



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION



**FORESIGHT PROJECT
THE FUTURE OF PRODUCTS OF THE ANDEAN HIGH
PLATEAU AND CENTRAL VALLEYS**

TERMS OF REFERENCE

VIENNA, JUNE 2006

OBJECTIVES OF THE PROJECT

The Andean region defined by the Andes mountain chain goes along the territories of Chile, Argentina, Peru, Bolivia, Ecuador and Colombia. The region of the Andean plateau (located between Bolivia, Ecuador and Peru) and of central valleys of Bolivia and Peru faces a challenge in relation to its current economic and industrial situation. It is an area with low per capita income, low levels of productivity and elevated indices of poverty, but that counts on with the areas more important for the industrial production of agriculture and cattle of these countries.

The climatologic condition in this region is extreme. The biodiversity of the species in this area and the products generated present a high level of differentiation with respect to their possible competitors. These characteristics can be seen as competitive advantages at the time of approaching new niches in the international market. That is the reason for the reorganization of the productive chain at regional level. This reorganization would go from the modernization of the existing industry through the introduction of appropriate technologies until the improvement of the channels of distribution, etc.



Although there is a great recognized potential for income generation through the development of region-specific products, such as medicinal plants products, insight into which products to develop and what technologies to employ in order to access markets is lacking.

The optimal advance of these aspects is of high importance for the economic development of this region. That is the reason for the need to implement this foresight project. The focus of the project is concentrated on the products and industrial sectors of origin located in the High-Plateau and Central Valleys of the Andean region. The aim of the project will consist on the formulation of a series of recommendations, which will serve as impulse of the regional development, through the improvement of the participation of local products in their economy and of the fortification of their regional productive chains.

The present project will approach the selected sector from three different perspectives:

- Product
- Production
- Markets (demand and commercialization of products)

The project will identify the areas of opportunity for the industry of this region and the technological improvements needed to reach high levels of competitiveness, that allow the companies of the sector to approach international markets.

Additional objectives:

- Modernizes and improve the Andean native economy through the development of its industry.
- Identify the risks and opportunities that arise in the improvement of the competitiveness of the selected productive chain.
- Establish a network of know-how that gathers all the initiatives, programs and national activities of technology foresight. This will constitute a referent, a source of information and a contact point for the exchange of experiences at regional level.
- Reinforce the interaction, communication and cooperation between stakeholders of the innovation systems at regional level.

The main aim of this project is that its findings can be used for the planning and introduction of development strategies, at sectorial and enterprise level, in the region of the High Andean Plateau and Central Valleys.

CHARACTERIZATION OF THE PROPOSED SECTORS

With the purpose of adjusting the project to the demands and necessities of the Andean society, the present project starts from an elaborated sectorial proposal after an- analysis of the regional context. In this proposal three possible objective sectors are raised for consideration. Among all three one sector will be selected during the first phase of the project. The pre-selected sectors are the following:

- Agro-alimentary: *Quinoa* (grains) and by-products
- Medicinal Plants and derivatives
- Fibers and textiles derived from camelids

In general, these sectors can be characterized as it follows:

Agro-alimentary: Quinoa (grains) and sub-products

Strengthens

- Exclusive production in the Andean High Plateau
- Large resources of land and water to avail the increase of the production areas
- Availability of various organizations on production and commercialization mainly at local and regional level
- Human resources with recognized knowledge and skills

Weaknesses

- Low productivity levels
- Lack of I&D policies for the development and diffusion of appropriated technologies for production
- Lack of quality control laboratories
- International markets poorly developed
- Lack of markets for sub-products
- Lack of promotion policies-marketing even at local level
- Lack of information about the products
- Lack of adequate financial mechanisms

Medicinal Plants and derivatives

Strengthens

- Diversity and abundance of medicinal plants with industrial application
- Existence of strong investigation groups
- Existence of regional cooperative network involving research groups
- Utilization of these products by a broad group of health-care professionals for medical treatment in the region
- Existing legislation at national and regional levels that regulates the access to these resources

Weaknesses

- Low productivity levels. Rudimentary treatment in the recollection of the plants
- Rudimentary production
- Difficulties of access (infrastructure) to areas of potential new resources
- Lack of capacity for quality certification of products resulting from local medicinal plants
- Lack of enterprise organization (Producers are not organized as enterprises or cooperatives)
- Lack of experience in commercialization and use of these products
- Insufficient information and information systems

