

ECONOMIC ANALYSIS TO AID DECISION-MAKING FOR AGROECOLOGICAL TRANSITION PROJECTS

ANALYSE ÉCONOMIQUE AU SERVICE DE LA PRISE DE DÉCISION POUR LES PROJETS DE TRANSITION AGROÉCOLOGIQUE

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ABSTRACT

As with any major change to an economic system, the agroecological transition can only succeed if stakeholders, primarily farmers, see it as being in their best interest. When conducted properly, economic analysis can be a powerful tool for assessing stakeholders' interests and anticipating the risks of change for them. Economic analysis is not so much about calculating the internal rate of return (IRR)—which has limited scope—but rather about identifying the drivers of change and incorporating them into the transition approach. By examining the strategies of the stakeholders involved, the issues at stake, and the impact that decisions will have on each of them, economic analysis makes it possible to model how complex systems may respond to changes. Once the key factors for each stakeholder are better understood, it becomes possible to define possible strategies and the actions needed to ensure that each stakeholder has both the motivation and the means to contribute to the transition. Economic analysis can then be used to compare different pathways to achieving the desired outcomes. In this way, economic analysis serves as a tool to help define appropriate strategies and make decisions.

The proposed approach differentiates between key stakeholders and specifies the economic and financial analysis to be carried out at the level of each stakeholder to define the conditions of their involvement, by studying their situation, their capacities, their expectations, and the relationships between them. Originally developed as part of the COSTEA⁴ to support the design of irrigation and drainage (I&D) projects, this approach can also be applied to ecological transition projects, as these too involve profound changes to existing agricultural systems—changes that generally cannot be undertaken by farmers alone, either technically or financially.

Keywords: Agroecological transition; stakeholder; appropriate strategies; economic analysis; agricultural systems.

RESUME

Comme pour tout changement majeur d'un système économique, la transition agroécologique ne peut aboutir que si les parties prenantes, essentiellement des agriculteurs, lorsqu'ils croient que c'est dans leur meilleur intérêt de le faire. Lorsqu'elle est menée correctement, l'analyse économique peut constituer un outil puissant pour évaluer les intérêts des parties prenantes et anticiper les risques que le changement représente pour elles. L'analyse économique ne consiste pas tant à calculer le taux de rentabilité interne (TRI) – dont la portée est limitée – qu'à identifier les moteurs du changement et à les intégrer dans l'approche de transition. En examinant les stratégies des parties prenantes impliquées, les enjeux liés à cette question et l'impact que les décisions auront sur chacune d'entre elles, l'analyse économique permet de modéliser la manière dont les systèmes complexes peuvent

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⁴ The COSTEA Think Tank (<https://www.comite-costea.fr/>), dedicated to water for food in the face of climate change challenges, was established in France in 2013 with financial support from the French Development Agency (AFD). Its mission is to produce, share, and promote knowledge and policy recommendations to address the challenges of irrigated agriculture.

réagir aux changements. Une fois que les facteurs clés pour chaque partie prenante sont mieux compris, il devient possible de définir des stratégies envisageables et les actions nécessaires pour s'assurer que chaque partie prenante dispose à la fois de la motivation et des moyens de contribuer à la transition. L'analyse économique peut alors être utilisée pour comparer différentes voies permettant d'atteindre les résultats souhaités. De cette manière, l'analyse économique sert d'outil pour aider à définir des stratégies appropriées et à prendre des décisions.

L'approche proposée distingue les principales parties prenantes et précise l'analyse économique et financière à mener au niveau de chacune d'entre elles afin de définir les conditions de leur implication, en étudiant leur situation, leurs capacités, leurs attentes et les relations qui les unissent. Initialement développée dans le cadre du COSTEA pour soutenir la conception de projets d'irrigation et de drainage (I&D), cette approche peut également s'appliquer aux projets de transition écologique, car ceux-ci impliquent eux aussi des changements profonds des systèmes agricoles existants — changements qui, en général, ne peuvent être entrepris par les agriculteurs seuls, que ce soit sur le plan technique ou financier.

