

## Steps in financial analysis

The **typical sequence** of tasks to be undertaken in financial analysis is the following:

1. Develop farm/enterprise models and identify benefits and costs (investment and recurrent) for WOP and WP scenarios (based on crop budgets).
2. Compare the discounted flows of benefits and costs and calculate the differences between the obtained results and the WOP scenario in order to determine the net incremental benefits (NIB) of the proposed interventions.
3. Calculate the project financial profitability indicators of each model (i.e. financial NPV, financial IRR and B/C ratio), applying these investment criteria to make an investment decision (positive or negative).
4. Assess family incomes and establish financing/credit needs by performing a 'sustainability analysis'.

## Steps in economic analysis

Economic analysis requires assessment of a project's net impact on economic welfare by considering:

5. Convert all market prices into economic/shadow prices (SP) that better reflect the social opportunity cost of the good.
6. Remove transfer payments (taxes and subsidies) and quantify externalities (positive and negative).
7. Aggregate all models' NIB cash flows respecting incorporation phasing patterns of targeted beneficiaries into project's activities.
8. Compare aggregated benefits with other project costs to obtain incremental discounted cash flows. Calculate economic performance indicators adopting a social discount rate: ENPV, ERR, B/C ratio.
9. Perform sensitivity analysis (SA) in order to deal with the main risks and uncertainties that could affect the proposed project.

# EFA step by step

## Financial analysis

**1** **WP-WOP develop and identify**

Develop farm/enterprise models and identify benefits and costs (investment and recurrent) for WOP and WP scenarios (based on crop budgets).

**2** **Discount flows – costs and benefits**

Compare the discounted flows of benefits and costs and calculate the differences between the obtained results and the WOP scenario in order to determine the net incremental benefits (NIB) of the proposed interventions.

**3** **Calculate indicators**

Calculate the project financial profitability indicators of each model (i.e. financial NPV, financial IRR and B/C ratio), applying these criteria to make an investment decision.

**4** **Financial sustainability**

Assess family incomes and establish credit needs by performing a 'sustainability analysis'.

## Economic analysis

**5** **Shadow prices**

Convert all market prices into economic/shadow prices (SP) that better reflect the social opportunity cost of the good.

**6** **Transfers and externalities**

Deduct taxes and subsidies – Consider positive and negative externalities

**7** **Aggregation**

Aggregate all model's NIB cash flows respecting incorporation phasing patterns of targeted beneficiaries.

**8** **Cash flows**

Compare aggregated benefits with other project costs to obtain incremental discounted cash flows. Calculate economic performance indicators adopting a social discount rate: ENPV, ERR, B/C ratio.

**9** **Perform sensitivity analysis**

in order to deal with the main risks and uncertainties that could affect the proposed project.

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