



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Project of Region Latin America

Project number:	XX/RLA/05/X39
Project Title:	TECHNOLOGY FORESIGHT INITIATIVE FOR LATIN AMERICA AND THE CARIBBEAN COUNTRIES: REGIONAL PRODUCTIVE CHAINS – THE FUTURE OF PRODUCTS OF THE ANDEAN HIGH PLATEAU AND CENTRAL VALLEYS
Starting date:	November 2005
Duration:	24 months
Project site:	La Paz (Bolivia), Quito (Ecuador), Lima (Peru)
Government co-ordinating agency:	Ministries of Foreign Affairs of Bolivia, Ecuador and Peru
Host country counterpart:	Ministry of Economic Development of Bolivia, Ministry for External Commerce, Industrialization and Fisheries of Ecuador, Ministry of Industry, Tourism, Integration and International Commercial Negotiations of Peru
Executing Agency:	United Nations Industrial Development Organization (UNIDO)

Brief description:

The Andean highland regions of the participating countries are facing similar situation with regard to their economies. Although there is a great recognized potential for income generation through the development of region-specific products, such as textiles (f.ex. cameloid fibers), food products (f.ex. quinoa) and medicinal plants, insight into which products to develop and what technologies to employ in order to access markets is lacking. To raise production levels, productivity and competitiveness of products of Andean region origin, the related industrial sectors and sub-sectors should be reorganized as productive chains, incorporating the necessary institutional framework for modern industry, financial services, wholesale markets, commodities exchanges and future markets, price information, quality standards, traceability, controls and certification, export marketing agencies and transportation facilities and infrastructure. To capture this complex reorganization process, future studies and trend analysis are on demand to cover structural and functional change scenarios, as well as technology development, which will affect gains and losses for the present industrial basis in the region. A pan-national Technology Foresight study, as proposed in the present project, could contribute to raise awareness and build consensus and agreements among the key stakeholders to conduct this reorganization in a sustainable manner. Expected beneficiaries will be the communities on the Andean High Plateau and Central Valleys of Bolivia, Ecuador and Peru. The project goal is to assist the participating communities in making decisions on future directions of the production of local products that might contribute to increased economic and social wealth in the region. The project purpose is to identify strategic technology areas for selected products and industrial sectors to raise their competitive advantage and to enable the national products to better access the regional and the global markets. The principal outcome of the project will be (a) a common vision of the possible future development of the region through the improvement of the participation of local products in its economy, and (b) a technology road-mapping indicating how to strengthen the related productive chains. The main output will be a foresight study for a selected Andean product and the related productive chain. The project will take advantage of linking with the UNIDO project on upgrading production and processing technologies and commercialization of vicuna and llama fibers for textile sector.

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PART A. CONTEXT

A.1. Description of sector

The focus of the project is concentrated on the products and industrial sectors of origin or located in the High-Plateau and Central Valleys of the Andean region. The Andean region defined by the Andes mountain chain goes along the territories of Chile, Argentina, Peru, Bolivia, Ecuador and Colombia. The Andes is a vast mountain system forming a continuous chain of highland along the western coast of South America. It is roughly 7,000 km long, 160 km wide in some parts, and of an average height of about 4,000 m. The highlands located in Bolivia, Ecuador and Peru and the central valleys located in Bolivia and Peru are the geographic scope of the project.

In Bolivia the Andes region covers 28% of its total area (1,089,581 km²) and are home to 60 % of the country's population (a total of approximately 8 million inhabitants). The High-Plateau as a part of the Andes, has an average height of 3,750 m above sea level. The Titicaca lake, the world's highest navigable lake, is placed in this region (elevation 3,805 m) as well as the provinces of La Paz, Oruro and Potosi. The lower Andes regions (Central Valleys) are placed in the center of Bolivia. These valleys have a temperate climate all year round. The provinces of Cochabamba, Chuquisaca and Tarija belongs to this region. In the past, the production of tin and other minerals was the basis of the Bolivian economy. Nowadays, Bolivia is looking to other fields - in mining, livestock and fish farming, and the agro-industry - to leverage its national product. The agriculture sector contributes with 17% to GDP, but only 2% of total surface is arable land and 53% consists of forests and woodland. Bolivia is a very known center of biodiversity for tubers, beans, maize, peppers and pumpkins. Since the Incas period, many of these species have been cultivated until now for food use and some for its medicinal properties. Due to its geographical characteristics, Bolivia produces nowadays a range of agricultural products from the tropics, the warm valley areas and the high mountains. The plains have the most important land areas for industrial crops as corn, sunflower, peanut, sugar cane, soybean, rice and other tropical fruits as citrus, bananas or avocado. Best quality coffee is grown in the Yungas area (high and cloudy but shiny culture lands), although the most part of horticultural products are produced in the central valleys as vegetables, fruits and flowers. The production of horticulture is mostly consumed fresh by local and regional markets, and a small part is processed by industry. In the last years some fruits as bananas and oranges have found a small market of exportation to a limited number of countries. The pigweed plant or quinoa (*Chenopodium quinoa*) which grains have high content of protein, the potatoes, barley, oats and beans are cultivated in the high plateau.

Bolivia is a low income country, with a GDP per capita (WB Atlas method) is around US\$ 900, where around 70% percent of households failed to meet their basic requirements¹, with greatest poverty in the mountainous areas.

¹ **National poverty rate (% of population):** the percentage of the population living below the national poverty line. National estimates are based on population-weighted sub-group estimates from household surveys.