Mots-clés : Transition agroécologique; Partie prenante; Stratégies appropriées; Analyse économique; Systèmes agricoles.

Introduction

In the context of international financing for agricultural projects and policies, economic analysis is most often limited to an assessment of the project's overall internal rate of return. While this calculation may be useful for choosing among several projects or for justifying a country's decision to take on debt, it provides no insight into the project itself and is of no use in structuring it. However, the failure rate—or at the very least the short-lived nature—of agricultural projects, especially when significant investments are made in infrastructure, shows that greater attention must be paid to the project design, its components, and the implementation phases.

This paper proposes revisiting traditional methods of economic analysis⁵ and extend their scope to the design of agricultural strategies and projects. Economic analysis also serves as a tool for dialogue among stakeholders, facilitating the co-construction of policies and ensuring broad support for the proposed strategies. Initially based on the authors' experience in designing and evaluating hydro-agricultural development and rural development projects in general, this analysis is also highly relevant in the context of supporting the agroecological transition projects. Indeed, adapting water management systems—which were often designed for single-crop production and rely on purchased inputs—to agroecological practices, which are based more on ecosystem functions and internal resources of farms, often requires a complete rethink of agricultural models and of the management of the irrigation systems.

The following overview of principles and methods is based on a model project for deep change in agricultural systems within a given region, involving irrigation and drainage infrastructure development, changes in public policies, and a set of measures to support farmers during the transition. These principles and methods can be adapted even without significant investment.

The three levels of economic analysis

Frequently, economic evaluations only take the perspective of general interest (at the level of the State, the community or the territory impacted), by analyzing the advantages and disadvantages for Society as a whole. They justify the decision to fund and implement the projects that are most beneficial to

⁵ For simplicity purpose, the generic term “economic analysis” here covers both financial and economic evaluations (or analysis). Financial analysis is conducted at the level of a specific actor or type of actor. It assesses the conditions for that actor's financial balance and thus helps to evaluate the resources it requires. Economic analysis takes place at the community level and assesses whether the public interest is served—that is, whether the benefits (monetary or otherwise) outweigh the costs, and under what conditions.

Society or help choosing between several options for the same project. In this latter case, economic evaluations assist in the choice of technical and organizational characteristics but are not actively involved in the process of defining the project and its components.

However, one must not forget that a project is carried out by individuals, groups, and institutions. It is therefore critical to examine the perspectives of the different types of stakeholders and verify that each is interested in the projected transition and will be in a position to engage actively in the project, considering the material and financial resources required. It enables the anticipation of the technical requirements that must be met (materials, knowledge) and, where applicable, the financial conditions that will ensure the participation of these actors, including subsidies, credits, tax exemptions, etc.

In an agroecological transition project, these key players are primarily the farmers, the public authorities, and—where an I&D infrastructure exists or is planned—the operator of the I&D scheme. As shown in Figure 1, the scope of each party's involvement differs, as do the challenges and risks they face in the project. The purpose of the various stages of financial analysis is to assess the conditions for managing risks and challenges for each stakeholder individually prior to a comprehensive economic analysis at Country or region level depending on the project's scope.

