



# Opportunities and Challenges for E-trading Platforms in Facilitating Grain Trade in Ghana

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- China CoE
- Organizers of this event

# The Development Challenge

- Lack of adequate markets
- Prevents Adam Smith's invisible hand to guide
- There could be gains or benefits to the different market participants collectively
- We've implemented three design interventions to address the constraints faced by smallholder farmers:
  - Nano-Commodity Exchanges
  - Credit Projects
  - Warehouse Provision (in cooperation with the MOFA)
- The design interventions show great promise.





## Context - The typical agricultural market

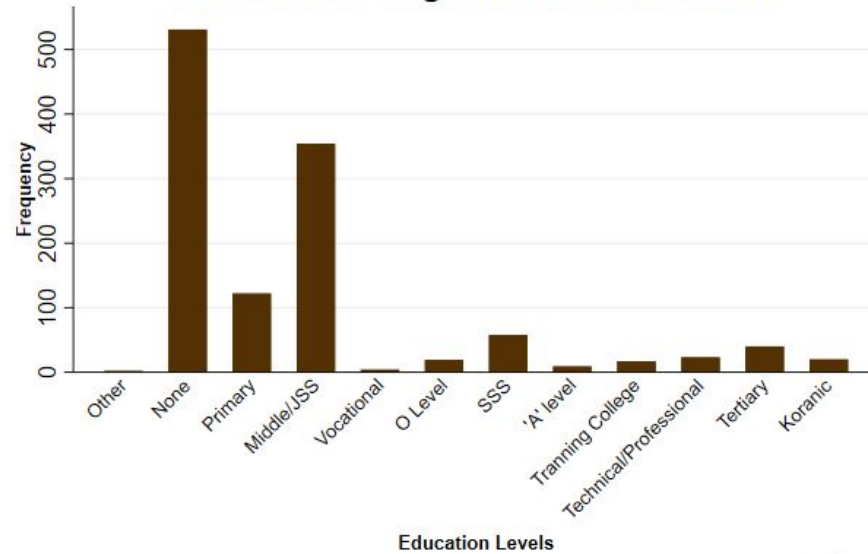
Smallholder farmers in Sub-Saharan Africa are constrained by limited access to markets, which has constrained their livelihoods and potential

- Market players:
  - Farmers negotiate on prices
  - Trader then takes the crops to bigger markets to sell
  - Traders go to agro processors
- Technology: Only use cutlass
- Land: 1-2 acres of land farmed
- Constraints: Transportation costs, distance to markets, credit limitations, lack of nearby warehouses





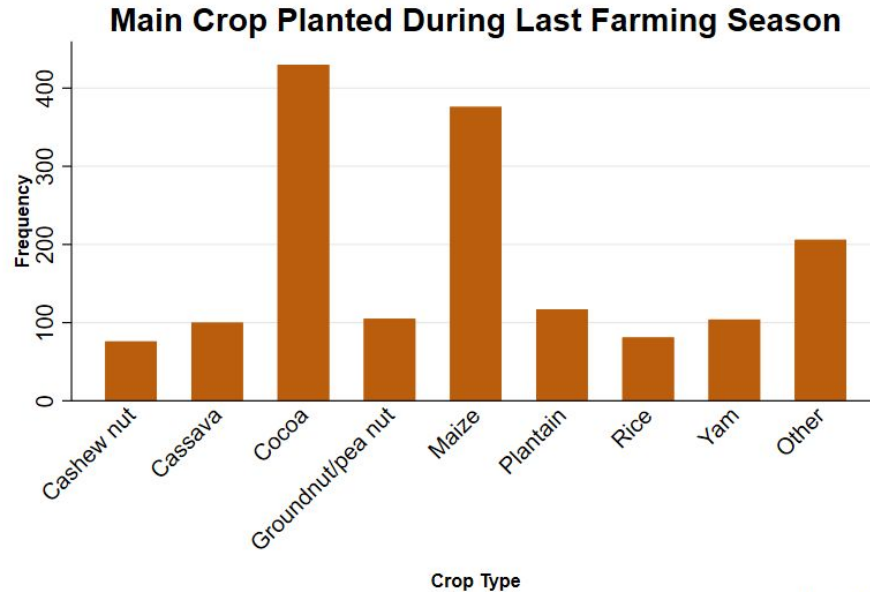
## Household's Highest Education Level



N = 1,199



We gained a lot of useful insight about land use, land disputes, and some of the other challenges that these farmers face.