The inhabitants of the high plateau and the valleys are typically smallholders. In the more highly populated areas, increased land and resource pressure results in low productivity, food insecurity, underemployment and environmental degradation. Nevertheless, these are the areas that carry the bulk of food production and mining operations.

The technological development of agriculture and livestock has had constrictions and as a result only very small changes on productivity of important sectors have been made through the incorporation of more advanced technologies. Actually there are a few traditional centres of research, which are looking for technology transfer and dissemination. The genetic improvement has risen the yields of many crops, but until now it does not enough to fight against the poverty.

Regarding Peru, the high lands are the commanding feature of its territory, reaching heights up to 6,768 meters. Hundreds of permanently glaciated and snowcapped peaks tower over the valleys. The steep, desiccated Pacific flank of the Andes supports only a sparse population in villages located at infrequent springs and seepages. In contrast, tropical forests blanket the eastern side of the Andes as high as 2,100 meters. Between these extremes, in the shadows of the great snow peaks, lie the most populous highland ecological zones: the intermountain valleys (kichwa) and the higher uplands and grassy puna or Altiplano plateaus. Approximately 36 % of the population lives in thousands of small villages and hamlets that constitute the rural hinterland for the regional capitals and trading centers. Over 15 % of Peruvians live at altitudes between 2,000 and 3,000 meters, 20 % live between 3,000 and 4,000 meters, and 1 % regularly reside at altitudes over 4,000 meters.

Although rich in mineral resources, such as copper, lead, silver, iron, and zinc, which are mined at altitudes as high as 5,152 meters, the Peruvian Andes are endowed with limited usable land. The highlands encompass 34 % of the national territory, or 437,000 square kilometers, but only 4.5 % of the highlands, or 19,665 square kilometers, is arable and cultivated. Nevertheless, this area constitutes more than half the nation's productive land. About 93,120 square kilometers of the highlands are natural pasture over 4,000 meters in altitude, which is too high for agriculture. The 4.5 % of arable land, therefore, has fairly dense populations, particularly in Puno, Cajamarca, and in valleys such as the Mantaro in Junín Department and Callejón de Huaylas in Ancash Department. The highland provinces have a population density of 460 persons per square kilometer of habitable, arable land.

The best areas for cultivation are the valleys, which range from 2,000 to 3,500 meters in altitude. Although many valleys have limited water supplies, others, due to glacial runoffs, enjoy abundant water for irrigation. In the protected valleys, the dry climate is temperate, with no frost or great heat. In the high plateau or puna regions above 3,939 meters, the climate is cold and severe, often going below freezing at night and seldom rising above 16° C by day. A myriad of native tubers thrives at altitudes from 2,800 meters to almost 4,000 meters, including over 4,000 known varieties of the potato, oca, and olluco, as well as grains such as quinoa. The hardy native llamas and alpacas thrive on the tough ichu grass of the punas; European sheep and cattle, when adapted, do well at lesser altitudes.²

Ecuador's economy depends heavily on petroleum production and exports, along with exports of agricultural commodities and seafood. The country's GDP is around USD 20 billion, with a GDP per capita of US\$ 1,900. However, 70% of the population lives below the poverty line. The state oil industry makes up 10% of GDP, generates 37% of total exports, and provides about 30% of government revenue. Agriculture contributes 12% of GDP. Ecuador's major agricultural and seafood exports are bananas, flowers, cocoa, coffee, shrimps

² SOURCES: Library of Congress Country Studies, FAO documents

and tuna. In recent years, industry has become increasingly important to Ecuador's economy, though it still lags behind commodities in importance.

In Ecuador, the Andes divide country's lowland coastal plains and its share of the Amazon region. The highlands are home to nearly 50% of the country's population, including the country's capital city of Quito and the commercial centers of Cuenca and Ambato. Highlands provinces are Imbabura, Pichincha, Cotopaxi, Tungurahua and Chimborazo, in the north, and Bolívar, Cañar, Azuay and Loja, in the south. Economic activity in the region is dominated by small-scale farming and services.

The Andean highland regions have been dependent on local resources based development. These resources are characterized by high differentiation, bio-diversity and extreme environmental conditions. These characteristics, however, could constitute a competitive basis for exploiting new niches with high yield in the international markets, whereas would be possible and viable upgrading available endogenous knowledge with the introduction of new technologies.

A.2. Host countries strategy

The project will address the policies and strategies for mountain development. The objectives of the project are consistent with the participating countries' objectives regarding rural development and tapping of unique Andean resources. One common strategy of the target countries is reflected in the Andean Trade Preferences Act, adopted in 1991. This act provides duty-free access to U.S. markets for some 5,600 products from the four eligible countries of Bolivia, Colombia, Ecuador and Peru. The ATPA contains intellectual property rights-related criteria, both mandatory and discretionary. The US Trade Act of 2002 renewed the ATPA program and extended new benefits to 700 additional products.

Reference for the project are also the sectoral policies and strategies of the Bolivian Strategy to Combat Poverty. The strategy includes a plan of action based on "measures for sustainable living", which involve giving the mountain inhabitants more opportunities for sustainable and equal access to natural and socio-economic resources and social and production infrastructure. The four components of the strategy are to help the poor by:

- expanding their opportunities for employment and income generation;
- developing their productive capacity;
- increasing their participation and social integration;
- enhancing their safety and protection.

Cross-cutting themes include development with identity, equity, sustainable management of natural resources and environmental conservation.