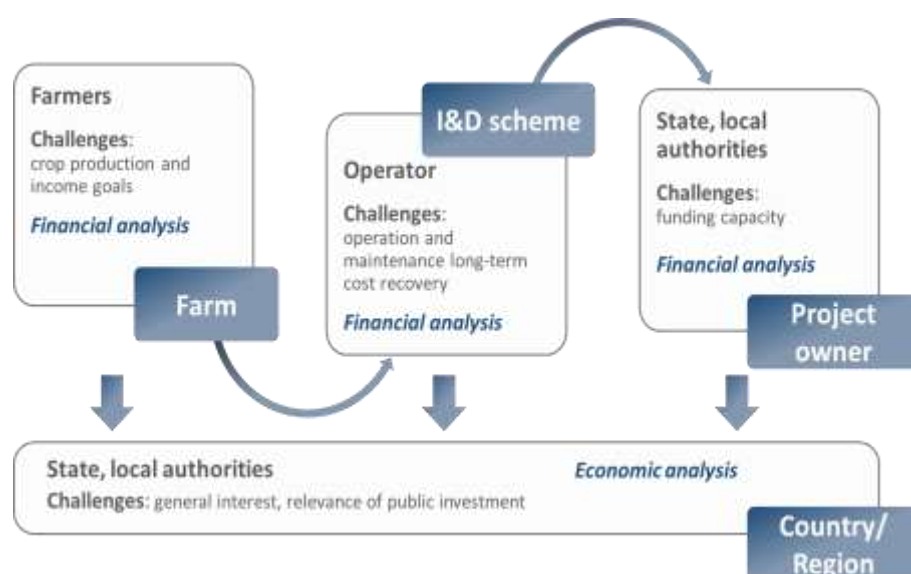


Figure 1: The three levels of economic analysis

For farmers and the operator of the I&D scheme, this paper proposes an analytical approach that is developed throughout the project, during the project definition, identification, feasibility, and detailed technical design phases. In any project, all groups of people involved in or affected by it⁶ should be subject to similar analysis. In this regard, it is particularly important to assess the technical and financial capacities of government authorities (at national or local level depending on the project's scope).

At the farmers' level

The analysis at the farm level must allow to determine if—and under what conditions—farmers would benefit from changing their current practices to achieve the project purpose. In the case of irrigated agriculture, depending on whether the project consists in rehabilitating, upgrading or creating an I&D scheme or substituting a water resource, the analysis must identify the specific determinants of farmers'

⁶ This requires that these individuals and entities be properly identified through a detailed assessment of the project's positive and negative impacts.

involvement, i.e., the factors that will make them decide to develop irrigation, change their crops or switch to an alternative water resource.

The analysis is a financial one, undertaken at the level of the farms located in the scheme being studied. It should be noted that not all farmers face the same conditions: for example, some may own their plots, while others are tenant farmers; some may also grow rain-fed crops or breed livestock outside the project area, while others have land only within it; some may be able to hire workers, while others must manage their farm with just family workers; some may have large plots, while others just a small one; some are family farms, while others are commercial farms; etc.

For obvious reasons, it is impossible for the financial analysis to include all the farmers that will participate in the project, and, in most cases, they are not yet identified at the feasibility study stage. Consequently, financial analyses are generally conducted in reference to a farmers' typology or model that is as representative as possible of the diversity of farmers who should participate in the project. Access to production means (i.e., labor, land, and capital) is generally the determining factor when defining a farmers' typology. To be practical, the typology should include a limited number of categories (four to six).

It is generally believed that a project will be advantageous to farmers if it offers prospects of higher income compared to using their resources for other economic activities. From this perspective, the point is, therefore, not merely to ensure that farmers can earn enough income to feed their family, for example, but also to ensure that other productive options are not more desirable. For example, farmers seeking to ensure their family's food security may prefer crops that are less profitable but less risky over the crops proposed by the project. For others, it may be in their interests to sell their labor or to work on rain-fed crops rather than on the irrigation scheme.

The analysis of existing farming systems should be used as a starting point to determine the changes the farmers would wish for and could implement, if they had access to irrigation or if that access improved (more reliable, more regular, more flexible, etc.). Several scenarios can then be tested to determine which one is the most relevant in the context of the project for each type of farmer identified and discuss their preferred options with farmers' representatives.

In addition to the farmers' motivation to develop a given type of irrigated farming it is also necessary to ensure that they will have the means to do so, i.e., 1) that they will have the technical means to implement the planned crops and agroecological practices to achieve the intended outcomes; 2) that family labor is available and/or accessible on the local labor market during the period when additional labor is needed; 3) that they will have the financial means to cover operating and capital costs throughout the project – and beyond.