Fibers and textiles derived from camelids

Strengthens

- Variety of cameloid cattle
- Experience in handling with cameloids and similar species
- Existence of enterprises with an acceptable level of technology
- Experience in making wear products
- Positive evolution of the exports of textiles and acquisition of experience in the international markets
- Increase of the added value of manufactured products

Weaknesses

- Low productivity of the raw material production and low technology for recycling
- Low quality of local intermediaries textiles products and the cotton
- Low technological level in general. Obsolete technology. Low quality of the machinery utilized in the production. Manufactured wear products.
- Lack of I&D centers
- Lack of coordination between the raw material producers and the I&D centers, public administration, etc.
- Limited numbers of technicians and low qualification of human resources (workers and entrepreneurs)

INTRODUCTION TO FORESIGHT

Technology foresight is one of the main tools to identify and systematically analyse possible future states (opportunities and threats) by taking into account social, technological, economic, environmental and political factors and drivers, as well as value systems of the stakeholders. The main features of foresight processes can be summarized as follows:

- The involvement of a great number of specialists and stakeholders with different fields of expertise, skills and accumulated knowledge, like consumers, policy-makers, businessmen, technology experts and NGOs.
- Anticipation of the social, economic and technological tendencies and requirements of a given sector.
- Interactive and participative methods of debate and analysis of the tendencies and necessities above mentioned.
- The result is something more than a report is the elaboration of strategic visions based on which shared commitments could be taken.
- Provide information to assist the current decision making process.

In the application of Foresight at regional level the factors of proximity acquire a relevant importance and constitute a key instrument to complement and to inform the planning process. The regional Foresight offers:

- To the institutions:
 - Knowledge to formulate I&D policies in the mid and long term.
 - Transparency and participative processes for the formulation of the above mentioned policies.
- To acquainted infrastructures (Universities, technological and research centers):
 - Information to link I&D to the social necessities and to its industrial applicability.
 - Cooperation projects.
- To the enterprise structure:
 - Information to design strategies and to improve its technological competition
 - Formation of networks
- To the society:
 - Participation through different consensus mechanisms
 - Information on the future

Foresight uses a series of different methods such as for example Delphi survey, swot analysis, scenario building, morphological analysis and relevance trees, expert panels, multi-criteria analysis, roadmapping, etc.

Roadmapping has been selected as the core methodology for the execution of this project. This technique constitutes one of the most important tools for planning activities and coordination of efforts between different agents operating in a sector. Starting from the present situation of the sector, this method will allow us to identify a series of landmarks (not only of technological nature, but also related to market and

products) that are interconnected to each other, and whose overcoming will inevitably lead to the attainment of objectives (visions) already fixed.

The fundamental idea that roadmapping seeks is not other than to be able to increase the competitiveness of the industry, since all interested parts are involved in the process. Roadmapping also helps optimize resources, share investments and risks, create technological platforms, and avoid duplicity of efforts.

A roadmap allows us to design sectorial strategies providing quality information for:

- The identification of visions in relation to the objective pursued in the project.
- The identification of critical product needs, which are essential to boost a technological development, a market move, etc.
- The establishment of different alternatives, which can better satisfy such needs.
- The selection of the most suitable alternative among those suggested.
- The establishment and implementation of a plan to implement the selected alternative.

The advantages of using roadmapping as a tool for planning activities can be summarized as follows:

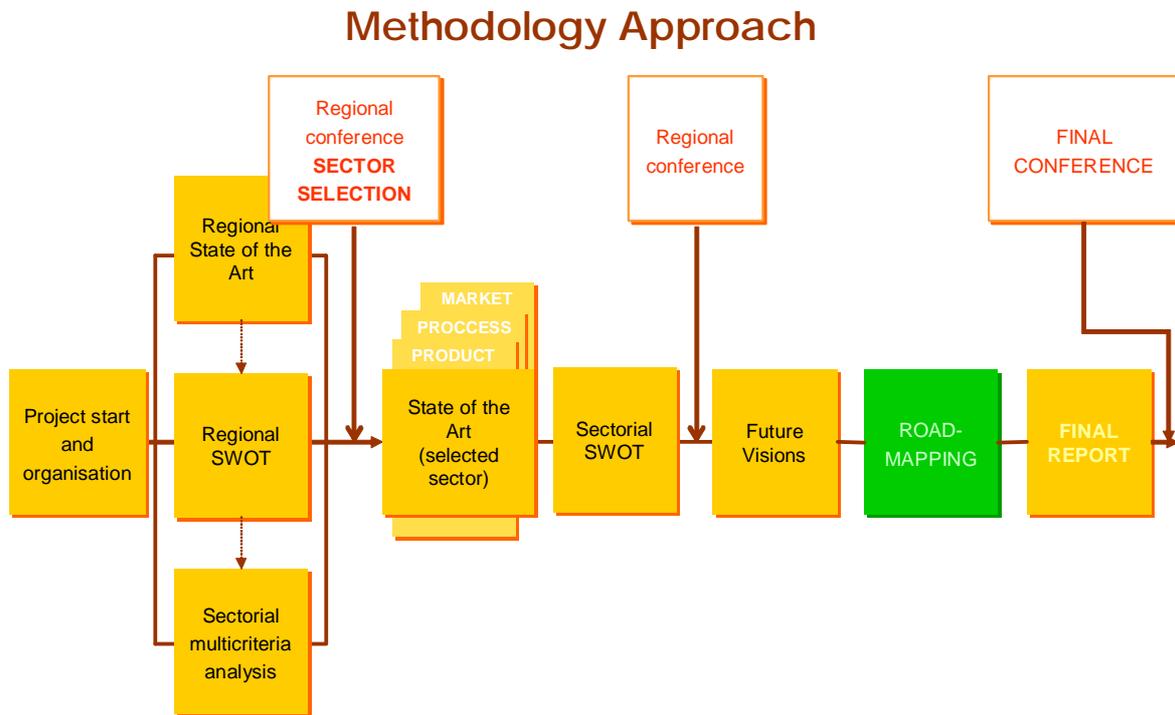
- It helps establish a consensus about the needs, the developments, reorganisation processes, etc. which are needed to reach a future objective in the sector.
- It provides a tool to predict the technological developments in the areas of the given objective.

It provides a framework, which facilitates planning activities and coordinates actions between the different agents operating in the sector.

METHODOLOGY

The methodology approach for the present project consists of a series of basic stages organized sequentially (See Figure 1). It is important to stand out that this method is based in a continuous process of participation and evaluation of the experts involved in the project.

Figure: 1 Methodological Approach



Sector Selection Activities

1. Starting and organization of the process

- Setting up the main goal and scope of the project.
- Definition of the time horizon of the project.
- Estimation of the duration of the project.

2. Regional State of the Art

- Analysis of the present situation of the region, in each of the proposed sectors.

3. Regional SWOT

- Analysis of the strengths, weaknesses, opportunities and threats of the Andean region as a whole, based on the state of the art report.

4. Sectorial multi-criteria analysis

In order to place each sector in Industry Attractiveness – Business Strength matrix, every sector will be evaluated in terms of:

Socio-environmental:

- Its importance to the country
- Its impact on the per capita income increase
- Its impact on employment increase

- Its contribution to biodiversity preservation

Economic and Market:

- Current demand
- Potential market prospects
- Contribution to the region competitiveness
- Current situation of the value chain in the sector
- Production infrastructure
- Availability of product-specialized human resources
- Availability of process-specialized human resources
- Contribution to the economic development of the region
- Contribution to the science and technology development of the region
- Contribution of the scientific sector to the project

5. Regional conference in Peru (Cuzco)

- Selection of the sector of interest for the accomplishment of the project.
- Establishment and final definition of the methodological proposal.

Sectorial Foresight Project

6. State-of-the-art (national level)

In this stage, a description of the present situation of the selected sector will be prepared for each country from three different perspectives:

- Product perspective, where all the aspects related to raw materials, final and by-products will be described.
- Production perspective, where productive chains and the main producers of the sector will be described and identified.
- Market perspective, where the current market situation will be analyzed, in terms of demand, distribution channels, legislation and commercialization procedures.