Both in Ecuador and Peru there are no specific policies and strategies for the high lands as a whole. In Ecuador, one reference for the study will be the government strategy for rural development and development of the agriculture, forestry, agro-industry and irrigation, which considers:

- strengthening representativity and management of the social organizations of the sector through the chambers, councils and others;
- developing the production of traditional and non-traditional agro-industry for exportation, based on generation and dissemination of technology;
- increasing the productivity;
- supporting the competitiveness agreements; and
- meeting the demand for capacity building of the production sector.

This strategy is linked to the Government's Economic Reactivation Agenda of Ecuador.

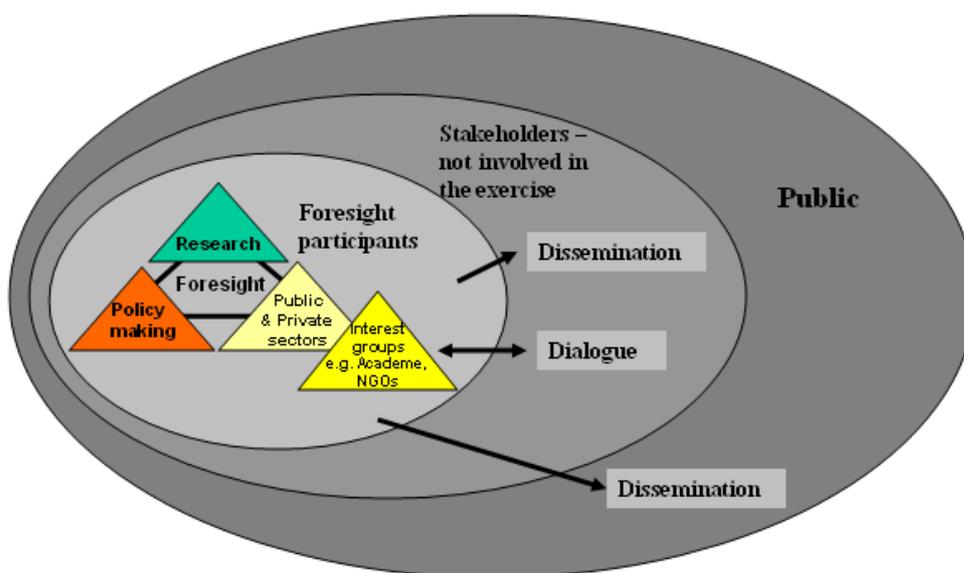
In Peru, the study will take as reference the National Strategy for Developing the Cameloid Sector, promoted by the National Council for South-American Cameloids (CONACS), Ministry of Agriculture. The strategy is dedicated to the promotion of production based on South-American cameloids, by improving and developing products and enlargement of markets, supporting the productive organization of local communities and small holders and consolidating their management capacity and competitiveness.

At the regional level, the strategic reference will be the Consortium for the Sustainable Development of the Andean Region (CONDESAN), which aim at the preservation of the Biodiversity in the High Plateau in the Northern and Central Andes.

A.3. Institutional framework for the sector

The project is dedicated to a foresight study at the sub-regional (pan-national) level. As usual in any foresight study, a large number and types of stakeholders, from governments, production sector and academia, will be involved, either as participants in panels or responding to consultations or absorbing the recommendations and conclusions of the study. The figure below indicates the stakeholders' framework of the exercise.

The context of the Foresight process



In a strategic decision making process, stakeholders are those people and/or organizations that have an interest in the economic and social development of the region. They feel they have something to say in the policy-making process. In this connection, stakeholders should participate actively in the Foresight process. They can become sponsors, provide experts, and/or act as champions. The most important stakeholders should be appointed to a steering committee. Stakeholders can act as champions, provide experts for the project and financially support the project.

Some stakeholders, however, might feel threatened and will oppose to the Foresight exercise. For this reason, promoters should organize consultations with most stakeholders

when drafting an exercise profile. In this way, it can be used as a tool of enrolment that could engender future ownership of Foresight process and results.

During the implementation of the present project, after the selection of the Andean product and the related productive chain, the actual stakeholders to be involved in the study will be identified and mobilized, including:

- Industry
- Research
- Public institutions
- NGOs.

A.4. Prior and ongoing UNIDO technical assistance

The following ongoing UNIDO projects are relevant for the present project, as they will be used as reference and source of information. The results of the foresight study can also be instrumental for the implementation of these projects.

(1) Bolivia: Assistance in enhancing the productivity and marketing of cameloid fibres and management of technological change in the textile sector of Bolivia in support of sustained growth and poverty alleviation.

(2) Ecuador: Promoting territorial development and local identity products by improving the value chain of ecological agricultural products (EAP) from fruit trees in Loja.

(3) Ecuador: Investment and partnership promotion programme.

(4) Peru: National programme on enhancing the productivity, competitiveness and market access of the textile goods based on llama fibers, ceramics and pottery products, leather and precious metals for sustained growth and increased export.

(5) Peru: Assistance to the Peruvian census of manufacturing.

(6) Peru: Assistance in upgrading production and processing technologies and commercialization of vicuna and llama fibers for the textile sector.

The project will help strengthen the technological capacity of Peru in the production, processing, storing and commercialization of the vicuña and llama fibers used in the textile sector of industry through the introduction of new technologies and innovations, market promotion and strategy development.

There will be a specific focus on SMEs, micro-enterprises and individual artisans, which will be direct beneficiaries of this project. They will be provided with existing experience and best practice in these areas and with facilitated access to new technologies and innovations, tools, methodologies and mechanisms enabling the companies to increase their productivity and performance, improve design and quality of products, apply best management and marketing practice and enhance competitive position at the local and international markets.