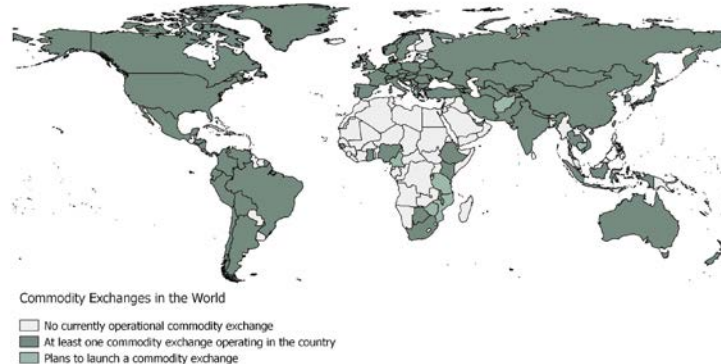
N = 1,595

Commodity exchanges are the  
ultimate E-commerce structures  
for Sub-Saharan Africa!



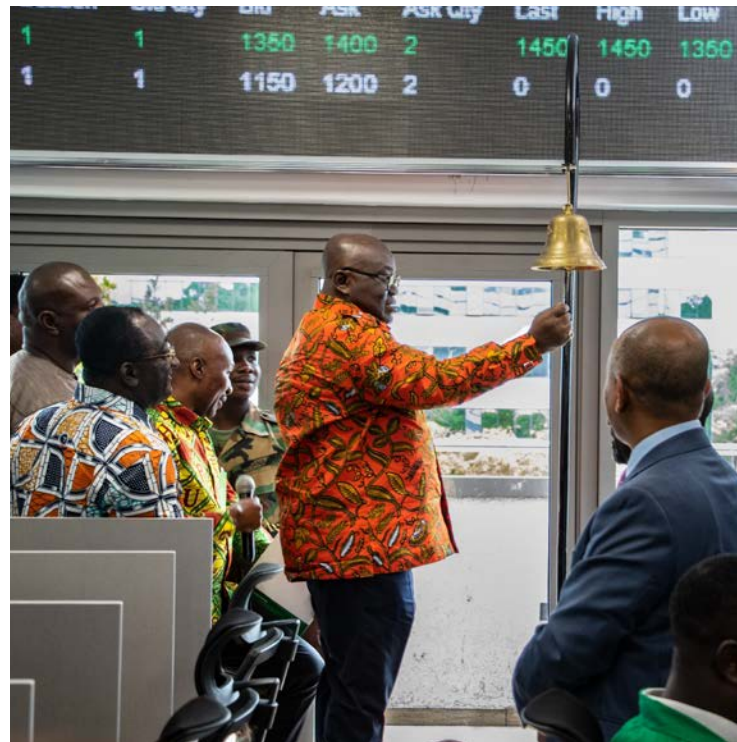
# Trading Institutions and Trade Costs

- High trade costs in developing economies.
- In most African countries, there are no commodity exchange markets. Farmers and traders search for each other in decentralized markets.
- Recently, several African countries have launched a commodity exchange. Transactions occur in a predetermined location and are mediated by a market maker.



## The Ghana Commodity Exchange

- In collaboration with GCX, the research team used Randomized Control Trial (RCT) methodology to measure the impact of the exchange on smallholder farmers.
- Some key indicators:
  - 96% of relevant sampled farmers were interested in trading with the GCX.
  - Of the farmers who were suitable for the study, 18% attempted to trade with the GCX.
  - An additional 15% were interested in trading with GCX but did not have the 1 MT minimum size required and could not form a group to trade on the exchange.
  - 57% of suitable farmers were interested in trading but did not for various reasons.





