DESIGN OF A SILO FOR RURAL AFRICAN FARMERS

Main issue:
Food loss:
• 1/3 of all food produced is wasted
• 30% of all food produced gets lost from field to fork

Context:
• Develop a low cost silo for rural African farmers with integrated sensors
• Reduce food loss due to bad storage conditions
• Give more power to small holder farmers

Info about the farmers:
• Each farmer has an average of 1.6 acres of land
• They live on an average of 1400 $/year
• They live in small communities

Hypotheses:
• Make it under 50 $/farmer
• Focus on Kenya: Rift Valley, the region with the most appropriate climate for agriculture and the best cell phone coverage in Kenya
• Focus on maize: most produced and consumed type of crop in Kenya
• Make it for a group of 10 farmers.

Silo:
Main Idea:
• Should be filled, emptied and stirred manually.
• Engineless mechanisms
• Emptied every week
• Must be hermetic

Material:
Locally produced and relatively cheap: Steel because of its good mechanical properties, its availability (local steel facilities) and its price

The Design:
An optimized cylinder with two openings, one in the roof for the filling, the other on ground level with opening mechanism that can be locked

Sensors:
Different sensors and chips used to measure the most important parameters to keep the crops safe:

Temperature & Humidity sensor:
Measure the temperature and humidity gradient therefore allowing the farmer to detect the air quality and the potential growth of moisture. DTH 22 (1)

GSM communication:
On board chip that gives access to 2G Network and allows communication via text messages. A6 Breakout Board (2)

Capacity sensor:
Measures the fullness level so each farmer is aware of the quantity of crop inside the silo. Infrared Proximity sensor Sharp 2Y0A21 (3)

Arduino Uno:
Open source computer hardware chip. (4)

All the data will be sent to the farmers. and can be transferred later on to the Buhler Cloud

Future developments:
Communication with the Buhler Cloud
Field testing and NGO financing

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