A.5. External aid to the same sector and/or allied sectors

The most important partners of the target region for external aid and cooperation are the Inter-American Development Bank and the *Corporación Andina de Fomento* (CAF). Both organizations have a large number of projects dedicated to the sub-region, which could be

relevant for the present study. During the implementation of the study, a careful evaluation of the outputs and information from the available project files will be conducted. Representatives of these organizations will be participating in the conferences of the present study.

The *Corporación Andina de Fomento* (CAF) and Harvard University (via the Center for International Development) had cooperated on a multi-year *Andean Competitiveness Project* (ACP), in conjunction with Andean research institutions, private sector representatives, other members of civil society, and the governments of Bolivia, Colombia, Ecuador, Peru, and Venezuela. The ACP began officially in December 1999 and closed by July 2002. It contributed to define and promote an integrated agenda for national and regional competitiveness to encourage environmentally sustainable growth and significantly improve living conditions in the region. Its conclusions and results will be considered in the present project.

PART B. PROJECT JUSTIFICATION

B.1. Problem addressed - the present situation

The Andean highland regions of the participating countries are facing similar situation with regard to their economies. Although there is a great recognized potential for income generation through the development of region-specific products, such as textiles from cameloids fibers, food projects from quinoa and medicinal plants, insight into which products to develop and what technologies to employ in order to access markets is lacking. The project aims at establishing a road map for the development of such products by applying technology foresight techniques.

For illustration, the following tables show a characterization of some relevant productive chains in the Andean region, which will be the object of the present foresight study.

SWOT analysis: Cameloids productive chain	
Strengthens	Opportunities
Variety of the cameloid cattle. Positive evolution of the exports of textiles and acquisition of experience in the international markets. Some high technologically qualified industries. Knowledge (sustainable) of small producers on handling of cameloids and similar species. Good suitability of the arable land for cultivating and breeding different plants and cattle. Experience with making wear products (handicraft).	Potential markets in developed countries, through trade agreements. High and increasing value added. High demand for textiles and other products based on cameloids.
Weaknesses	Threats
Low productivity of the raw material production and low technology for recycling. Low level of modernisation and lack of research centres. Handicraft conditions of production. Limited number of technicians and low qualification of workers. Not enough technical qualification of entrepreneurs. Low quality of national intermediaries textile products Low quality accessories used as input in wear production.	Imports of second hand wear products. Increasing technology obsolescence. Lack of management capabilities. Low quality cotton. Non existence of coordination between raw materials producers, government, research institutions; consequently lack of effective programmes for enhancing the agriculture and cattle production. Lack of policy for environmental protection.

Previsions and hypothesis on the future for the behaviour of the productive chain
<p>Relative potential for its development in the national market and one much larger at the export markets. The strategic objective would be the penetration of manufactured textile products in the international markets. In parallel, it should be considered as objective the reduction of exports of raw material without added value. To achieve these objectives, there are four conditions to be met: a) favourable conditions for the provision of raw material of local origin or imported; b) strengthening and internationalisation of the production chain based on an export oriented strategic plan; c) enhancing the productivity; d) enable environment for investments.</p>

Source: Different documents prepared during the Bolivian National Dialogue (*Diálogo Nacional 2000*). La Paz, August 2000.

SWOT analysis: Quinoa productive chain	
Strengthens	Opportunities
<p>Niches of exclusive markets for the final product. Large resources of land and water for increasing the production areas. Experience of various organizations on production and commercialisation. Human resources with recognized skills. Unique genetic material in the highlands.</p>	<p>Posibility of enlarging the markets through nutrition social programmes. International markets increasingly interested in natural food products with attractive prices in these markets. Joint marketing with other natural products of the highlands.</p>
Weaknesses	Threats
<p>Less developed international market. Image of the region as quality producer is incipient. There is no market for derivative products (by-products). Lack of valorisation of the consume at the national level. There is no R&D policy for the development and diffusion of technologies, appropriate for the production. Limited promotion policies. Producers are subsistence crop farmers. Lack of initiative at the municipal level for production promotion. Lack of information in general. Lack of laboratories for quality control. Inadequated financing mechanisms. Low productivity.</p>	<p>Lack of external market for future trading. Lack of exportation policy. Fragile arable land for production. Precarious transportation infrastructure. Norms, procedures and requirements for certification are to cumbersome. Lack of knowledge of the WTO norms. Weak organization of the independent producers.</p>
Previsions and hypothesis on the future for the behaviour of the productive chain	
Positive aspects	Negative aspects
<p>Access to the MERCOSUR markets. Tendency towards more production levels and duplication of the agriculture frontier. Diversified industrialization and large markets. Hydro resources better utilized. National markets are more open. Organic agriculture shows an expanding tendency. More capability of the export oriented enterprises. Increasing clustering of producers. Improving production technologies. Inclusion of quinoa in the food supply security. Robust export promotion campaign.</p>	<p>Prices being defined by exporters and intermediaries. Failing to identify new markets. No competitive production of quinoa. Higher degradation of soils. Production of quinoa in third countries. Further migration from land to the cities. Continuation of illegal imports. Lack of R&D efforts. Lack of coordination of the services offer. Poor infrastructure and lack of innovation.</p>

Source: Different documents prepared during the Bolivian National Dialogue (*Diálogo Nacional 2000*). La Paz, August 2000.

