

Digitizing and Tokenizing the Bamboo Supply Chain using Blockchain – A Pilot Project

Enabling and strengthening smallholder and enterprise value chains in the Philippines through dMRV (digital monitoring reporting verification)

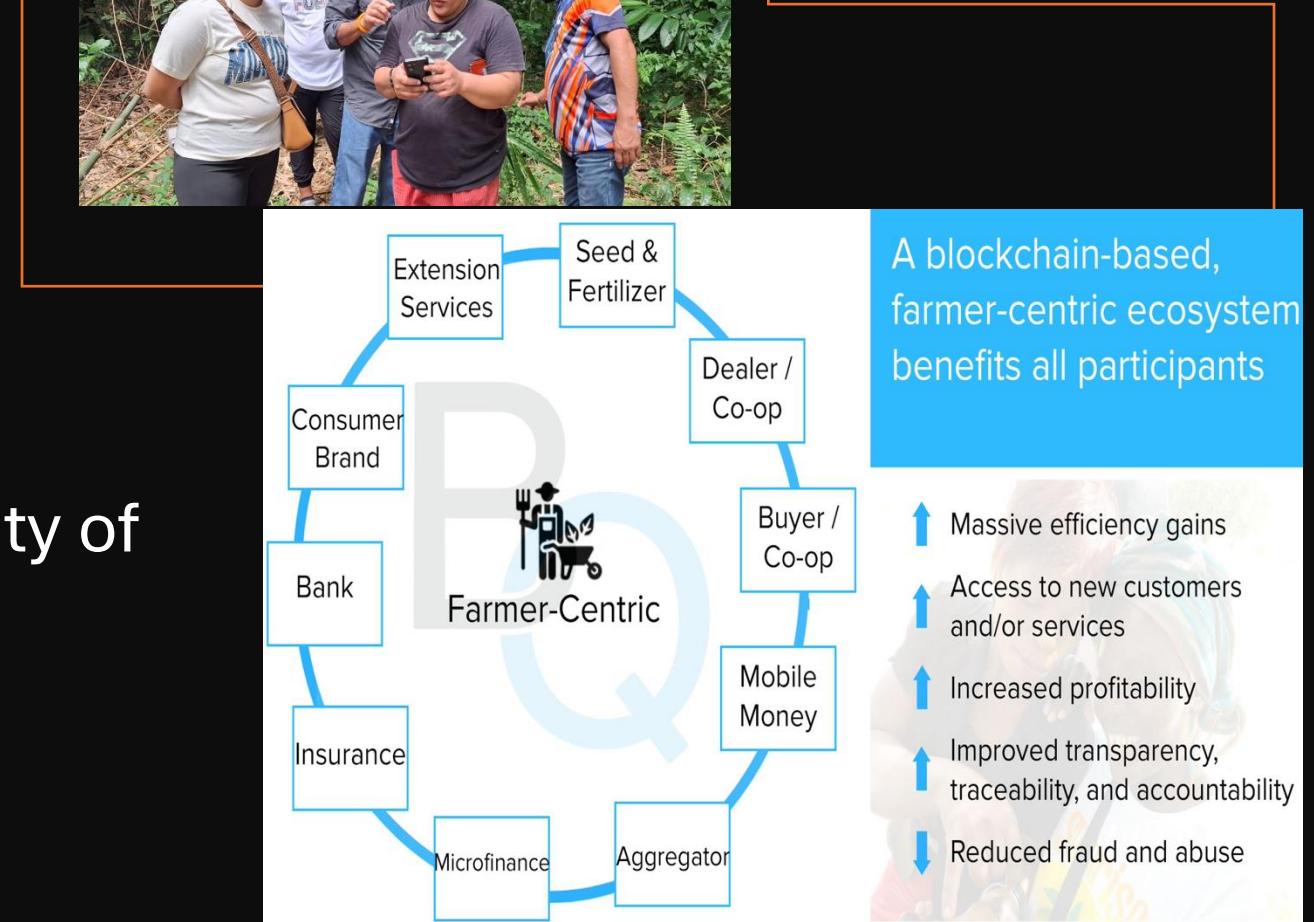
Supported by ADB TA 10470: *Harnessing Bamboo Industries for Green Growth and Climate Action* in collaboration with the Rizome corporation, Rep. Jose Manuel Alba (1st district, Bukidnon), Rep. Anna Veloso-Tuason (3rd district, Leyte), and the Philippine Bamboo Industry Development Council (PBIDC)

