The cocoa sector in Trinidad and Tobago and the Caribbean has been declining due to the following factors:

- Ageing farms and farmers, low farm productivity, high production costs, and labour shortages, resulting in unviable business models;
- A convoluted and long value chain, resulting in farmers receiving disproportionately small proportions of the value chain (5%);
- A lack of a technology transfer system to transfer information and new technologies from laboratory-to-farm-to-table.

The IFCIC project was built on the approach of a triple helix model (university-public-private partnership), to develop and showcase smallholder innovations along the value chain, as well as provide training and technology services, support policy development, and attract public and private sector investment to support industry development on the establishment of a sustained cocoa industry.

This approach helped the project to serve as a technology transfer interface. The IFCIC also used more nuanced approaches to cocoa orchard management and smallholder mechanisation enabled by research and development, resulting in higher yields and quality, as well as increased profitability.
Project results

Improved knowledge of scientists, researchers, farmers, government on a sustained cocoa industry through the technology transfer on the production of cocoa and manufacture of chocolate.

1. "6-acre model cocoa orchard" operational and providing hands on training.

To help farmers add value, farmers now have access to information and technology services (DNA fingerprinting, quality certification, traceability, and branding), basic and advanced chocolate making training (>250 trainees), and technology and business incubation.

2. Short courses (theory and practical):
   - 13 Agronomy courses
   - 36 Chocolate making courses
   - 6 Sensory analysis courses
   - 6 Post-harvest courses
   - 4 Molecular marker technology courses

People trained:
- 239 Chocolate making trainees
- 287 Agronomy technicians
- 78 Sensory laboratory technicians
- 120 Post-harvest technicians
- 36 Molecular laboratory technicians and supervisors
- 56 Farmers
- 116 Cocoa value add producers
- 68 Start-up technologists


Chocolate-making equipment was purchased to supply intermediate raw materials to chocolatiers, resulting in 59 new start-ups and micro, small, and medium-sized businesses, as well as a business cluster focused on the cocoa farming sector.

4. The establishment of an International Fine Cocoa Innovation Centre (IFCIC).

IFCIC's factory outlet sells its own branded chocolates as well as other value-added products, like chocolates from start-ups.

World Cocoa and Chocolate Day Expos were enterprises got 1st hand access to public and regional markets.

Online courses:
- Rehabilitation of cocoa fields
- Risk analysis and mitigation

The establishment of an International Fine Cocoa Innovation Centre (IFCIC).
Project results (2)

Stakeholders Involved:

- **800** Farmers/cocoa producers.
- **10** Private investors in the local and regional cocoa sector, government controlled/managed cocoa farms.
- **70** Start-ups and MSMEs involved in cocoa-based value-added products.
- **260** Chocolatiers, chocolate-based cuisine chefs.
- **10** Processors with fermentation and drying facilities.
- **12** Public sector organisations: local and international cocoa industry boards, government ministries, special purpose public sector boards, bureau of standards, financial entities, export import agencies, cocoa industry networks - CocoaNext and Caribbean Fine Cocoa Forum, Cocoa Research Centre Chocolate Guild, Partners in Conservation.
- **9** Incubators involved in project implementation:
  - 2 technology incubators
  - 6 business incubators
  - 1 cuisine incubators

9 databases: Agro-ecological zones, Risk and constraints, Base survey of cocoa industry in Trinidad Tobago 2017, Cadmium contamination of soils and beans.

Soil fertility of cocoa soils, Flavour map of Trinidad and Tobago, DNA fingerprint, NIRS spectral fingerprint, Cost of production.

1 digital traceability platform.

8 videos: Cocoa Research Centre and IFCIC, Post-harvest processing, Beanto- bar production, Quality Control and certification, DNA fingerprinting, Cocoa pollination, Climate change and cocoa yields, Genebank.
Project results (3)

7 bulletins: IFCIC; Cadmium contamination and mitigation; Disease identification and management; Cocoa propagation, pruning and shade management; Quality management; Value addition; Post-harvest processing.

9 guidelines: Geographical indication based branding, Traceability of cocoa, SOP for quality laboratories, Quality certification of cocoa, SOP for DNA fingerprinting, Fidelity testing, Determination of ancestry of cocoa clones; Determining an effective population size for conservation; Determination of cadmium in cocoa beans and leaves.

3 protocols: DNA isolation for DNA fingerprinting, DNA fingerprinting using FLUIDIGM, NIRS analysis of cocoa samples.

2 manuals: Quality certification, Branding: 15 brand stories for farms.

6 policy briefs: Labour policy brief, Cocoa.

Industry Research and development needs.

National cocoa strategic plan and action plan, international cocoa flavour and quality standards, National and regional standards for cocoa quality, National and regional standards for cocoa products.