For a project proposing water resource substitution (e.g., replacing an individual borehole with a connection to a collective network), it is also necessary to ensure that the new, alternative resource is, *at least*, as accessible, and reliable as the existing one, without being more expensive (or that the additional cost is justified by better irrigation service).

The analysis process at farms' level can be summarized in the following steps:

1. Establishing agricultural systems typology and collecting technical and economic data on each identified type.
2. Formulating the project's technical choices, including irrigation options and development scenarios (choice of crop rotations, value chains, projected yields, etc.).
3. Carrying out a financial evaluation of an average year to determine the benefit for each type of farmer to participate in the project and/or to select the most profitable options.

4. Analyzing financial flows to highlight the financial conditions under which farmers can implement the planned agricultural systems.
5. Conducting a sensitivity analysis of the main risks and most sensitive parameters.

At the operators' level

Whenever the transition project includes a collective infrastructure such as an irrigation and drainage system, the long-term financial balance of the system's operator; as well as the adequacy of its organization and capacity, is critical for the success of the project and the sustainability of the infrastructure. Many I&D projects show poor performance due to poor operation and lack of maintenance at all levels (dams, canals, pumps, etc.).

In the case of irrigation projects, it is generally considered that farmers should cover the full cost of irrigation service, meaning irrigation service fees should cover all costs. As a result, the actual cost of irrigation service is rarely estimated and consequently, its financing is not addressed. Whereas the larger the irrigation scheme and the more complex the infrastructure, the less likely it is that irrigation service fees will be sufficient to cover operating and maintenance costs, let alone the long-term renewal. If charging farmers for water service does not cover the "Sustainable cost" (Figure 2), then achieving financial stability for the operator and the irrigation scheme means identifying and securing other sources of funding, in particular public subsidies when these are justified by the overall benefits of the project for the community. The project's sustainability depends on ensuring that the "Full cost" is funded and that the "Total cost" is justified by the expected benefits of all kinds, not only agriculture.



Figure 2 : Irrigation service cost recovery scenarios⁷

Financial evaluation of the operator aims:

1. To properly assess the cost of irrigation service, depending on the infrastructure characteristics and the management framework.
2. To estimate the irrigation services fees in adequacy with both the quality of the service and the economy of the irrigated agriculture system; the fees usually only cover part of the costs.

⁷ Based on Tardieu and Préfol, 2002.

3. To model the operator's financial situation during the project's development phase and the first few years of normal operations. The model must include sensitivity analyses of key parameters, including project implementation time, water availability, or the occurrence of weather events affecting crop yields.
4. To calculate the costs and investments which cannot be met by farmers through the irrigation service fees and must therefore be financed by other sources to be identified (also see next chapter).

The calculation of O&M costs is often a challenge as existing infrastructure O&M costs are rarely well documented. There are, however, several approaches that allow for a sufficiently accurate assessment of the costs involved. For new infrastructure projects, operation and maintenance (O&M) budgets are generally estimated based on cost ratios by type of work applied to the corresponding investment amount (for example, for concrete works, the common ratio would be 1% of the initial investment, 5 to 6% for electromechanical equipment). For older infrastructure, an analytical approach can also be used, it consists in precisely listing and quantifying all required tasks. It is also important to quantify the cost of management and administration. The cost assessment should also carefully consider the nature and structure of the operator. Just because the operator is a WUO that relies heavily on volunteer work from its members does not mean there are no O&M costs to consider.

Irrigation service fees cannot be estimated simply by dividing the total cost by the number of farmers, hectares, or cubic meters supplied. Irrigation tariffication should be based on a combined approach: determining which portion of the cost the fees should cover (operations, routine maintenance, sustainability cost, etc. – See Figure 2) while remaining affordable for farmers (where “affordable” means that the fee is consistent with the types of crops grown and expected farm income). Studies on farmers' ability and willingness to pay are needed.