7. Sectorial SWOT (regional level)

Key aspects in this stage consist of:

- The integration of the national state-of-the-art reports.
- The analysis of the strengths, weaknesses, opportunities and threats of the industry of the region.

8. Regional conference in Bolivia (Potosí)

In this conference two main activities will take place:

- Presentation of the results obtained until this moment.
- Future visions panel. In this panel, a group of 20 – 30 experts from the Public Administration (regional and national level), sectorial experts and Andean community representatives (NGOs, etc.) will describe future scenarios of the sector in terms of:

- Technology requirements.
- Strengthen of the current markets.
- Opening of new markets.
- Development of a strong brand image.
- ...

There will be one meeting of the expert panel to define future visions for the selected sector. These future visions will be based on the information derived from the SWOT analysis and the state-of-the-art.

The establishment of future visions and strategic objectives is one of the most important issues when developing a roadmap, as they set a series of objectives for the sector in the future (“where do we want to be?”) and the time horizon to reach those objectives (“when are we going to accomplish them”).

When all agents operating in the sector reach a consensus on a strategic vision a linear trend in the evolution of the sector can be broken and thus lead to innovative solutions and to important technology breakthroughs. By relating the present situation of the sector with the future, these visions may help focus efforts on how to reach those objectives from the present.

Future visions are a compromise among all parties involved in the process, and so special attention must be paid to make them realistic and easily understandable. It is also important to notice that a roadmap needs multidisciplinary approach to the subject and so creativity must be promoted during the process.

9. Roadmapping

Once future visions for the sector – region have been developed, a roadmapping will be developed with the following methodology:

- i. Defining barriers to progress. Having reached a consensus on the future direction for the selected sector, the next stage is to determine “What is stopping us getting there?” In addition, challenges derived from those barriers will be identified, in relation to products, production process, technology and markets.
- ii. Identifying possible solutions. In this stage, the expert panel will identify different alternatives to overcome those barriers identified in the previous stage also in relation to products, production process, technology and markets. The different alternatives will be organised in terms of their potential to overcome barriers and help achieve the objectives of the project. In addition, experts must determine the time horizon in which items identified in the roadmap will be materialized.

The outcome of this process will consist of a list of prioritized items which corresponds to each one of the actions identified to reach the future objectives.

The sequence of the process can be summarised as follows:

Figure 2: Roadmapping's process



In order to develop the roadmap, a selected expert panel will be called on two meetings. This workgroup will be composed of a maximum of 15 sectorial and regional experts. The activities to be developed by this expert panel can be summarised as follows:

- First meeting: Taking into account all the information derived from the state-of-the-art, the SWOT analysis and the future visions, experts will identify the barriers that prevent the sector from developing and getting to the objectives, which have already been established. Once barriers have been identified, experts will suggest different alternatives (technological, economical, human resources, commercial, trade mark, etc.) to overcome such barriers.
- Second meeting: In this meeting, experts will prioritise the suggested alternatives and will identify key actions to be put into practice in order to reach the future visions which have been already established. These actions should be related to:
 - Business management and strategic planning activities
 - Commercialisation and marketing
 - Human Resources
 - Legislation

In addition, experts will define the different roles of all agents involved in the process (Industry, Administration, R&D Centres, University, etc.).

10. Formulation of strategic recommendations

- Evaluation of possible implications for the sector
- Identification of future opportunities for the sector
- Elaboration of strategic recommendations for the future development of the sector from the regional and the business point of view.
- Elaboration of the final report

11. Final conference in Ecuador (Otavalo)

- Dissemination of the results of the project

1. UNIDO

Function

- Project concept and management;
- Overall coordination of the agents of the project;
- Preparation and maintenance of the main information and data base for the project;
- Final evaluation and preparation of the project reports;
- The UNIDO regional office will logistically support the application of the project.

2. Host counterparts

Profile

- High level leadership and mandate for defining and implementing economic and technological development policies;
- Capacity to formulate and evaluate industrial and technology strategies at the long run;
- Capacity of coordinating different institutions, government authorities and enterprises related to the subject productive chain.

Functions

- Coordinating the different institutions at the national level involved in the project and facilitating the work to be allocated to these institutions;
- Policy decision on critical issues for the implementation of the project;
- Definition of the priorities and highlights for the project;
- Providing funding contribution to the project.

