IMPLEMENTATION ROADMAP WITH FINANCING PLAN FOR THE BLOCKCHAIN-BASED PARAMETRIC CROP INSURANCE IN THAILAND

Output 6.1

Contract No. UNEP/2024/288 (Umoja No. 4700028629)

Research Division I

Blockchain & Climate Institute

August 2025

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This roadmap outlines the implementation and scale-up strategy for a blockchain-based parametric crop insurance (BBPCI) product aimed at enhancing climate resilience among smallholder farmers in Thailand. The project will deploy a blockchain-enabled insurance platform that automates payouts based on real-time climate data, reducing basis risk by 20-25% and improving trust, speed, and accessibility.

Over a 24-month period (January 2026 - December 2027), the project is structured around two strategic phases with a total budget of USD 750,000:

- Phase 1: Refinement of use-cases and proof-of-concept (PoC) (Months 1-13) - This initial phase focuses on validating the technical and commercial viability. Key activities include securing an insurance partner, obtaining regulatory sandbox approval, developing and testing the platform with a limited pilot group of 200-300 farmers, and compiling a validation report to inform the potential scale-up. A concept note was developed for this phase 1.
- Phase 2: Full-scale implementation and handover (Months 14-24) - Contingent on a successful PoC, this phase focuses on a larger implementation at national level. It involves scaling the platform, mobilizing significant co-funding from insurers, launching mass onboarding campaigns to enrol over 20,000 farmers, and formalizing the integration of the model into Thailand's National Crop Insurance Scheme.

The initiative emphasizes gender-responsive training, cooperative-led outreach, and a clear transition from donor funding to a sustainable, co-financed model, laying the foundation for long-term scalability and financial independence.

แผนงานนี้สรุปกลยุทธ์การดำเนินการและขยายขนาดสำหรับผลิตภัณฑ์ประกันภัยพืชผลพาราเมตริก (BBPCI) ที่ใช้บล็อกเชน
ซึ่งมีเป้าหมายเพื่อเพิ่มความยืดหยุ่นด้านสภาพภูมิอากาศในหมู่เกษตรกรรายย่อยในประเทศไทย
โครงการนี้จะปรับใช้แพลตฟอร์มประกันภัยที่เปิดใช้งานบล็อกเชน
ซึ่งจะทำให้การจ่ายเงินเป็นไปโดยอัตโนมัติตามข้อมูลสภาพภูมิอากาศแบบเรียลไทม์ ลดความเสี่ยงพื้นฐานลง 20-25%
และปรับปรุงความไว้วางใจ ความเร็ว และการเข้าถึง

ตลอดระยะเวลา 24 เดือน (มกราคม 2569 - ธันวาคม 2570) โครงการนี้มีโครงสร้างเป็น 2 ระยะเชิงกลยุทธ์ โดยมีงบประมาณรวม 750,000 เหรียญสหรัฐ

- ระยะที่ 1: การปรับปรุงกรณีการใช้งานและการพิสูจน์แนวคิด (เดือนที่ 1-13) -
  ระยะเริ่มแรกนี้มุ่งเน้นไปที่การตรวจสอบความถูกต้องทางเทคนิคและเชิงพาณิชย์ กิจกรรมสำคัญ ได้แก่
  การรักษาความปลอดภัยให้กับพันธมิตรประกันภัย การได้รับการอนุมัติแซนด์บ็อกซ์ตามกฎระเบียบ
  การพัฒนาและทดสอบแพลตฟอร์มกับกลุ่มนำร่องที่จำกัดซึ่งมีเกษตรกร 200-300 ราย
  และการรวบรวมรายงานการตรวจสอบเพื่อแจ้งการตัดสินใจ go/no-go

- ระยะที่ 2: การใช้งานและการส่งมอบเต็มรูปแบบ (เดือนที่ 14-24) - ขึ้นอยู่กับ PoC ที่ประสบความสำเร็จ
  ระยะนี้มุ่งเน้นไปที่การบรรลุผลกระทบระดับชาติ โดยเกี่ยวข้องกับการขยายขนาดแพลตฟอร์ม
  การระดมเงินทุนร่วมที่สำคัญจากบริษัทประกัน การเปิดตัวแคมเปญเริ่มต้นจำนวนมากเพื่อลงทะเบียนเกษตรกรมากกว่า 20,000 ราย
  และการบูรณาการแบบจำลองดังกล่าวเข้ากับโครงการประกันพืชผลแห่งชาติของประเทศไทยอย่างเป็นทางการ