At country level

Comprehensive economic analysis is the only type of analysis that is almost always conducted as part of the process of defining and deciding on agricultural development projects. It generally involves calculating the internal rate of return (IRR) using the Cost-Benefit method and is primarily used to justify the project to donors and national governments. In most cases, the scope of the evaluation doesn't extend beyond the project area and its immediate surroundings. Environmental and social issues are also rarely considered because they are difficult to quantify.

As noted earlier, infrastructure projects may involve O&M costs that cannot be met by agriculture revenue alone. When the benefits extend beyond agriculture and are long-term, it makes sense for them to be supported by a broader funding base. This may well be where the primary value of a comprehensive economic analysis lies: to identify and quantify the project's impacts⁸ and other beneficiaries, thereby providing the basis for a fair sharing of costs among farmers and other beneficiaries.

When irrigation projects benefit the community as a whole (job creation, improved food quality and health) and in the long term (environmental conservation, restoration of natural resources, flood control), “the nation's taxpayers could (or should?) be charged as well as the system's direct users” (Tardieu/ICID, 2005) for both investments (which usually rely mostly on public funding already) and O&M costs.

Economic Analysis in the Project Process

Irrigation projects, like any agricultural development project, are carried out in several successive stages, from identification to implementation, including feasibility studies and detailed design. Each of

⁸ In the event of negative impacts, compensation measures should also be considered.

these stages should incorporate an economic dimension. Just like technical aspects, economics is an integral part of project development.

Figure 3 outlines the successive stages of economic analysis, the scope and nature of the analysis to be conducted, and the expected outcomes that inform the design and decision-making process.

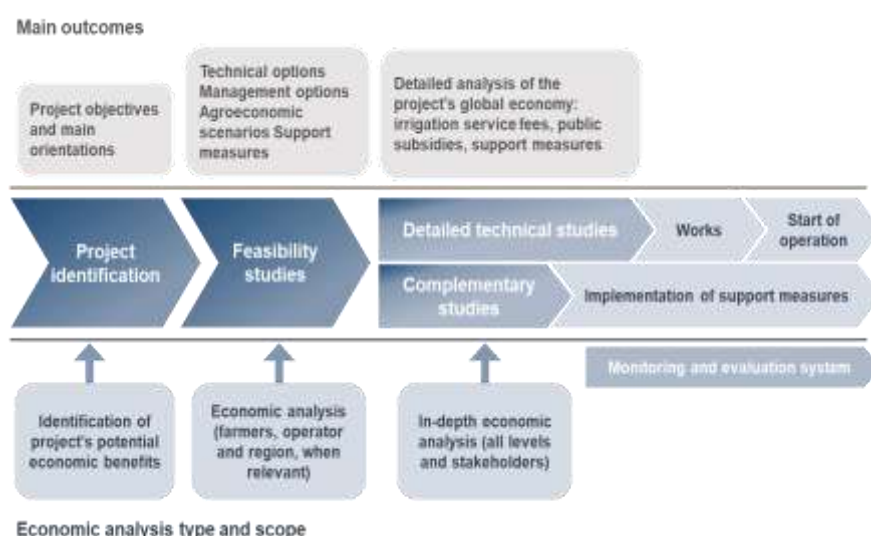


Figure 3: Project process and economic analysis

Conclusion

In the context of climate changes, agroecological transition and irrigation development are among the solutions frequently considered by development projects to foster adaptation of farming systems. It is therefore important to assess the willingness and capacity of stakeholders to engage in these projects. Furthermore, when these projects involve the modernization of existing infrastructure or the creation of new infrastructure, the financial viability of the project is essential. Finally, the cost of the adaptation cannot be borne solely by farmers. The terms of its financing must be specified.

An economic approach integrated into the definition and decision-making process can provide insights into all these questions. Economic analysis helps to understand the drivers of change for each stakeholder and allows for better consideration of these factors in the design of projects and public policies. It also seeks to establish a long-term financing framework and provides guidelines for the fair allocation of costs among beneficiaries. In this regard, economic analysis makes it possible to estimate what can be supported by agriculture and what must be covered by the community, based on the indirect and long-term benefits.

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