3. National coordinators

Profile

- Coordination capacity with the authorities responsible for defining and implementing economic, industrial and technological development policies;
- Experience in project and expert teams administration;
- Technical capability in the related knowledge areas;
- Relationship with the agents of the subject productive chain.

Functions

- Selection of experts and other institutions/organizations/representatives interested in participating in the different meetings;
- Facilitation of information to the sectorial experts;
- Preparation (with the sectorial expert) of the report regarding actions and recommendations at national level based in the roadmapping workshop;
- Nomination of the national members of the Regional Panel;
- Participation in the different panels;
- Participation in the conferences;
- Collaboration in the preparation of the different meetings and conferences.

4. Regional coordinator

Profile

- Coordination capacity with the different authorities responsible for the national coordination, the methodological coordinator and UNIDO;
- Experience in project and expert teams administration;
- Knowledge of foresight methodologies;
- Capability to produce reports and communication in Spanish and English languages;
- Technical capability in the related knowledge areas;

Functions

- Coordination activities between UNIDO, the methodological institution and the rest of the agents;
- Revision of the experts' works;
- Assistance to the national teams regarding the implementation of the project;
- Collaboration in the organization of the different workshops, meetings and conferences and preparing different reports.

4. Foresight expert institution (Sub-contracted institution)

Profile

- International experience in conducting and assisting developing countries, with focus in Latin America and the Caribbean, in developing and implementing technology foresight activities;
- Recognized center of excellence in technology foresight methodology and applications;
- Good relations and networking with the industry and other agents of the subject productive chain;
- Established extensive research network with similar centers of excellence worldwide and especially in Latin America;
- Track record of foresight studies;
- Capability to produce reports and communication in Spanish language (mandatory condition).

Functions

- Advice on the methodology for the project;
- Advice on the design of the project;
- Preparation of terms of reference for national coordinators, regional coordinator and sectoral experts;
- Conducting and moderating the project workshops and conferences, such as the visions and roadmapping workshops, the regional conferences and regional panel;
- Designing the consultation process and documentation;
- Assisting the national agents;
- Preparation of project reports.

6. International experts

Duties

- State of the art and swot analysis of the subject production chains;
- Participation in the regional panel, workshops and conferences;
- Elaboration of reports;
- Collection and organization of documentation and research data and electronic data management.

ACTIVITIES TO BE PERFORMED BY THE FORESIGHT EXPERT INSTITUTION

Participation of the foresight expert institution will be requested to provide expertise on all relevant aspects related to the design and implementation of the foresight project for the subject productive chain. In close cooperation with UNIDO project management, the foresight expert institution is expected to perform the following duties:

- Advice on the methodology and the design of the development and implementation process of the project.
- Proposals for the preparation of the terms of reference (including profile and activities) for national coordinators, regional coordinator and sectorial experts collaborating in the project.

- Organization and moderation of the workshop dedicated to the future visions and roadmapping.
- Assisting and active participation in the regional conferences.
- Technical advice to the work performed by the sectoral experts, regional coordinator and national teams in the three countries involved in the project and in the design of the consultation process and documentation.
- Conducting and moderating the multi-criteria workshop during the first regional conference, which will be responsible for selection of the product.
- Elaboration of the roadmap report.
- Analyzing the different reports at national level, and preparation of the final report on the project.

Qualifications:

- International experience in conducting and assisting developing countries, with focus in Latin America and the Caribbean, in developing and implementing technology foresight activities.
- Recognized center of excellence in technology foresight methodology and applications.
- Good relations and networking with the industry and other agents of the subject productive chain.
- Established extensive research network with similar centers of excellence worldwide and especially in Latin America.
- Track record of foresight studies in the agro-food sector.
- Capability to produce reports and communication in Spanish language (mandatory condition).

Reports:

The implementation progress and results of the project should be presented through the following reports or deliverables, in accordance to the implementation schedule:

- 1) Draft terms of reference for national coordinators, regional coordinator and national and international experts.
- 2) State of the art and swot analysis for the different sectors: Camelids, grains/quinua and medicinal plants.
- 3) State of the art report more developed of the chosen product.
- 4) Future visions report.
- 5) Roadmapping at national level report (3)
- 6) Roadmapping at regional level report.
- 7) Final report.