Introduce *Farmer360*

Digital value chain platform with

dMRV (digital monitoring reporting verification)

To increase farmers' incomes, enhance efficiency and productivity of enterprises, and scale up stakeholders' participation in the bamboo value chain

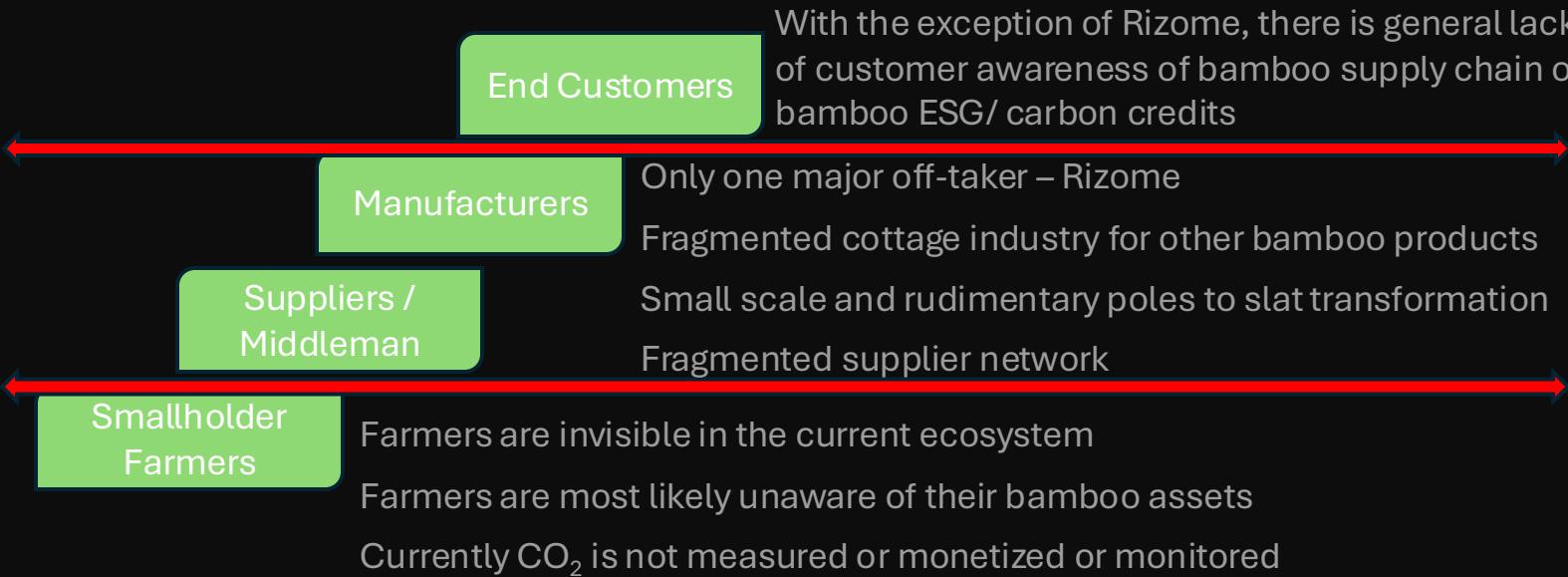


Why Blockchain?

- Ability to ensure equitable data trace at all tiers of the value chain
- Data privacy & ownership
- Distributed ledger enables diversified market access as all stakeholders have equal transparency / traceability
- Auditable & tokenized supply chain data unlocks supply chain financing
- First-mile (especially smallholder farmers) digitalization without the need of smartphones → proof of location, harvest, price can be delivered via sms / USSD codes while maintaining blockchain proof
- Scales much faster (and more secure) than traditional database systems
- Integrates with mobile money: G-Cash; M-Pesa; PayTM etc.