We also performed various farmer aggregation exercises in partnership with the Ghana Commodity Exchange (GCX).





We were able to transport a minimum of 50 Bush bags per trip. Then we visited the villages to weigh and inspect the maize quality.





We checked for moisture content and insect damage.







**We plan on;**

- a) Documenting the changes in commodity value chains associated with the introduction of the commodities exchange
- b) Identifying the effects of these changes on the decisions and welfare of smallholder farmers and their families.



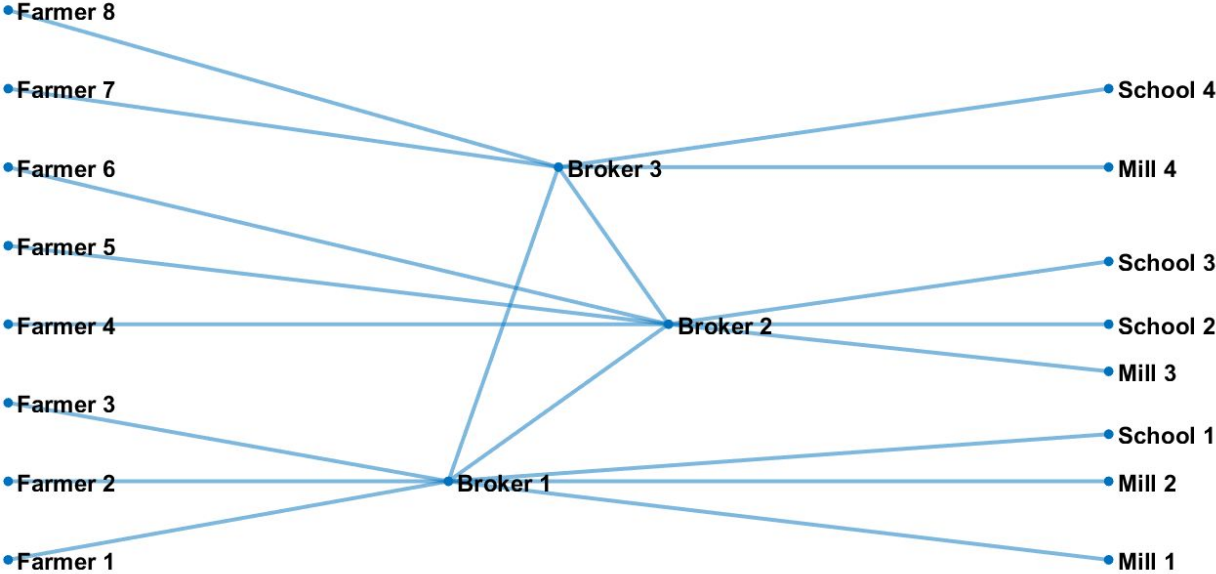


# Institutional Context: GCX

- Trading pit of GCX is located in Accra. There are GCX warehouses in several markets across Ghana where farmers can drop their produce.
- A contract in GCX is a triple of good, quality and location of the warehouse
  - For example: white maize, grade 1, Tamale (WM1TA)
  - Only operates in spot markets
- The basic fee for farmers amounts to 10% of the price (additional fees related to drying, cleaning and fumigation can increase fees up to 40%).



# Environment: Commodity Exchange Market (CEM)



This is all E-commerce!

# Results of Our Field Research

- Low uptake!