SWOT analysis: Andean medicine plants productive chain	
<i>Strengths</i>	<i>Opportunities</i>
<ul style="list-style-type: none"> -Diversity and abundance of plants that can be used for medical and industrial application. -Limited in number but strong research groups studying medical applications. -Existence of a regional cooperative network involving research groups (amongst them Bolivia, Peru and Ecuador) -Small but competent group of medical practitioners using native plants for medical treatment. -Existing legislation at national and regional levels that regulates the access to genetic resources. 	<ul style="list-style-type: none"> - Research Centres in more developed countries and medical industries ready to negotiate research projects and laboratory tests for pharmo-chemical production. -Growing interest for new pharmo-chemicals -Regional and national promotional regimes -Growing interest to organize producers and users -Local industries interested in new plants
<i>Weaknesses</i>	<i>Threats</i>
<ul style="list-style-type: none"> -Little experience in the negotiations of use and trade of genetic resources. -Difficulties of access (infrastructure) to areas of potential new resources. -No systematic mapping of location of medical plants -Rudimentary treatment of several plants for the preparation of new pharmo-chemicals at local level. -Insufficient information and information systems. -Lack of capacity for quality certification of products resulting from local medical plants -Producers are not organized as enterprises or cooperatives. Producers are normally subsistence peasants. -Low productivity. Collection of samples is rudimentary. 	<ul style="list-style-type: none"> -Piracy of genetic resources by organizations of more developed countries. -Competitiveness of artificial products - Prices subject to importers decisions or intermediaries. -Lack of capacity to identify appropriate markets.

Source: Different documents prepared during the Bolivian National Dialogue (*Diálogo Nacional* 2000). La Paz, August 2000

To raise production levels, productivity and competitiveness of products of Andean region origin, the related industrial sectors and sub-sectors should be reorganized as productive chains, incorporating the necessary institutional framework for modern industry, financial services, wholesale markets, commodities exchanges and future markets, price information, quality and safety standards, traceability, controls and certification, export marketing agencies, transportation facilities and infrastructure, and energy availability (including rural energy).

To capture this complex reorganization process, future studies and trend analysis are on demand to cover structural and functional change scenarios, as well as technology development, which will affect gains and losses for the present industrial basis in the region. A pan-national Technology Foresight study, as proposed in the present project, could contribute to raise awareness and build consensus and agreements among the key stakeholders to conduct this reorganization in a sustainable manner.

Taking into consideration the above analysed sectors, the project will contemplate an experts and steering meeting to decide which sector will be targeted and define the substantive area of action.

B.2. Project strategy and institutional co-ordination

The strategy proposed for implementing this project follows international good practices on developing and applying the technology foresight process and roadmapping. The box bellow summarizes how technology foresight and roadmapping accordingly operates.

The present project will be dedicated to a selected production chain related to one main product, originated in the High Plateau and Central Valleys of the Andes. The project will be the second study at the Technology Foresight initiative for Latin America, using the concept of productive chain and thematic fields as the basic approach. The countries to be directly involved in the present study are Bolivia, Ecuador and Peru. The regional and international dimension will consider the other related countries, such as:

- Extration sites: Bolivia, Chile, Colombia, Ecuador and Peru.
- Production sites: Argentina, Bolivia, Brazil, Chile, Ecuador, Peru and Colombia.
- Reference experience: high land areas in India, China and Nepal.
- Target markets: Mercosur, European Union and ALCA countries.

Technology foresight is a relatively new mechanism for strategic decision-making. Its wide application in certain countries dates back to the beginning of the 1990s. It is also highly regarded as a tool for anticipating future market demand and designing development strategies for corporations.

The nature of Technology policy-making practice in many advanced and some developing countries has changed in recent years with the inclusion of Foresight activities. Previous decision-making models followed a linear path, whereas the addition of Foresight brought more participative processes. The conventional policy-making process places little stress on interaction. This process is mainly conducted by a small group. Therefore the public acceptability is usually low, so as the implementation of outcomes. However, decision-making process with Foresight places high stress on interaction, opinion gathering and information from a wide range of sources and in principle more legitimacy for, "ownership" of, and networks established around the activity.

Meanwhile, technology foresight is being increasingly recognized world-wide as a powerful instrument for establishing common views on future development strategies among policy-making bodies, bridging the present with the future. One of its unique features is the participation of a large number of stakeholders, namely, government, science, industry and civil society. Taking participation and active involvement of stakeholders with a widespread dialogue environment as a base, and placing particular emphasis on the dissemination and networking, the Technology Foresight method has introduced various highly desirable strengths to the policy making processes. Indeed, the contribution of Technology Foresight to policy-making towards more participative processes, represents a more dynamic, systemic and both top-down and bottom-up processes.

The application of technology foresight processes at the national and regional levels have become crucially important for developing countries and countries with economy in transition to narrowing their competitive gap in the global economy.

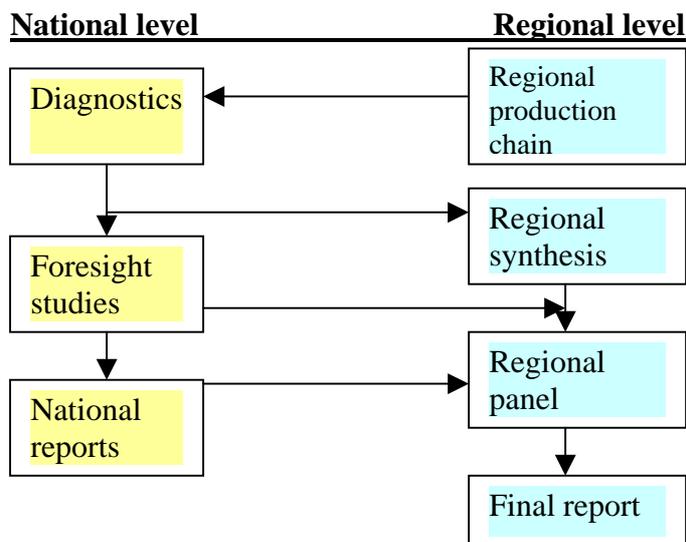
Technology Roadmapping method is widely used at industry level to support and justify technology strategy and planning. The method can be used both at industry and company level as well as at national sector-level. Technology roadmaps can take many forms, but generally comprise multi-layered time-base charts or tables, together with supporting text, that enable technology decisions and developments consistent with market trends and drivers.