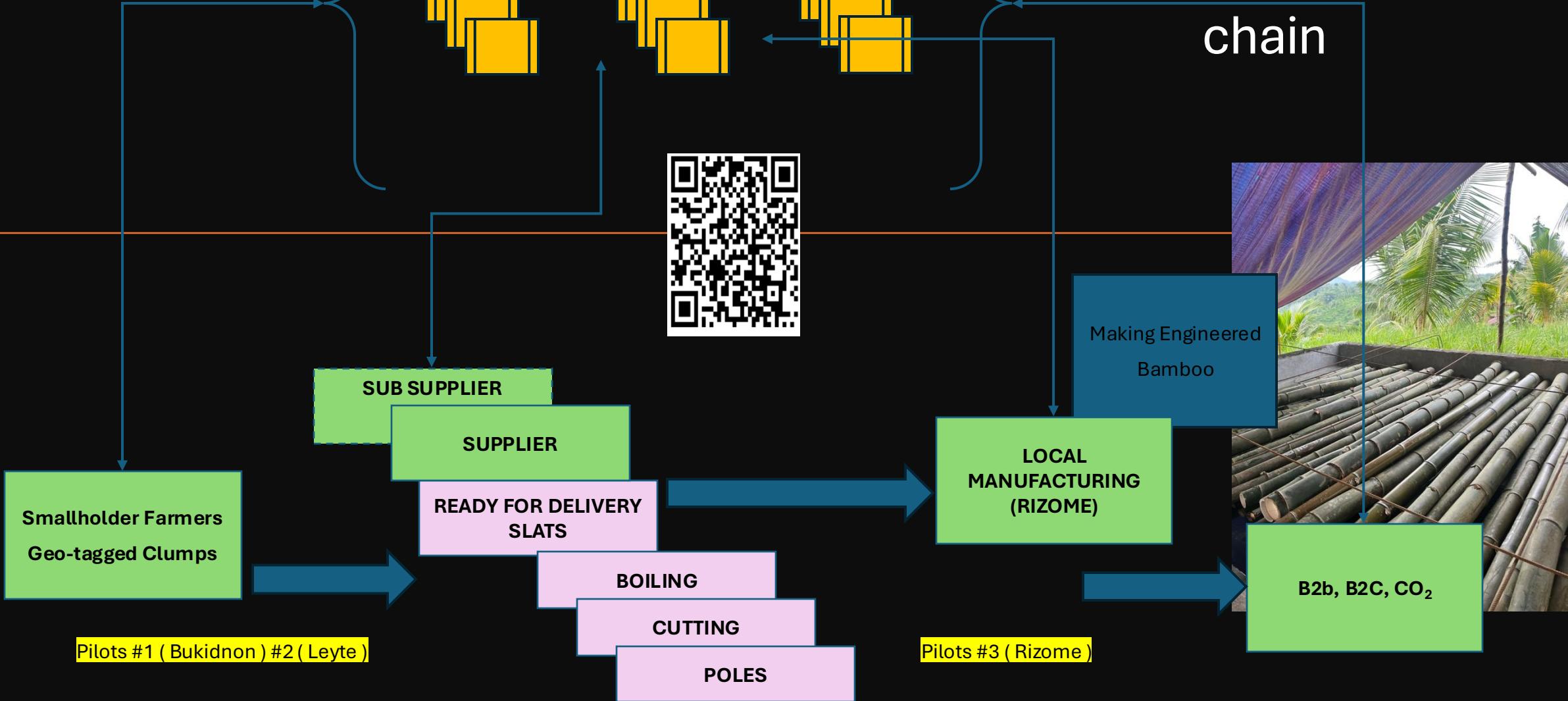


Non digitized current state of bamboo supply chain



Blockchain supply chain track and trace --- dMRV

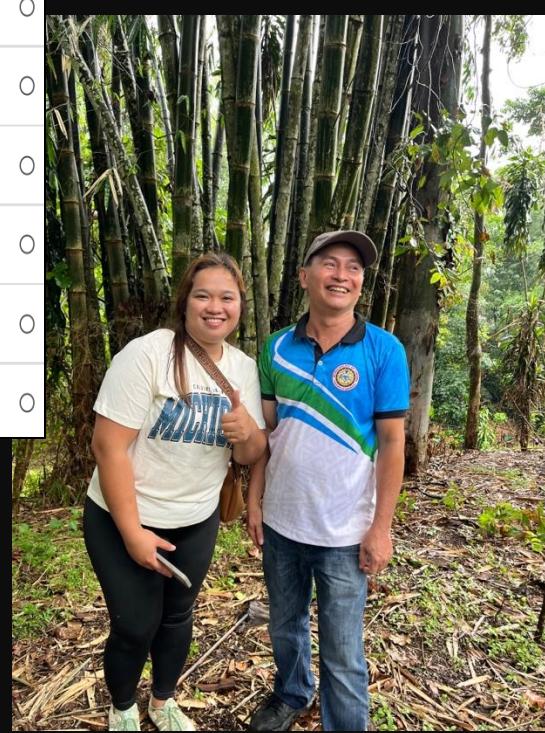
Blockchain
enabled digital
bamboo value
chain