## CTED Interventions:

- We've implemented three design interventions to address the constraints faced by smallholder farmers:
  - Nano-Commodity Exchanges
  - Credit Projects
  - Warehouse Provision (in cooperation with the MOFA)
- The design interventions show great promise



## Intervention I: Nano Commodity Exchanges (Trade Fairs)

- We observe that when access to organized agricultural markets is limited, smallholder farmers face large search costs when looking for traders to purchase their produce
- Traders also face difficulties establishing a consistent supply of agricultural commodities and determining the quality of purchased crops
- We observe that a key issue preventing farmers and traders from participating in the nano commodity exchange is existing credit constraints, for which farmer obtain credit from a trader in exchange for a commitment of unfavorable terms of trade for the farmer





## Intervention I: Nano Commodity Exchanges (Trade Fairs)

- We attempt to address this through the implementation of nano commodity exchanges that utilize mobile phone technologies.
- Of the 7116 farmers in our phone survey study, 75% showed interest in participating
  - From which, we invited 738 individuals that have expressed interest in participating in the nano commodity exchanges across 82 communities, including 404 farmers and 334 traders
- Since May 2021, we've completed 19 nano commodity exchange pilots in the Sekyere Kumawu District, where 71% of participants present engaged in a trade





*Images of CTED-organized trade fairs at the CTED Research Center in Kumawu. Farmers and traders are negotiating their commodity trades, which are facilitated by CTED staff, using CTED's proprietary mobile phone apps.*







Farmers and traders arrive and register for CTED's trade fair.







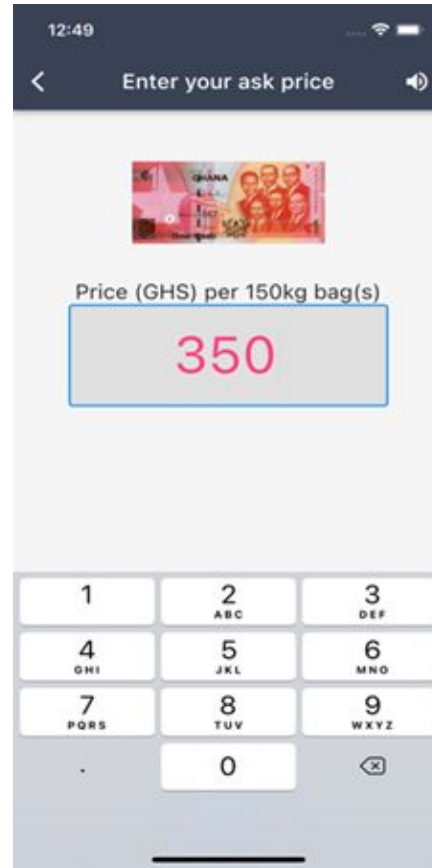
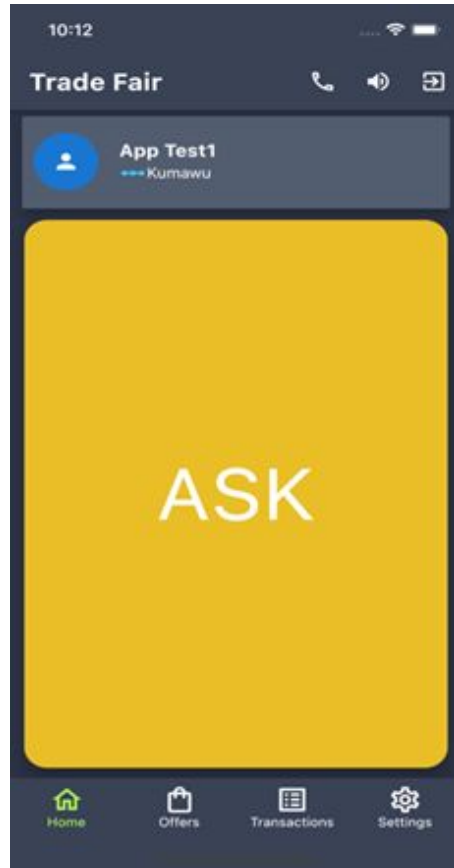
# Intervention I: Nano Commodity Exchanges (Trade Fairs)

In efforts to facilitate the Nano Commodity Exchanges, CTED's local team of software engineers has successfully developed several mobile applications and pricing tracking systems:

- A trading application used during trade fairs is the Marketplace App, a proprietary mobile phone app that enables commodities trading between buyers and sellers.
- We train farmers and traders to use the app to capture data on trading crops, quantities, prices, and frequency. CTED's team of researchers have set up backend systems that ensure the integration of data collected using the app with existing survey data and work toward recording data on the characteristics of farmers and traders, and their trading behavior.
- The team also developed an application that farmers and traders can use to track current trends in commodity prices across different markets and regions across the country.