Impact

The IFCIC project has generated a successful transfer of science and technology on the production and development of DNA fingerprinting for the different cocoa varieties that has generated a change on the process and production of cocoa and manufacture of chocolate in Trinidad and Tobago as well as in Jamaica through its trainings and capacity building opportunities. The project has generated a new interest in the Cocoa sector across farmers, producers, chocolatiers, universities, government as well as private and public investors, due to the manufacture and commercialisation of intermediary products for MSMEs. IFCIC was proposed as one of five innovation centres improving the country's economic diversification, in the task of rehabilitating the cocoa industry.
On the b2b contacts the IFCI has facilitated 40 stakeholders across the cocoa value chain with 7 international bean buyers as part of the World Cocoa and Chocolate Day (2019).

$24,200.00 revenue on the Certification and traceability 157 local business and 91 international business, and 5 traceability certifications.

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$90,777.00 revenues on:
- Chocolate making training 57 participants on Basic and 12 on Advanced courses;
- Incubating technology with 11 participants to the bean-to-bar chocolate makers;
- Providing business incubation to 72 stakeholders across the cocoa value chain.

$656,829.00 revenue from Global ADN fingerprinting services such as cacao accession, ancestry determination and fidelity studies, extended from two international companies to:
- 7 international companies;
- 3 regional institutions (2 from Haiti and 1 Dominican Republic);
- 4 international research organisations from Costa Rica, Honduras, Bolivia, UK and Peru;
- 7 company farms (Nicaragua, Guatemala< St Vincent, Thailand, Taiwan, Grenada);
- 3 government ministries Dominica, Trinidad & Tobago, and Honduras;
- 3 local farmers.

$19,747.00 revenues on branding assistance to:
- 7 tree-to-bar;
- 7 bean-to-bar chocolate makers;
- 1 geographical indication branding.

$80,000.00 funding from Global Challenges Research Fund (GCRF) of the UK Research and Innovation (UKRI) fund for the project “Changing cocoa beans for better chocolate” lead by the University of Nottingham.

$150,000.00 funding from Compete Caribbean for Capacity Building and Applied Research in Cluster Development Best Practices in Dominica, Belize and St Lucia.

$418,000.00 funding from Cargill Foundation promoting Cocoa & Chocolate innovative solutions.

The sustained impact of IFCIC has been massive in the role of knowledge transfer and incubator promoting the cocoa industry, and institutionally reinforcing. IFCIC has continue delivering services:

1 b2b focus group session with 60 farmers, value add processors, and government support agencies (2020).

On the technology transfer activities IFCI has provide training sensory analysis and quality management to 10 organisations across the LAC region.

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IFCIC have received funding for over € 5.8 million on 15 spin-off projects to support the cocoa industry.

$950,000.00 funding from the European Cocoa Association (ECA), the Chocolate, Biscuits and Confectionery of Europe (CAOBISCO), and the Federation of Cocoa Commerce (FCC) join research Fund for the project “Mitigation of Cadmium (CD) Bioaccumulation in Theobroma Cacao L.”

$350,000.00 from MOCCA (USDA-FAS) funding for project "Improving cadmium mitigation in LAC and conservation" on Honduras, EL Salvador, Nicaragua and Guatemala (completed).

$67,000.00 from AVSF funding project delivering: DNA fingerprinting of genetic resources, cadmium mapping and mitigation, fertility mapping and nuanced approach to fertility management, postharvest quality management, certification and traceability (on-going).

$751,893.00 funding from IDB-LAB (AIDB) for project “Improving Marketing and Production of Artisanal Cocoa from Trinidad and Tobago (IMPACTT)”, linking small scale growers with high value markets required for sustainability and growth of the cocoa sector in Trinidad and Tobago, equipping growers with quality certification, chain of custody and branding.

$120,000.00 funding from the Trinidad and Tobago Research and Development Impact Fund (RDIFUND) for the project “Product, process and market innovations to support sustainable cocoa sector development for economic diversification.”

$1,100,000.00 funding from Mondelez for three projects on the cocoa industry.

$125,000.00 subcontracting from Inter-American Institute for Cooperation on Agriculture (IICA) providing technical methodologies for cadmium mitigation.

$60,000.00 funding from Mars-Wrigley supporting Cocoa for Generations strategy.

$125,000.00 funding from Lindt & Sprügili promoting Lindt Home of Chocolate project.

$751,893.00 from AVSF funding project delivering: DNA fingerprinting of genetic resources, cadmium mapping and mitigation, fertility mapping and nuanced approach to fertility management, postharvest quality management, certification and traceability (on-going).
Key lessons learned and best practices

Importance of knowledge transfer and generating innovation in the implementation.

The leverage of combining knowledge transfer and commercial approach.

Importance to collaborative partners and gather key stakeholders’ support.

Develop a strong public-private partnership.

Capitalisation of lessons learned from IFCIC.

“\textit{I think we would all agree that the Caribbean region holds great potential to be a major player in the international fine cocoa and chocolate trade and the work of the International Fine Cocoa Innovation Centre (IFCIC) is bringing us closer to that reality.}”

His Excellency Peter Cavendish
The EU Ambassador to Trinidad and Tobago