โครงการริเริ่มนี้เน้นการฝึกอบรมที่ตอบสนองต่อเพศสภาพ การเข้าถึงโดยความร่วมมือ
และการเปลี่ยนแปลงที่ชัดเจนจากการระดมทุนของผู้บริจาคไปสู่รูปแบบที่ยั่งยืนและได้รับทุนร่วม
ซึ่งเป็นการวางรากฐานสำหรับความสามารถในการปรับขนาดในระยะยาวและความเป็นอิสระทางการเงิน

CONTEXT AND BACKGROUND

Thailand's smallholder farmers face increasing climate shocks—including floods, droughts, and erratic rainfall—which severely threaten their income stability and the nation's food security. The existing agricultural insurance system, predominantly based on traditional indemnity models, is ill-equipped to address these challenges effectively. It is characterized by high basis risk, slow claims payouts, and consequently, low uptake among farmers, leaving a critical protection gap.

This project is the direct continuation of the technical feasibility study and the economic feasibility study, which were successfully delivered by the Blockchain & Climate Institute for the Climate Technology Centre and Network (CTCN). The positive findings of that foundational study, completed in 2024, confirmed the technical feasibility, operational viability, and significant farmer demand for a blockchain-based parametric crop insurance (BBPCI) product in Thailand. The study validated that such a model, which automates payouts based on verifiable, real-time climate data triggers, could effectively reduce administrative delays and basis risk.

Building directly upon the recommendations and evidence-based conclusions of that prior work, this document presents the subsequent Implementation Roadmap and Financing Plan. This roadmap outlines a strategic, two-phase plan to pilot and scale the BBPCI product, transitioning from a proof-of-concept (PoC) to a fully integrated component of Thailand's national climate risk management framework. The proposed pilot will target three high-risk agro-ecological zones, with the objective of demonstrating a tangible reduction in basis risk by 20-25% and validating a scalable, financially sustainable solution for the most vulnerable agricultural communities, thereby executing the logical next step as envisioned in the initial UNEP/CTCN mandate.

PART A: PROJECT INITIATION AND STRATEGIC FOUNDATION

1 OBJECTIVES

To establish the leadership, governance, and detailed scope required to successfully execute the three-phase implementation plan.

2 FOUNDATIONAL ACTIVITIES

The following foundational activities will be undertaken to establish the necessary governance, partnerships, and operational framework for successful project initiation:

- Activity 0.1: Establish a multi-stakeholder steering committee (Office of Insurance Commission (OIC), Bank for Agriculture and Agricultural Cooperatives (BAAC), insurers, farmer cooperatives, tech experts, etc.);
- Activity 0.2: Finalize the selection and contractual agreements with the lead implementing organization Prerequisite: Approval of the Phase 1 of the concept note. The concept note defines the technical scope, budget (total = USD 750,000), pilot zones (Chiang Mai, Nakhon Phanom, Ubon Ratchathani), and partner roles, enabling formal selection, due diligence, and binding Memorandum of Understanding (MoU) drafting;
- Activity 0.3: Conduct a high-level pilot scoping study to provide the critical preliminary analysis required to define the core parameters for the Phase 1 concept note, including:
  - Identification and shortlisting of potential high-risk pilot zones
  - Initial farmer targeting criteria and segmentation
  - Assessment and recommendation of candidate crops for the PoC;
- Activity 0.4: Develop a comprehensive resource mobilization and partnership strategy. This strategy will outline a phased approach to secure funding and technical partners, directly linked to the financial requirements of the Phase 1 concept note and establishing a clear pathway to mobilize the larger-scale co-funding required for Phase 2; and
- Activity 0.5: Develop a detailed monitoring, evaluation, and learning (MEL) framework for the entire project lifecycle.

3 DELIVERABLES

The following deliverables will mark the successful completion of the project initiation phase and establish the foundation for subsequent implementation activities:

(a) Signed MoU among key stakeholders;

(b) Formal agreement with the Lead Implementing Organization;

(c) Finalized pilot scoping document; and

(d) Approved MEL Framework and Resource Mobilization Plan.

PART B: THE TWO-PHASE IMPLEMENTATION PLAN

1 PHASE 1: REFINEMENT OF MARKET NEEDS AND USE-CASES + PROOF-OF-CONCEPT

This phase focuses on demonstrating the technical and commercial viability of the BBPCI product through a controlled pilot, securing necessary partnerships and resources.