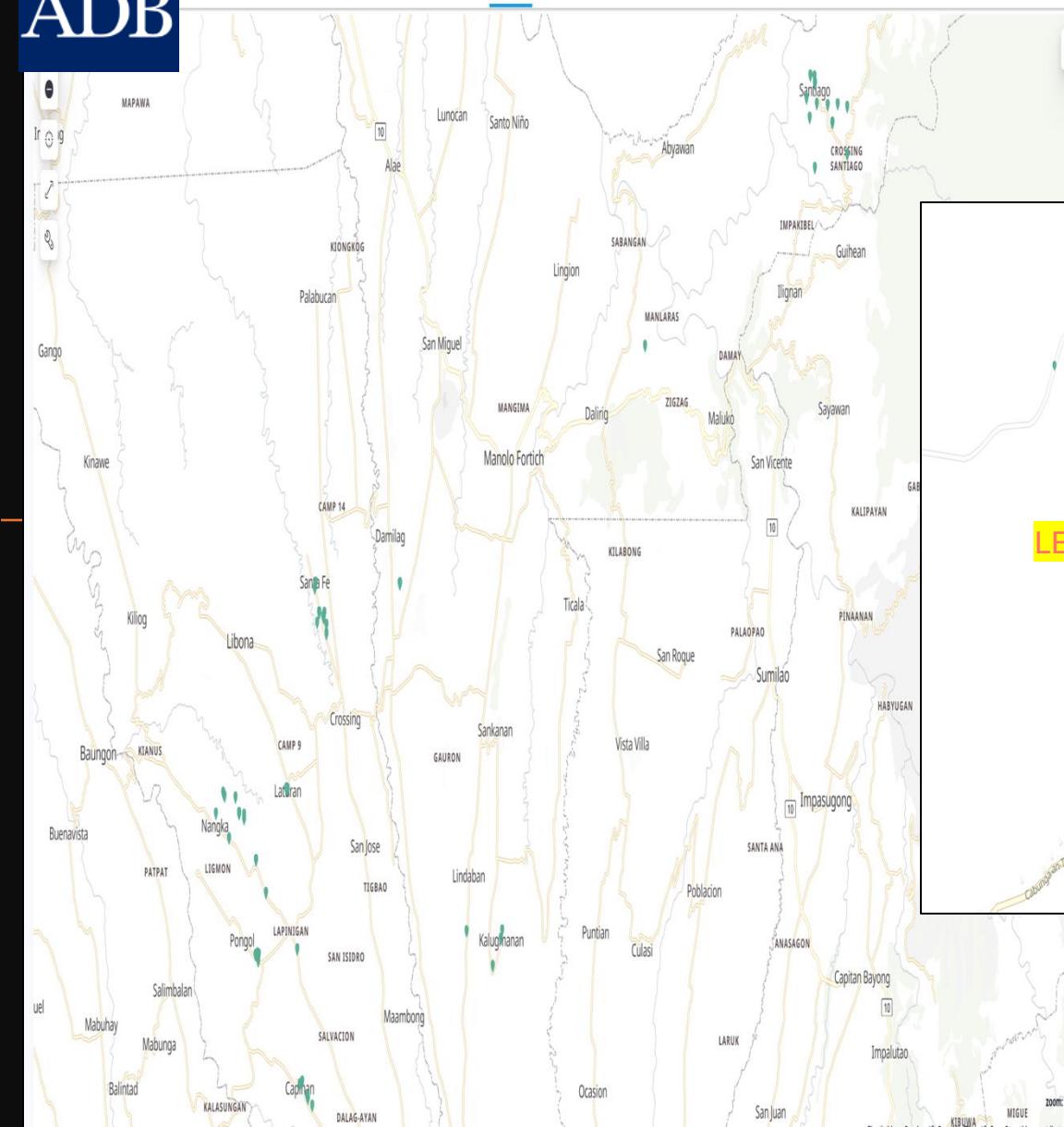


Bukidnon	○
Bamboo furniture /Factory	○
Rizome CDO Intake factory	○
Supplier - Arbusto Farms	○
Supplier - Jean Habulan	○
Supplier - Libona Pangkabuhayan Sakawayan	○
Supplier - Mariano Malones	○
Supplier - Mark Sebastian	○
Supplier - Pezman Sofian	○
Supplier - Regie Mosqueda	○
Supplier - Sandivfa Association	○
Supplier - Taruc Jose	○
LEYTE	○
3D LEG Office	○
USWAG Artesano producers Cooperative	○
Cagnocot Crop Producers Association, Inc. (CCPAI)	○
Calbugos Lligay Farmers Association (CALIFA)	○
Samahan NG Munting (Samumaca)	○
Rizome CDO Intake factory	○