In order to mobilize the representative number and types of stakeholders, the implementation of the project materializes in the following activities:

- Regional conference for study scoping and methodology elaboration.
- National and regional diagnostics.
- Progress regional conference.
- Working Panels and consultations at national and regional levels.
- Final Conference on the presentation of results.
- Dissemination of results and recommendations for follow up actions.

To develop, coordinate and implement these actions and prepare the related reports, multiple actors from different positions and disciplines from the three involved Andean countries (Bolivia, Ecuador and Peru) will participate to get visions, values and expectations of the future Andean-located industry. The project facilitates the public debate and collects points of view from research, industry, government and social groups. This approach will establish a knowledge community on trends, visions, social demands and alternatives in manufacturing, product, service and distribution.

The figure below indicates the flow of actions related to the realization of the study at the national and regional levels.



As a tool for initiating integrated future-oriented thinking and to promote the necessary linkage of diverse perspectives, consultations at the national level using *mini-Delphi surveys, interviews and key technologies questionnaire* will be launched. Experts from the three countries will be involved in shaping the set up and scope of the mini-Delphi surveys. The interviews and the questionnaire will cover developments in all relevant aspects of the Andean-located industry from technologies via organisational concerns to socio-economic questions of the supply chain. Traceability and Sustainability issues will be a special focus throughout the whole project.

Emphasising and elaborating the *social demand side perspective* is a core activity of this project. For this purpose, the views of users, consumers and other societal groups concerned with the selected products will be collected by a *scenario building exercise*.

Finally, taking into account the current situation of the selected productive chain, together with the future visions, a *technology road map* exercise will take place. The aim of this stage is to create linkages between medium- and long-term socio-technical visions and needed developments on various levels including that of science and education, technology, business/industry, market and legislation.

An international *research institute experienced in foresight* and policy counselling will conceptualise and monitor the Delphi, interviews and key technologies questionnaire, scenario building and road mapping. National partners from the three involved countries will support the survey in their countries by organising panels where national experts contribute to the statement generation, and further conduct the foresight exercises at the national level.

The *result and recommendations* will be consolidated in a manual and will help the local industries to use the results for individual strategic planning. The reports and scenarios will be fed into the governments and multilateral institutions' work programmes and long-term planning. The UNIDO project on upgrading production and processing technologies and commercialization of vicuna and llama fibers for textile sector will be instrumental for the dissemination of results and recommendations for follow up actions.

Regarding internal coordination, linkages with investment promotion, agro-industries, rural energy and private sector development will be required for the implementation of the recommendations of the present study.

B.3. Expected end-of-project situation

The technology foresight process carried out and the results achieved by the present project are expected to contribute that strategic decisions have been taken regarding the selected industrial production chains and products for increasing competitiveness and access to the international market. Specially, the project should change the situation of the sector by reaching: (1) agreements on regional cooperation for improving productivity and competitiveness of selected Andean products; (2) definition of regional R&D programmes; (3) application of up-graded technologies in selected products and industrial sectors.

B.4. Target beneficiaries

The foresight process will involve the local communities of the Andean High Plateau and Central Valleys of Bolivia, Ecuador and Peru, specially the associations of farmers and producers of Andean products, the research institutions and NGOs dedicated to the economic and social development of the region, industries located in the region or in other regions processing Andean products, and the different councils and agencies responsible for promoting economic and industrial development of the region. The policy-making results and recommendations of the study will be directed to the high level governmental authorities of the various participating countries dealing with regional and industrial development, as well as CEOs and leaders of the industrial and academic sectors. Consumers of the selected Andean products will be the ultimate target beneficiaries of the study.

B.5. Special considerations, viz. MDG and other overarching targets

The project will mainly contribute to MDG 1: Eradicate extreme poverty and hunger. The study will consider environmental issues, as the Andean region is affected by degradation of conditions of living and arable land. Gender issues will be considered, as women play an important role in the production sector in the region.

B.6. Reasons for assistance from UNIDO

UNIDO has been developing and applying Technology Foresight as a tool for strategic decision-making and policies formulation. According to the organization's approach, foresight can be applied at macro and micro level, for setting research priorities, create a shared vision of the future and identify firm's technological needs for innovation and improved competitiveness. The UNIDO initiative supports foresight exercises at the regional (pan-national) level and focusing on the specific productive-chains.

The main objectives of the initiative is to facilitate decision makers to identify priority areas in selected industrial sectors of competitive advantage to enable products to better access the regional and the global market; and to build capacity at institution and enterprise level to identify risks and opportunities on how to improve value chain competitiveness through the application and use of technology foresight analysis and methodologies.

The initiative exposes decision makers, experts and private companies' managers to methodologies, information and know-how through educational seminars, workshops and training courses. Senior experienced guidance is provided through international consultants and institutions. As final result of this initiative is to have finalized regional (pan-national) and national studies for which consistent Technology Foresight methodologies will be applied.