Objective: To develop, test, and validate a functional BBPCI prototype with a limited user group, confirming product-market fit, regulatory feasibility, and operational readiness to inform a go/no-go decision for full-scale implementation.

Key activities and responsibilities:

- Activity 1.1: Project initiation and partner formalization
  - Key actions: Finalize grant agreements with the donor; execute formal contracts and MoUs with the committed insurance provider, technology vendor, and other key partners identified during the concept development phase.
  - Responsibilities: Lead implementing organization(s), donors, private insurers (e.g., Sompo, Dhipaya).
- Activity 1.2: Regulatory engagement and product finalization
  - Key actions: Finalize the detailed pilot scoping based on the foundational study (Activity 0.3), confirming the final selection of specific zones, precise farmer targeting, and crop parameters. Submit the BBPCI product for approval under the OIC regulatory sandbox and conduct a legal review on smart contract enforceability and data privacy. Compile the outcomes and recommendations from these processes into a formal Regulatory and Legal Pathway Document. These outputs are critical to secure initial operational legitimacy. Develop a validated financial model projecting the path to break-even and long-term sustainability, which will inform the Phase 2 financing strategy.
  - Responsibilities: Lead implementing organization, OIC, legal experts, insurers.
- Activity 1.3: PoC system development and integration
  - Key actions: Develop the blockchain backend and smart contracts; integrate decentralized oracles with climate data sources (satellite, Thai Meteorological Department (TMD), internet of things (IoT)); build and test the mobile application with e-Know Your Customer and wallet integration.
  - Responsibilities: Tech vendor, data partners, BAAC.
- Activity 1.4: Limited pilot implementation and monitoring
  - Key actions: Onboard a controlled pilot group (200-300 farmers); conduct gender-responsive training; monitor the platform through at least one full climate season; collect technical performance data and user feedback.
  - Responsibilities: Cooperatives, non-governmental organizations (NGOs), BAAC, monitoring and evaluation (M&E) team, insurers.
- Activity 1.5: Review of PoC results and scale-up decision
  - Key actions: Analyse pilot results (basis risk, payout efficiency, user satisfaction, operational costs); prepare a comprehensive PoC validation report; make a formal go/no-go decision for Phase 2. A positive decision will be contingent on both the technical validation and firm co-funding commitments from private insurers, demonstrating market buy-in and a clear transition from a donor-funded pilot to a commercially viable model.
  - Responsibilities: Research division, steering committee, insurers, OIC.

Activities of Phase 1	Start-end period
1.1. Project initiation and partner formalization (critical path: insurance provider must be secured by end of Month 4 to avoid delays)	Months 1-4
1.2. Regulatory engagement and product finalization (can start once an insurer is engaged, runs in parallel with later part of 1.1)	Months 2-5
1.3. Proof-of-concept system development and integration (dependent on regulatory clarity from 1.2 and funding from 1.1)	Months 5-9
1.4. Limited pilot implementation and monitoring (directly follows system development. The 3-4 month duration allows for a full crop season)	Months 9-12
1.5. Review of proof-of-concept results and scale-up decision (a focused, final-month activity to conclude the phase)	Month 13

2 PHASE 2: FULL-SCALE IMPLEMENTATION

This phase is conditional on the successful validation of the PoC and focuses on scaling the product to a national level, requiring deeper commitments from insurers and regulators.

Objective: To achieve national scale by integrating the BBPCI into Thailand's mainstream agricultural insurance system, ensuring long-term financial sustainability and widespread farmer adoption.

Key activities and responsibilities:

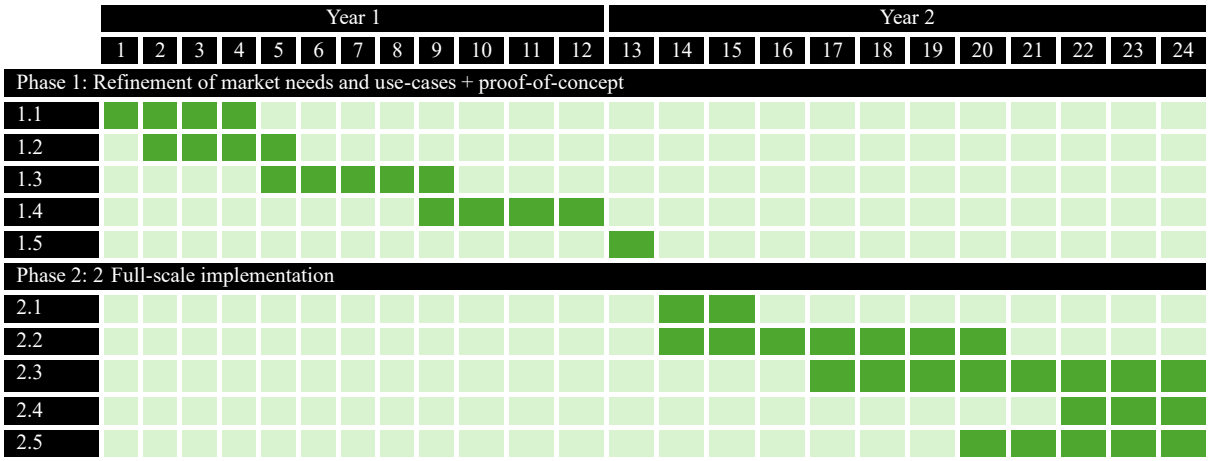
- Activity 2.1: Large-scale resource mobilization and co-funding
  - Key actions: Secure larger-scale funding; finalize co-funding agreements with committed insurance companies for a national rollout.
  - Responsibilities: Donors, private insurers, government.
- Activity 2.2: Regulatory and data infrastructure development
  - Key actions: Advocate for and support the development of formal regulatory guidance or a circular from the OIC based on the validated proof-of-concept; secure improved and sustained access to high-resolution climate data.
  - Responsibilities: OIC, Ministry of Digital Economy and Society, TMD, lead implementing organization (advocacy role).
- Activity 2.3: Platform scaling and national rollout
  - Key actions: Scale the platform architecture to handle 20,000+ farmers; conduct mass onboarding and training campaigns across multiple provinces; ensure full interoperability with BAAC and insurer systems.
  - Responsibilities: Tech Vendor, BAAC, cooperatives, insurers.
- Activity 2.4: Integration with national systems
  - Key actions: Formalize integration of the BBPCI model with the Thailand National Crop Insurance Scheme (TNCIS); develop a sustainable public-private partnership and governance model; secure a signed MoU outlining the integration plan.

- Responsibilities: OIC, BAAC, Ministry of Agriculture, insurers, lead implementing organization (facilitation role).

- Activity 2.5: Long-term impact monitoring and optimization
  - Key actions: Implement a long-term M&E system; continuously refine the product based on performance data and evolving climate risks.
  - Responsibilities: M&E team, research partners, insurers.

Activities of Phase 2	Start-end period
2.1. Large-scale resource mobilization and co-funding (intensive 3-month period to lock in financing for the scale-up)	Months 14-16
2.2. Regulatory and data infrastructure development (a longer, parallel process that runs alongside initial scaling preparations)	Months 14-20
2.3. Platform scaling and national rollout (the core implementation activity, split into preparation and execution)	Months 17-24
2.4. Integration with national systems (finalizes the institutionalization of the model)	Months 22-24
2.5 Long-term impact monitoring and optimization (ongoing activity that starts after initial scale-up and continues beyond the project)	Months 20-24

Implementation timeline:



Activity-based budget and payment details:

	Budget (USD)
Phase 1: Refinement of use-cases and proof-of-concept This phase covers initial setup, stakeholder engagement, regulatory approval, and the development and limited pilot of a functional prototype with 200-300 farmers over 13 months.	325,000
Phase 2: Full-scale implementation and handover This phase covers the cost of scaling the platform, mass onboarding of 20,000+ farmers, formalizing regulatory frameworks, and integrating the system into national structures over 11 months.	425,000
	Total = 750,000

PART C: FINANCIAL STRUCTURE AND MONITORING

To ensure full transparency and effective financial management, this section provides a detailed breakdown of costs, funding sources, and key performance indicators.

1 BREAKDOWN OF COST CATEGORIES

The total project budget of USD 750,000 is strategically allocated across key cost categories and phases to ensure all critical components from initial research and development to national scale-up are adequately resourced.