Rizome (Ready for Shipment)	○
Finished Product	○
Semi - Finished	○
Sanded	○
Laminated	○
Finished Slat	○
Dry Planed	○
Dried	○
Pressure Treated	○
Steamed	○
Wet Planed	○
Rizome CDO Intake factory	○

3 distinct pilots in one
integrated digital ecosystem





Almost 275
bamboo clumps
geotagged in 4
days



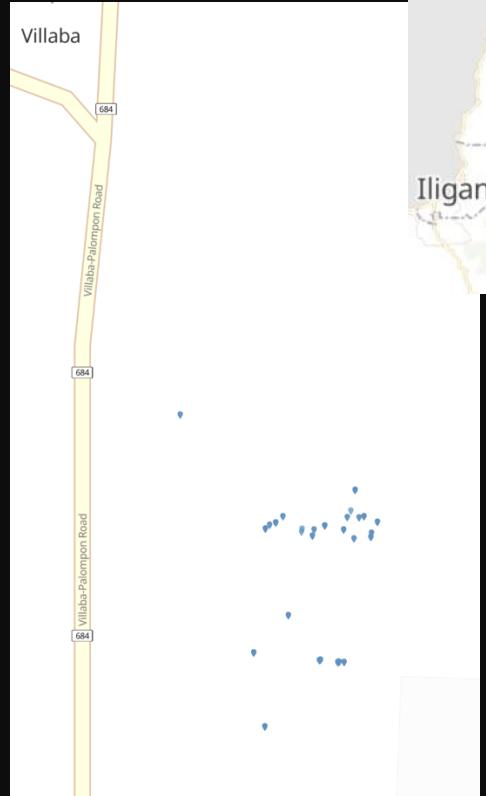
Digital MRV

Total Farmers	Farmer Procurement - Quantity			Farmer Procurement - Quantity By Region & Asset		
	Giant Bamboo Sections	Kawayan Tinik Poles	Poles Purchased (EA)	Kawayan Tinik Poles	LEYTE	Sections
32	4,198	925		902	1,009	
Total Transactions	Farmer Procurement - Value			Bukidnon/Rizome		
	Giant Bamboo Sections	Kawayan Tinik Poles	Total Value (PHP)	4,221	4,198	Sections
81	18,576,150	3,507,600				

Total Suppliers	Supplier Procurement - Quantities Moved By Suppliers			Supplier Procurement - Quantity Received At Rizome CDO		
	Giant Bamboo Slats	Wet Planed	Kawayan Tinik Poles	Giant Bamboo Sections	Giant Bamboo Slats	Treated Kawayan Tinik Poles
18	17,266	9,246	837	158	11,748	116

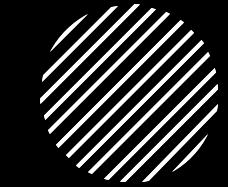
Bukidnon	Total Farmers	Farmer Procurement - Quantity			Farmer Procurement - Value		
		Giant Bamboo Sections Purchased (EA)	Giant Bamboo Slats Purchased (EA)	Kawayan Tinik Poles Purchased (EA)	Giant Bamboo Sections Total Value (PHP)	Giant Bamboo Slats Total Value (PHP)	Kawayan Tinik Poles Total Value (PHP)
	20	4,198	50	23	18,576,150	550	5,060

Leyte	Total Farmers	Quantity Sent in Batches		Quantity Received in Batches		Transactions by Draft State	
		Kawayan Tinik Poles Quantity Sent in Batches (EA)	Treated Kawayan Tinik Poles Quantity Sent in Batches (EA)	Kawayan Tinik Poles Quantity Received in Batches (EA)	Treated Kawayan Tinik Poles Quantity Received in Batches (EA)	finalized Transactions by State	Transactions by State
	12	856	125	745	123	61	