The present study will be based on UNIDO unique approach and methodologies for the regional level and dedicated to selected productive chains.

B.7. Counterpart support capacity

The Government of Bolivia, Ecuador and Peru are expected to provide the project with high level political support, designated counterpart of UNIDO for this project at the institution level, human resources for implementing the exercises at the national level, facilities for the meetings planned within the framework of the project and some in-kind contributions to meet the costs of secretarial support, communication facility and logistic support (transportation, copying publishing, translation, etc.) for the activities to be implemented within the frame of the project.

PART C. OBJECTIVES, OUTPUTS AND ACTIVITIES

C.1 DEVELOPMENT OBJECTIVE:

To assist the participating communities in making decisions on future directions of the production of local products that might contribute to increased economic and social wealth in the region. The reference framework will be the governmental policies and strategies for sustainable development of the high plateau and valleys of the Andean region.

C.2 IMMEDIATE OBJECTIVE AND OUTCOME OF PROJECT:

The **immediate objective** of the study is to assist decision makers in identifying strategic technology areas for selected products and industrial sectors to raise their competitive advantage and to enable the national products to better access the regional and the global markets.

Additional objectives are:

- Build capacity at institution and company levels to identify risks and opportunities on how to improve value-chain competitiveness through the application and use of technology foresight analysis and methodologies;
- Establish a knowledge-based network related to national TF initiatives, programmes, activities and methodologies to make available a regional reference source of information, expertise and comparative studies;
- Strengthen interaction, communication and cooperation between all relevant stakeholders of the innovation systems at the regional level.

The **principal outcome** of the project will be (a) a common vision of the possible future development of the region through the improvement of the participation of local products in its economy, and (b) a technology road-mapping indicating how to strengthen the related productive chains.

C.3 OUTPUT and ACTIVITIES:

The main output will be a foresight study for a selected Andean product and the related productive chain.

C.3.1 Activity 1: Networking and electronic portal

The practical experience of carrying out technology foresight studies indicates that communication means and logistics among the numerous stakeholders and the other actors such as experts, promoters etc. can become very cumbersome and costly if traditional means are used (travel, post, telephone, meetings etc). To facilitate the consultations and availability

of reference and working material, the project will use modern information and communications technologies. The platform for all information flows and files to facilitate the exchange of knowledge among the participants, will be an electronic portal placed at the internet, containing the following information:

- Information on the methodologies for the preparation of foresight exercises
- Information on the results and best practices of foresight studies
- General data on selected industrial sectors and productive chains
- Global trends in selected technology fields
- Events
- Links

The development of this portal will follow the UNIDO experience gained with the foresight study for the fishery industry in the Pacific coast of South-America. This portal will be developed in phases, incorporating information according to the interest of the participants, establishing a live forum for debate, cooperation and exchange of experience. The technical management of the portal and the updating of its contents will be done by an international expert on regional development (Job description 1). At the end of the project, the portal will be instrumental for dissemination of results and recommendations for follow up actions.

C.3.2 Activity 2: Regional Conferences

These conferences are of a double nature: political and operational. From the political point of view, it is necessary to adopt decisions about the common issues and sub-sectors to be dealt with among the participating countries, monitor the development of the study, host the regional panel and prepare recommendations and follow up actions. From the operational point of view, the methodological aspects and system of operation of the panels or working groups and the planning of their activities shall be agreed upon and later reported. This double facet requires the representation of each country in the Conferences to have the corresponding dual capacity: political (having the capacity to make decisions) and technical (in a position to discuss the methodological, operative and substantive aspects).

The study will contemplate three regional conferences: the first one will launch the project and select the product and related productive chain to be dedicated in the foresight study, and host a methodology workshop; the second one will discuss the mid-term progress of the study and host the regional panel; the third one will discuss the results of the study and prepare recommendations and follow up actions. Each participant country is expected to host one of the conferences.

The first conference should provide the following agenda:

- Project presentation;
- Definition of the selected productive chain;
- Definition of common issues and sub-sectors;
- Definition of the national counterparts;
- Presentation and discussion of the methodology to be employed;
- Presentation of available international assessments;
- Definition of the coordinating and supervising mechanisms.

The second conference should provide the following agenda:

- Project progress presentation;
- Presentation of national diagnosis;
- Advances on results;
- Evaluation of performance on participant members and improvements indication;

- Regional diagnostics by the regional panel.

The third conference should provide the following agenda:

- Project final presentation;
- Presentation on results;
- Conclusions and recommendations;
- Follow up actions and agreements at the regional level.

C.3.3 **Activity 3: Foresight study**

The working implementation procedure will involve the creation of national and regional panels of experts, in which the interested countries will be represented, along with the international advisers who can contribute experience in selected product and related productive chain. The panels will be instrumental for the consultation exercise and the preparation of the scenarios.

By the way of orientation, the working scheme of the study shall follow:

- Work scope, questions to be dealt with, working plan, methodology, results to be achieved, sources of information.
- Compilation and analysis of information.
- Identification of guiding forces. Countries that are doing national studies on the subject. Mega-trends of technological evolution.
- Analysis of the position of each country making up the panel. Position in relation to the guiding forces and mega-trends identified.
- Common visions at the regional level.
- Regional perspective.
- Relationship with the educational system, R&D institutions, industrial capacity, legal and regulatory framework, financing, etc.