# Intervention I: Nano Commodity Exchanges (Trade Fairs)



We found out that farmers  
are in debt to traders.

## Intervention II: The Credit Project

- We observed that farmers face liquidity constraints during harvest time, leading us to consider the option of pre-financing instruments as a potential solution
- From the over 30,000 surveys that we conducted, we find that many farmers finance their activities through informal credit schemes, where a trader finances a farmer's farming activities in exchange of getting the first refusal for any crops cultivated
- However, such informal credit schemes often involve terms that are unfavorable to farmers, such as high interest rates and limitations on participation in centralized trading platforms
- We also observe that while there is a high demand for agricultural credit, more than half of the farmers we surveyed have not take a loan because of their inability to find creditors



## Intervention II: The Credit Project

- To address such, we explored Receipt Financing, for which as soon as a farmer drops off crops at the warehouse, GCX brokers may provide an advance (of a fraction of the crop value, with the crop as collateral), even before a trade is complete
- Over the course of the season, more farmers have indicated interest and we are currently in talks with regional banks to find ways to scale up our credit project
- From our intervention, we find that many farmers determine their level of production based on the amount of credit that they obtain and farmers who are not able to obtain a sufficient level of credit do not produce at their full potential



# Policy Insights

- Need to get Agricultural and Development banks even more involved!
- Credit markets need digital markets.

## Intervention III: The Warehouse Project

- Traders often don't go through because farmers and traders disagree on who should subsidize the cost of transporting the Maize
- To address this, the CTED team has worked with the Ghanaian Ministry of Agriculture to secure a warehouse that is located near the premises of the nano commodity exchange trading floor, in an attempt to reduce transportation costs





## Intervention III: The Warehouse Project

- Through this, farmers are now able to store their crops in the CTED warehouse ahead of time, and if they agree on a trade while participating in a nano commodities exchange, then the buyer can directly pick up the Maize on the same day; which eliminates the need to set up a follow up visit to complete the trade.
- This also opens up the possibility for farmers to store maize in the warehouse to arbitrage across seasons.
- At the same time, the warehouse also allows the CTED team to ensure that crops meet industry standards for proper storage and testing for moisture and Aflatoxins





# E-Commerce

- **A commodity exchange is primarily E-commerce:**
  - Rules/laws
  - Warehouses
- **Need to further develop:**
  - Warehouse Receipt System
  - More sophisticated financial instruments

# African Continental Free Trade Agreement (AfCFTA)

- “**Digital trade is an integral part of free trade and critical to boosting intra-Africa trade.** In February 2020, the AU Assembly decided to include digital trade within the AfCFTA. Digital trade issues will be constituted into a Protocol that shall, upon entry into force, form an integral part of the AfCFTA Agreement.”
- “In May 2021, the Council of Ministers established the **Committee on Digital Trade** to coordinate and facilitate the negotiations of the Protocol on Digital Trade under the AfCFTA. The Committee consists of all State Parties.”

# Blockchain

- We can't speak about the **future opportunities of e-trading** and online transactions without addressing the role of **blockchain and digital currencies**
- It is a decentralized, public ledger used to record information, such as transaction. Data is stored across many computers, so recorded data can't be feasibly altered
- First used for cryptocurrencies by providing a secure and decentralized record of transactions, but not limited to that use
- Blockchain is immutable, meaning that the data entering is irreversible and can't be changed