Philippines Bamboo Supply Chain - ENTERPRISE	
Bukidnon	
Bamboo furniture /Factory	Readonly
LEYTE	
3D LEG Office	Readonly
USWAG Artesano producers Cooperative	Readonly
Cagncot Crop Producers Association, Inc. (CCPA)	Readonly
Calbugos Liglig Farmers Association (CALIFA)	Readonly
Samahan NG Munting (Samumaca)	Readonly
Rizome (Ready for Shipment)	●
Finished Product	Readonly
Semi - Finished	Readonly
Sanded	Readonly
Laminated	Readonly
Finished Slat	Readonly
Dry Planed	Readonly
Dried	Readonly
Pressure Treated	Readonly
Steamed	Readonly
Wet Planed	Readonly
Rizome CDO Intake factory	Readonly
Supplier - Arbuso Farms	Readonly
Supplier - Jean Habulan	Readonly
Supplier - Libona Pangkabuhayan Sakawayan	Readonly
Supplier - Mariano Malones	Readonly

Key observations



- Systems / DLT
 - Blockchain application works across all tiers
 - While internet access & connectivity can be a challenge, they don't impede the ability to register farms/farmers, geotag bamboo clumps
 - We found suppliers (aggregating the bamboo and making slats) have connectivity and they had no issues doing buy and batch transactions on the platform real-time.
- Business processes
 - Business processes are well defined, and roles / responsibilities are well established
 - The missing link seems to be digitization / automation
- Farm / farmer / supplier / financing
 - Smallholder farmer supply chains are informal
 - Farmers are not aware of the value of their bamboo plantations
 - Suppliers are informal
 - Quality of bamboo slats can be challenge due to equipment and cost of fuel / electricity
 - Lack of capital to sustain operations/delivery on a regular basis
- Off taker / market
 - Lack of multiple commercial off takers / lack of demand
 - Lack of source to finished product forecasting
 - Quality of raw materials
 - Price and payment terms
- Overall industry economics
 - There is not enough data yet to prove if bamboo cultivation is profitable for farmers
 - Philippines Carbon Credits have yet to gain global credibility

Lessons learned

- Bamboo farmers **definitely** need to be organized so they have a singular voice across all regions, varieties and applications
- Bamboo value chains, especially with smallholder farmers, can be digitized, and supply chain traceability can be established in remote and no connectivity areas of Bukidnon and Leyte
- Geo tagging a single clump of giant bamboo or Kawayan Tinik bamboo (or other varieties) is very doable and scalable
- User adoption is not a barrier given the local community engagement – in both Bukidnon and Leyte we found strong women-led supplier champions
- Off taker demand and options are limited but increasing which is critical for the industry
- **Major untapped opportunities for the entire Philippines bamboo industry at 3 levels:**
 - Increasing smallholder livelihood / income (including indigenous communities)
 - Boost the success and visibility of great companies like Rizome
 - Monetize the carbon credit opportunity for all stakeholders including the farmers
- **Opportunity to invest in bamboo agroforestry and supporting infrastructure:**
 - Production and manufacturing
 - Supplier (transforming poles to slats)
 - Farmer level – training and market access





Blockchain does not solve all challenges

Non-tech challenges / opportunities

- Smallholder farmers need to be organized and collective
- Farmer level training about bamboo related agronomy and income
- Standardization of Carbon Credits – in a way that is relevant to all stakeholders especially smallholder farmers
- Establish a regional or national baseline on price of bamboo poles (based on variety)
- Market linkages to commercial enterprises that trade in engineered bamboo, bamboo products and/or carbon offsets

Way forward recommendations

GOING BEYOND THE PILOTS:

- Tackle each of these 4 areas that make up the bamboo ecosystem in Philippines
 - **SOURCING**
 - Farmers are really empowered and make bamboo profitable for smallholders
 - Include side crops – coffee, cocoa, cassava
 - Carbon credit auditability and monetization
 - **PROCESSING**
 - Reliable machines for slat making in the field
 - Better pricing, forecasting
 - Training of suppliers to increase quality
 - **MANUFACTURING**
 - Increase market access by incentivizing new off takers / manufacturers
 - Increase farm to product quality in a way that reduces rejection rates for farmers
 - Explore byproducts – especially alternative fuels
 - Better pricing, forecasting
 - **ECONOMICS**
 - Supply / Demand synchronization
 - B2B2C
 - Global carbon market credibility
- Bring other actors into the ecosystem:
 - Energy companies
 - Travel & tourism companies to be end users
 - Foundations and philanthropic organizations
 - Micro-finance agencies
 - Development finance institutions