



Term of Reference

Service Provision: Research and development of cocoa-based biodegradable materials

Project: CIRCULAR ECONOMY COCOA: “FROM BEAN TO BAR”

Helvetas is an independent organization for development based in Switzerland with affiliated organizations in Germany and the United States. Helvetas has been active in Vietnam since 1994, working in various areas typically Agriculture, Bio-conservation, Forestry, Eco-Tourism, and Rural Economy.

1. BACKGROUND/CONTEXT

Under the SWITCH-Asia programme of the European Union, we are implementing the **Project “Circular Economy Cocoa: From Bean to Bar”** with the main objective to develop circular economy solutions in cocoa and other agri-food sectors, leading to equitable economic growth decoupled from harmful environmental impacts. The Project, will be implemented within 04 years from 2022 to 2026 in 06-07 cacao provinces in Central Highlands and Mekong Delta of Vietnam.

Research and development in bio-packaging within the cocoa sector stands as a pivotal pursuit in fostering a circular economy approach. As the demand for cocoa products continues to surge globally, the need for sustainable packaging becomes increasingly imperative. Bio-packaging presents a promising solution by leveraging biodegradable materials, minimizing waste, and reducing the environmental footprint of packaging in the cocoa industry. By investing in R&D for bio-packaging, stakeholders can revolutionize the sector's sustainability, addressing concerns related to plastic pollution and promoting a closed-loop system. These efforts not only align with consumer preferences for eco-friendly products but also contribute significantly to preserving ecosystems and ensuring the longevity of the cocoa industry by creating a harmonious balance between economic growth and environmental responsibility.

In partnership with key cocoa producers and chocolate makers in Vietnam, HELVETAS Vietnam is seeking experienced and qualified service providers to conduct feasibility research and pilot production of cocoa-based biodegradable packaging materials in Vietnam. The overall objective is to enhance the efficiency and sustainability of the cocoa supply chain as well as to promote the circular economy approach within the agri-food production sector in the country.

2. OBJECTIVES

The specific objectives of this service package are:

- (i) Research and development to identify the technical feasibility of producing cocoa-based bio-degradable materials as a circular economy solution for cocoa or packaging SMEs in Vietnam.
- (ii) Prototyping, performance testing and identifying the cost structure of these materials to explore its economic potential in the domestic market.

3. SCOPE OF WORK

This R&D service package should cover the following tasks:

- i. Research and Material Processing:
 - Understanding Cocoa Waste: Study the composition of cocoa waste to identify usable materials.
 - Material Collection: Collect cocoa husks, cocoa bean shells, or other byproducts from local cocoa processing facilities or farms. This will be supported and provided by Helvetas's company partners.
 - Extraction and Preparation: Extract usable components from the collected cocoa waste, such as cellulose, lignin, or other organic compounds.
 - Treatment and Modification: Process these components to make them suitable for bio-plastic production or as a base for biodegradable materials.
- ii. Bio-plastic/Biodegradable Material Development:
 - Formulation: Experiment with different ratios and combinations of extracted materials to create a suitable bio-plastic or biodegradable compound.
 - Testing: Evaluate the mechanical properties, biodegradability, and other relevant characteristics of the developed materials.
- iii. Prototyping and Performance Testing:
 - Prototype Development: Create small-scale prototypes of packaging materials using the formulated bio-plastic or biodegradable compounds.
 - Strength and Durability Tests: Assess the strength, durability, and flexibility of the produced packaging materials.
 - Biodegradability Testing: Conduct tests to verify the biodegradability of the materials in various environments (composting conditions, soil, etc.).
- iv. Manufacturing and Commercialization (optional in the future)
 - Manufacturing Process: Scale up the production process for these materials, considering cost-effectiveness and efficiency.
 - Feedback Collection: Gather feedback from consumers, businesses, and stakeholders to improve the packaging material.

4. REQUIRED QUALIFICATIONS

The Service Provider is recommended to be a company, laboratory, or a consortium composed of two legally registered entities in Vietnam. They should meet the following minimum qualifications:

- Having a demonstrated R&D capacity on bio-degradable packaging materials.
- Having adequate production capacity to create prototypes/samples of bio-materials.
- Proven track record in implementing similar projects on other agri-based waste products.
- Highly committed to innovation and sustainability.

The Service Provider will appoint a Team Leader who will be fully responsible for implementing and documenting the project. This personnel should have the following qualifications:

- Being a specialist with significant professional experience in research and development of bio-degradable materials.
- Having a solid background in bio-degradable materials, ideally with a postgraduate degree (Master's or PhD) in a relevant field such as material science, chemical engineering, or environmental science.
- Comprehensive knowledge and hands-on experience in bio-degradable materials, polymer chemistry, material engineering, or related fields.
- Proficiency in understanding the properties, development, and application of sustainable packaging materials is essential.
- Understanding cacao production and processing technologies, sustainable development, and the agricultural sector in Vietnam (would be an advantage).
- Strong communication skills and professional working efficiency in English.

5. DELIVERABLES

- **Project Report:** A comprehensive report in English with supporting documents and databases following a structure that is agreed upfront between the Service Provider and the Project Manager. This report should comprise the following issues:
 - + Research Report: A comprehensive report detailing the findings of R&D efforts, including the properties, feasibility, and viability of various bio-degradable materials for packaging.
 - + Testing and Analysis Documentation: Reports on rigorous testing conducted on the developed materials, including stress tests, degradation studies, environmental impact assessments, and compliance with industry standards and regulations.
 - + Production Process Guidelines: Detailed documentation outlining the production processes for these bio-materials, including manufacturing methodologies, quality control measures, and scalability assessments.
 - + Feasibility and Cost Analysis: Reports evaluating the feasibility of large-scale production, including cost projections, supply chain considerations, and potential market positioning.
 - + Sustainability Impact Assessment: An analysis of the environmental impact of the developed materials compared to traditional packaging, highlighting the sustainability benefits.
 - + Recommendations and Roadmap: Strategic recommendations and a roadmap for further development, refinement, and potential commercialization of the bio-degradable packaging materials.
 - + Presentation Materials: Compelling presentations summarizing key findings, achievements, and the value proposition of the developed bio-materials for internal and external stakeholders, including potential investors or partners.
 - + Intellectual Property (IP) Documentation: IP documentation such as patents, trademarks, or copyrights, safeguarding any novel innovations or discoveries made during the project.
- **Prototypes and Samples:** Actual prototypes and samples of bio-materials developed during the project, showcasing their physical characteristics, durability, and potential applications.

These will be delivered to Helvetas's company partners who have supported to provide raw materials for this R&D project.

6. SUGGEST TIMELINE

Activities	Tentative timeline
Submission of proposals	By February 15 th , 2024
Short-list and contract negotiation	By February 29 th , 2024
Contract implementation	From March to July 2024

7. TECHNICAL & FINANCIAL PROPOSALS

Interesting candidates should send their Technical & Financial Proposals to the Helvetas Vietnam – Circular Economy Cocoa Project at the following emails: helvetas.vietnam@helvetas.org and tuan.nguyen@helvetas.org.

- The Technical Proposal should outline the project approach and methodology, team composition and expertise, research and development plan, testing and quality assurance, and estimated timeline for the project.
- The Financial Proposal should indicate the cost breakdown, budget justification, payment schedule, and additional cost considerations of the project.

Deadline of submission: **February 15th, 2024.**