Activity / work package	Description	Allocation (USD)
1.1 Project initiation and partner formalization	Formalize the project consortium by executing grant agreements, MOUs, and contracts with key implementation partners (insurance provider, technology vendor)	15,000
1.2 Pilot design, regulatory engagement and financial modelling	Finalizing pilot scoping, OIC sandbox submission, legal reviews, and developing the validated financial model	40,000
1.3 Proof-of-concept system development and integration	Development of blockchain backend, smart contracts, mobile application, and integration with climate data oracles	200,000
1.4 Limited pilot implementation and monitoring	Onboarding 200-300 farmers, conducting gender-responsive training, and monitoring through a full climate season (M&E)	55,000
1.5 Review of proof-of-concept and scale-up decision	Analysis of pilot results, preparation of the validation report, and stakeholder review for the go/no-go decision	15,000
	Phase 1 total	= 325,000
2.1 Large-scale resource mobilization and co-funding	Securing larger-scale funding and finalizing co-funding agreements with insurers	25,000
2.2 Regulatory formalization and data infrastructure	Advocacy for formal OIC guidance, securing sustained data access, and infrastructure scaling	55,000
2.3 Platform scaling and national rollout	Scaling platform architecture, mass onboarding/training for 20,000+ farmers, and campaign management	240,000
2.4 Integration with national systems	Formalizing integration with TNCIS, developing PPP model, and securing the final MoU	50,000
2.5 Long-term impact monitoring and optimization	Implementing long-term M&E system and continuous product refinement	25,000
Project management, coordination and contingency	Cross-phase project management, partner coordination, communication, and reserve for unforeseen costs	30,000
	Phase 2 total	= 425,000

2 FINANCING SOURCES

The financial sustainability of the project is strengthened by a strategic mix of donor funding, co-financing, and significant in-kind contributions from national partners. This structure is designed to transition from initial grant-dependent research and development to a co-funded operational model, ensuring long-term viability.

Source	Type	Phase 1 contribution (USD)	Phase 2 contribution (USD)	
Donor grant (e.g., Adaptation Fund Climate Innovation Accelerator)	Grant	325,000	75,000	Covers 100% of Phase 1 costs. Phase 2 grant is for technical assistance and transition support, contingent on successful proof-of-concept
Private insurers (e.g., Sompo, Dhipaya)	Co-financing (cash for premium subsidies, actuarial support, risk capital)	0	150,000	Contingent on successful proof-of-concept and agreed business case. Commitment will be secured during the Phase 1 go/no-go decision
BAAC	In-kind (system integration, fee waivers, staff time for onboarding and training)	35,000	75,000	In-kind support is anticipated in both phases, with increased commitment for national rollout
Government (subsidy reserve)	Public funding	0	100,000	Contingent on successful proof-of-concept and alignment with national policy. To be advocated for during Phase 2
Agricultural cooperatives	In-kind (farmer outreach, training venues, local staff time)	15,000	15,000	In-kind support is anticipated in both phases
Other partners (e.g., technical universities)	In-kind (research, data analysis, legal review)	15,000	10,000	In-kind support is anticipated in both phases
	Total	= 325,000	= 425,000	
	Total	= 750,000		

3 MONITORING, EVALUATION, AND LEARNING FRAMEWORK

The following key performance indicators (KPIs) will be tracked throughout the project to measure progress, assess impact, ensure accountability, and inform strategic decisions. This framework covers project performance, financial sustainability, and social outcomes.

Project performance and output key performance indicators

Key performance indicator	Baseline	Phase 1 target	Phase 2 target
Adherence to project timeline	0%	>90% of milestones met on schedule	>90% of milestones met on schedule
Number of farmers enrolled	0	200-300 farmers	>20,000 farmers
Platform uptime and reliability	N/A	>99% during pilot period	>99.5% availability

Financial sustainability and efficiency key performance indicators

Key performance indicator	Phase 1 target	Phase 2 target
Cost per farmer enrolled	Establish baseline with 200-300 farmers	Reduce cost to <USD 21 per farmer for 20,000+ farmers
Premium collection rate	N/A (may be subsidized in pilot)	>90%
Claims payout efficiency	Payout in <7 days	Payout in <7 days
Break-even analysis	Deliver a validated financial model projecting the break-even point	Demonstrate a clear path to reach the break-even point with the 20,000+ farmer target
Co-financing ratio (cash and in-kind / donor grant)	≥1.0	≥1.5

Social impact and outcome key performance indicators

Key performance indicator	Baseline (pre-pilot)	Phase 1 target	Phase 2 target
Farmer satisfaction rate (post-payout)	To be established via initial survey	>75% of pilot farmers satisfied with the process	>80% of enrolled farmers satisfied
Reduction in basis risk (vs. traditional insurance)	To be established via analysis	Demonstrate a 20-25% reduction	Maintain a 20-25% reduction
Percentage of female farmers enrolled	To be established via initial mapping	At least proportionate to their representation in the target population	At least proportionate to their representation in the target population