Activities summary:

<i>Activity</i>	<i>Responsibility</i>	<i>Estimated completion date</i>
1. Networking and electronic portal	UNIDO, Experts	1-3 months
2. Regional Conferences	UNIDO, Experts, host counterparts	3 month; 12 month; 23 month
3. Foresight study	UNIDO, Experts, Contractors	3 - 24 month

Note: Project summary matrix is attached at Part C.

Project summary matrix

OBJECTIVE OF THE UNIDO PROJECT

The immediate objective of the study is to assist decision makers in identifying strategic technology areas for selected products and industrial sectors to raise their competitive advantage and to enable the national products to better access the regional and the global markets.

OUTCOME INDICATOR

The principal outcome of the project will be (a) a common vision of the possible future development of the region through the improvement of the participation of local products in its economy, and (b) a technology road-mapping indicating how to strengthen the related productive chains.

		<i>Implementing service module</i>	<i>Budget line</i>	<i>Output indicator</i>
Output	The main output will be a foresight study for a selected Andean product and the related productive chain.			
Activity 1	Networking and electronic portal	SM3	11-51 13-00 17-01 51-00	<i>Operational web portal</i>
Activity 2	Regional Conferences	SM3	11-52 13-00 17-02/04 35-00 51-00	<i>Conference proceedings</i>
Activity 3	Foresight study	SM3	11-53 13-00 17-02/04 21-00 51-00	<i>Study reports</i>

PART D. INPUTS

D.1. Counterpart inputs

The project will receive in-kind support from the participant countries as a cost-sharing basis. The participant countries will contribute to the implementation of the project and incorporating the recommendations at the policy making level through nominated host counterpart and national coordinator. Their profiles and functions are indicated below.

a. 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.

b. National coordinators

Profile

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

Functions

- Preparation of the national sectors' diagnostics;
- Supervision of the national foresight studies;
- Nomination of the national members of the Regional panel;
- Participation in the Regional panel;
- Collaboration in the preparation and implementation of the regional conferences.

D.2. UNIDO inputs

1. International staff

- 1.1. International expert on the selected product and related productive chain (to be defined) – 3 w/m (home base and consultations and training services via internet)
- 1.2. International expert on regional development – 2 w/m (home base and consultations and training services via internet)

2. National staff

- 2.1. National experts (three) on the selected product and related productive chain (to be defined) – 2 w/m (each)
- 2.2. National experts (three) on technology foresight – 3 w/m (each)

3. Sub-contracts

- 3.1. International technology foresight institution – responsible for development of the methodology of the study and monitoring its application
- 3.2. Regional Technology foresight institution – responsible for coordinating the activities related to the development of the foresight study in the three countries

4. Conferences

Three two-day regional conferences (see description in item C.3.2.)

PART E. RISKS

The main risk to the timely and efficient implementation of the project is related to the correct identification of the host authority in each country, which should be committed both to the preparation of the study and its application in the strategic decision making process related to the development of the selected productive chain. This risk can be mitigated through the mobilization of the countries permanent representatives to the UNIDO to assist in the identification and mobilization of the most appropriate host counterpart.

PART F. PRIOR OBLIGATIONS AND PREREQUISITES

No prior obligations and prerequisites are recorded.

PART G. MONITORING AND EVALUATION

The project will be subject to annual reviews by UNIDO and the donor(s). The progress of the project will be reviewed in three regional conferences.

PART H. LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFYABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
PROJECT GOAL: To assist the participating communities in making decisions on future directions of the production of local products that might contribute to increased economic and social wealth in the region.	Increased contribution of the selected local industries to the regional economy, specially increased national and international investment in these industries.	Economic indicators from national bureaux of statistics and financial institutions reports	1) Wider recognition exists of the potential of the Andean products as economic resources for enhancing the Andean communities wealth. 2) Agreements towards the future between the public and private sectors can be established.
PROJECT PURPOSE: To assist decision makers in identifying strategic technology areas for selected products and industrial sectors to raise their competitive advantage and to enable the national products to better access the regional and the global markets.	The principal outcome of the project will be (a) a regional common vision of the possible future development of the region through the improvement of the participation of Andean products in its economy, and (b) a technology road-mapping indicating how to strengthen the related productive chains.	1) Number of institutions and companies applying technology foresight as instrument for strategic decision making (at the end of the study). 2) Policy recommendations for technology upgrading of Andean products and industrial sectors (immediate follow up of the study). 3) Increase of production capacity, productivity and exports for the target productive chain (medium-term achievement).	1) Andean products remains a viable livelihood option for communities in the region. 2) Positive government response to policy dialogue. 3) International market acceptance for Andean products continues to grow, improvements in new products are apparent to the national and international consumers.
OUTPUTS: The main output will be a foresight study for a selected Andean product and the related productive chain.	1) Agreements on regional cooperation for improving productivity and competitiveness of selected Andean products. 2) Definition of regional R&D programmes. 3) Application of up-graded technologies in selected products and industrial sectors	1) Public and private expenditures on R&D. 2) Number of higher quality products and/or increase of production levels. 3) Number of employees in R&D and production lines.	1) Long-term commitment of producers to adopt new technologies and skills exists. 2) Economic feasibility of the selected products. 3) R&D capabilities exist or can be mobilized.
INPUTS: 1) Networking and electronic portal 2) Regional Conferences 3) Foresight study	1) Operational web portal 2) Conference proceedings 3) Study reports	1) Project Progress Reports 2) Final study report	1) Financing from all sources is made on a timely basis in line with the study implementation framework. 2) Project manager and the national management units and collaborating institutions co-ordinate and execute the project efficiently and effectively. 3) Governments, academia and private sector take up suggestions from the policy dialogue.