

ATTACHMENT TO BEAM APPLICATION

Expected impacts in the developing country

1. What will be the main expected impacts of the innovation in developing countries (some examples are shown in brackets)?

- X Economic impacts (e.g. *new jobs, incomes, income equality, poverty reduction, new enterprises, participation in value chains, financial services, external finance*)
- Impacts on working conditions (e.g. *occupational health, work welfare, working hours, work-related social benefits, work safety*)
- Impacts on governance, participation and security (e.g. *anti-corruption, transparency of institutions, rule of law, societal participation, women's inclusion, violence, crime, non-discrimination*)
- Impacts on access to services and welfare (e.g. *social and health services, diseases and health risks, disasters, education and learning, access to information, infrastructure, transportation, housing*)
- X Impacts on capacity development (e.g. *new knowledge, skills, use and transfer of technology, innovation knowhow, environmental awareness*)
- X Environmental impacts (e.g. *water, sanitation, air, soil, food, ecosystems, biodiversity, desertification, waste, energy, energy/material efficiency, climate sustainability*)

2. Please specify further how you will achieve the above listed impacts both in the short and long term? (fill in only the boxes that you have ticked in question 2):

Economic aspects (e.g. *new jobs, incomes, income equality, poverty reduction, new enterprises, participation in value chains, financial services, external finance*)

The selected food crops in the research (quinoa, lupine, oat) are mostly produced in the rural mountaneous regions of Peru and other the Andean countries, where poverty still remains a biggest challenge for development. The recent global market demand has driven the growth and value of these harvests, but also created unstability in local value chains. Value addition in the early part of the chain is still minimal and large proportion of the harvest and secondary produce is discarded because of low quality or lack of access to proper processing capacity.

The novel post-harvest processes developed in the project can be applied in valorization of these crops and their low-value side streams in Peru. The expected long-term economic impacts are increased incomes of smallholder producers through local value addition of these crops. Further to the value chain, the novel high-value ingredients extracted by processing can be utilized by SME's in agri-food sector creating new jobs and economic growth.

Governance, participation and security (e.g. *anti-corruption, transparency of institutions, rule of law, societal participation, women's inclusion, violence, crime, non-discrimination*)

Access to services and welfare (e.g. *social and health services, diseases and health risks, disasters, education and learning, access to information, infrastructure, transportation, housing*)

Working conditions (e.g. *occupational health, work welfare, working hours, work-related social benefits, work safety*)

Environmental impacts (e.g. **water**, *sanitation, air, soil, food, ecosystems, biodiversity, desertification, waste, energy, energy/material efficiency, climate sustainability*)

The ecological imprint of Andean crop production hinders their large-scale development, and potentially results in the moving of production to other countries. Analysis of the environmental risks and development of cleantech solutions to mitigate them is a prerequisite for successful industrial utilization of the crops in their production areas.

Removal, capture and extraction of unwanted side streams in lupine (alkaloids) and quinoa (saponines) using the modern clean technology reduces the environmental pressure caused by release of these substance in the environment. Circular wastewater treatment system also enables reduction of the total water consumption that is especially important in mountaneous areas suffering from low access to water supply. The long-term environmental impacts are assured when these waste streams can be converted in commercially valuable ingredients.

Robust post-harvest drying systems based on electricity from solar energy are developed to improve the access and quality of crop processing in remote rural areas. Utilization of renewable energy sources has impact in climate sustainability that is especially important in climate vulnerable mountaneous regions in Peru.

Capacity development (e.g. **new knowledge, skills, use and transfer of technology, innovation knowhow, environmental awareness**)

The research is conducted in collaboration with National Agrarian University of La Molina. In the short-term the project will improve the capacity of research and teaching personnel through access to new knowledge created in the project.

The project activities to innovate new product concepts from novel ingredients are performed parallelly in Finland and Peru, which utilizes the results of earlier capacity building efforts of HEI-ICI project 2013-2015. The application of parallel development directly improves the innovation know-how in La Molina.

The project develops sustainable processing technologies applicable to the conditions in Andean region. After the research project it is anticipated that these technologies are piloted locally in Peru, together with La Molina University and their network of local SME companies and producers. This piloting would require practical level capacity improvements in transfer of technology.

Anything else

3. Do you expect any negative impacts on the above-mentioned issues in the short and long term and on whom?

The role and ownerships of possible immaterial rights need to be assessed already during the project to avoid any negative impacts after the project.

The southern partners in the project should monitor any major changes or developments in the production of food crops in the focus of the project, to avoid any negative impacts in the long-term applicability of the results produced.

4. What impact will the project have on longer-term cooperation and partnerships between Finland and developing countries (e.g. *between/among public and private sectors, civil society, research and educational institutions*)?

The proposed project provides excellent means to offer continuity in development cooperation between Finnish research partners and La Molina University. The recent HEI-ICI project coordinated by University of Turku, and previous ICI project by Luke have both made extensive improvements in research capacity of the La Molina University. It has already been jointly agreed that further collaboration should be aimed at practical research activities utilizing this potential.

The project creates new linkages to the Finnish private sector in the cooperation that has so far been active between research institutions only. In Peru La Molina University has made efforts to increase the local cooperation with local food industry sector, in reference to recently formed Center of Expertise in Andean Native Food Crops in La Molina University. This enables an excellent opportunity to expand the partnerships in private sector in both countries and increase the awareness of business opportunities in Latin America and in Europe.

5. What is the potential scalability of the innovation in a developing country (e.g. number of users, utilizers or beneficiaries)?

The project brings together the value-chains around quinoa, lupine and oat, and strengthens their relative competitiveness by a) reducing ecological impact, b) creating new ingredients, and c) developing novel concepts for utilization of nutritious and safe Andean crops.

These crops are mostly produced by smallholder agricultural farms in rural regions of Peru and neighbouring Andean countries. It is expected that the processing innovations regarding extraction of high-value ingredients are utilized by 3-5 SME food companies currently producing consumer food products or exported premium raw materials. This can be supported by research of acceptable consumer food products utilizing these materials.

The robust, more low-cost technology (such as drying) are expected to have wide scaling potential among the farmers or farming cooperations in the rural areas. The number of users is still hard to predict, but sustainable impacts should be reached with 100-200 beneficiaries (farms utilizing the solutions).

One of the aims in the concept development part is to research feasibility of processed raw materials in consumer food applications. Successful development into commercial products brings more options to select nutritious and health-promoting foods in local diet.