## Utility of Blockchain (opportunities in trading/markets...)

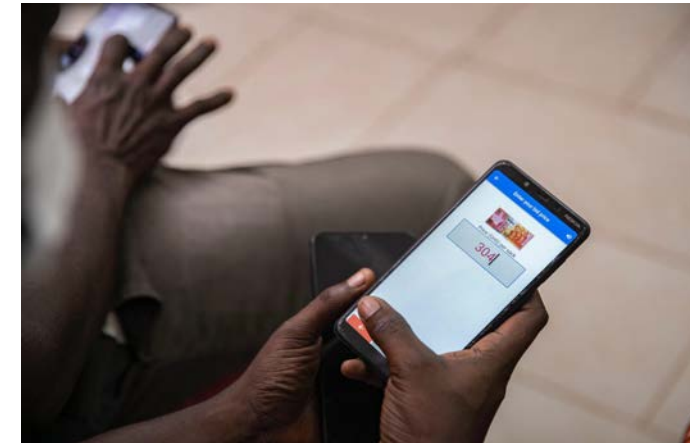
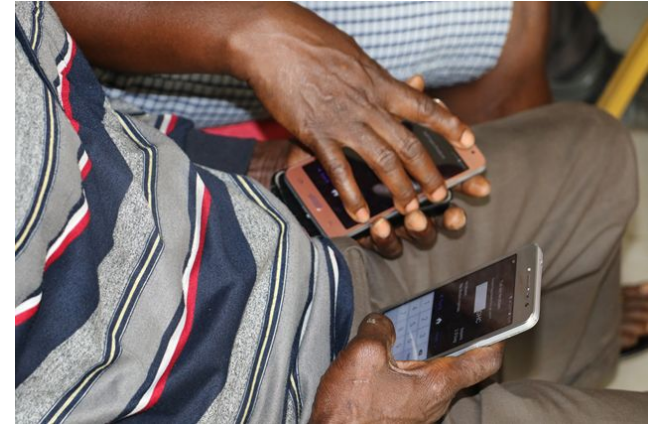
- Faster and safer, Targeted Transactions (Domestic markets, aid and financial assistance)
- Provide “banking” services to the unbanked population, which was 70% in Ghana’s in 2014 (Bank of Ghana)
- Trading across nations (International markets) (low transaction fees...)
- Monitoring and Authentication combined with Privacy Securely and publicly record all transaction conducted on the network Create a public database, which is immutable and secure
- Supply chain tracking (recording produce from farmer to final destination)





# CTED Blockchain Project

- **Blockchain mobile app** (in development stage)
  - Used to connect users (farmers, traders, vendors) on the blockchain
  - Allows users to buy and/or sell products, and the transaction gets permanently and publicly recorded on the blockchain network
  - Can trade in any token, including our own custom made CTED tokens (Note: CTED token has no value, we only give it value if we allow it to be exchanged for real money at any of “our vendors”)
  - All the transactions are transparent and publicly available, and so are the listed products...

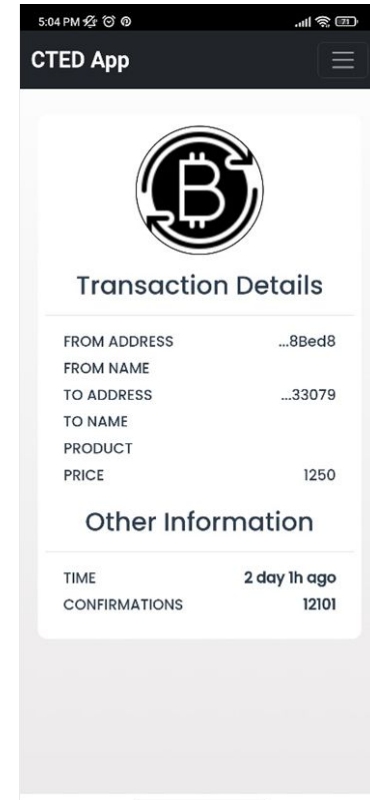
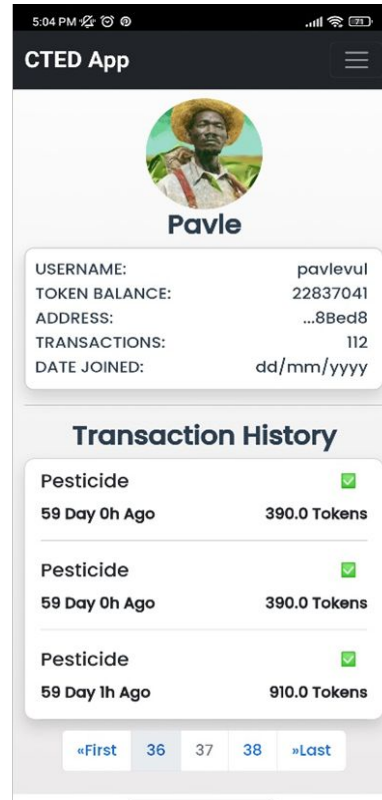
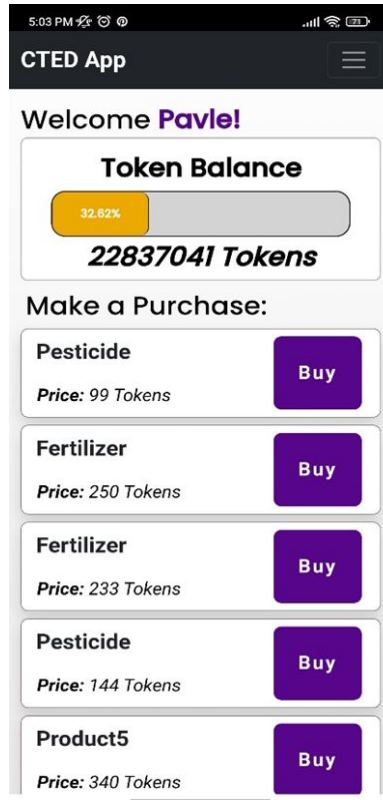


# CTED Blockchain Project

- Could be implemented in the **Credit project**:
  - Farmers could get credit in terms of our token on the blockchain app
  - They can use it to buy required products at designated vendors (who later exchange that token with us for money)
  - Compared to cash, this ensures that we could track every transaction made with the credit, ensuring that the credit is spent on the intended benefits
  - These tokens are unforgeable and can only be used for the intended purpose
- Could be implemented in the **Trade Fairs**:
  - Traders and farmers could use the app to complete trades
  - All trades and relevant trade details would be securely and immutably recorded on the blockchain network



# CTED Blockchain Project: Quick Look



# Central Bank Digital Currency (CBDC) of Ghana

- Bank of Ghana (Central Bank) piloted their first CBDC, called e-Cedi
- It intended to complement and serve as an alternative for physical cash, and is still in early pilot stages
- Electronic e-Cedi tokens will be backed by the Ghana government, and will aim replace coin minting or printing paper notes
- One of the motivations for creating e-Cedi was to provide a safer alternative to cryptocurrencies, as e-Cedi would be issued and guaranteed by the central bank.
- e-Cedi would facilitate both online and offline transactions



# E-commerce in Ghana

- Ghana has approximately 15 million internet users who are buying online every day.
  - Leading local E-commerce platforms include Hubtel, Jumia, Plendify, Jiji, as well as Uber Eats and Bolt Food.
- There are approximately 40 million mobile phone connections and six million active social media users.
  - Many are young people between the ages of 16 and 35.
  - About 79 percent of users online have a smartphone, and they spend an average of three hours online daily
- Mobile money and debit payments such as those offered by Emergent, TechHustle, Vodafone, and MTN, are widely used by consumers
  - E-commerce payment platforms allow for a wide range of payment options beyond just major credit cards.



# Digital Platforms in Ghana

- In 2022, the World Bank today approved \$200 million to help the Government of Ghana increase access to broadband, enhance the efficiency and quality of selected digital public services, and strengthen the digital innovation ecosystem in Ghana.
- Ghana Digital Acceleration Project is supporting a regulatory shift to create an enabling environment for digital inclusion and innovation; streamline governance and delivery of public services; and facilitate smallholder engagement in data-driven digital agriculture.

