

Executive Summary

The delayed arrival of information - information latency - in global agricultural value chains negatively impacts all stakeholders involved, threatening profits and increasing risk in a volatile market. Acopio confronts this problem with web and mobile information management tools that facilitate the flow of data within supply chains, thereby helping rural smallholder farmers (1) increase their operational efficiency; (2) gain access to credit and fair trade/organic certification; and (3) improve relationships with their buyers in the specialty market. We are developing a technology designed to make data aggregation, analysis and delivery more efficient and affordable than ever before. Our solution has the potential to improve the lives of millions of farmers around the world.

Agricultural cooperatives in the developing world play a pivotal role in providing access to financing, markets and technical assistance for smallholder farmers. Yet, cooperatives often lack the resources and skills necessary to access modern information management systems. The rural and remote context without reliable electricity or internet connection in which this information is collected would make implementing most modern tools extremely difficult as well. We've observed first-hand that poor information management contributes to operational bottlenecks, errors, and opportunities for corruption, which severely limit the potential of agricultural producers.

Our tools are designed to tackle these challenges head-on. Acopio's information systems enable cooperatives to automate the aggregation, analysis, and sharing of their data – data that is vital to managing their operations, accessing financing, and marketing their products. The result is a more profitable coffee value chain in which all industry stakeholders – and especially

smallholder cooperatives – are positioned to earn greater revenues at lower risk, and in a more transparent and accountable manner. Beyond coffee, we believe that our solution can be applied in the agricultural value chains of products such as tea, cocoa, and cashew nut. The market for Acopio’s product therefore includes hundreds of thousands of cooperatives and millions of farmers.

Our team began working on Acopio in the spring of 2011 and we have spent the past year iterating on and refining our idea, field-testing our assumptions, building software tools, and building relationships with industry stakeholders. Much of our progress to date has been accelerated through the generous support of our primary adviser, Professor Tapan Parikh of the School of Information, and numerous students on the UC-Berkeley campus. In this document we intend to describe the problem space that we’re working in, share our solution, and detail our efforts to date.

The Problem

Agricultural Development and Coffee

A recent World Bank report states that the majority of the world’s one billion people living in extreme poverty rely on agriculture for their food and income.¹ Multilateral aid agencies and major philanthropic organizations have correspondingly identified agricultural development as the most effective vehicle for breaking the cycle of poverty. These organizations are working to provide small farmers with tools and training to create the opportunity to boost productivity and

¹ World Bank, *World Development Report, 2008. Agriculture for Development*.
<http://siteresources.worldbank.org/INTWDR2008/Resources/2795087-1192111580172/WDROver2008-ENG.pdf>

increase incomes. The field of agricultural development typically includes three categories: staple crops, cash crops, and fruits and vegetables. Thanks to high export premiums, cash crops often provide the best income-generating opportunities for low-income rural communities.

Among cash crops, coffee is considered the most profitable and is often referred to as “black gold”. Nearly 100 million people worldwide participate in coffee production², the majority of whom are smallholder farmers whose livelihoods depend completely on coffee crops. Most toil in rural locations largely disconnected from the markets where their coffee is bought and sold. An \$80 billion industry globally, coffee currently trades at prices higher than seen in 14 years in importing nations, yet rural coffee producers struggle to break even on the crops that they and their communities depend on.³

Agricultural Cooperatives

Agricultural cooperatives in the developing world play a pivotal role in supporting these producers. Groups of small producers organize into cooperatives to achieve economies of scale and bypass intermediaries through direct sales to buyers. Cooperatives also provide agronomy expertise, support fair trade and organic certifications, and manage the allocation of dividends earned through the production of such specialty coffees. While cooperatives are member-owned, they must still take ownership of harvested coffee produced by their members before processing and selling it. In doing so, they compete on price with local middlemen and the volatile New York ‘C’ market.

² Stephen Castle. “The Real Price of Coffee”, *The Independent*, October 27, 2006.

³ Aaron Smith. “Hyper-caffeinated coffee prices hit 14-year high”, *CNN*, February 18, 2011.

While cooperatives play a pivotal role in supporting farmers, they often lack the capacity and technology to conduct their business using modern information management practices and tools. The paper-based practices prevalent at cooperatives – even those exporting millions of dollars of product annually – critically limit cooperatives’ ability to support their farmers. Iris Shim, an Acopio co-founder, witnessed this problem while working with Rwandan coffee cooperatives during one of the country’s busiest harvest seasons. During harvest transactions, Iris observed human capacity constraints and poor information management causing severe bottlenecks, errors, and opportunities for corruption. Furthermore, capturing and relaying source information via paper-based processes was a central and avoidable cause of these constraints. Iris’ observations were affirmed by industry experts and cooperative managers in Africa and Latin America, as well as by buy-side actors in the United States.

Consequences of Information Latency

Poor information management at the cooperative level results in information latency, meaning that the information needed at each level of the value chain simply does not arrive in time to be fully useful. Information latency places cooperatives in a compromised position within volatile markets, profoundly limiting their ability to make well-informed business decisions and adequately manage risk. Furthermore, information latency ties up valuable human and financial resources and limits access to finance - two critical elements needed to help cooperatives move rural populations out of poverty.⁴

⁴ William Foote. “TEDxBYU - Willy Foote - Root Capital: Pioneering Rural Finance for the Missing Middle”. April 11, 2011. Online video clip. YouTube.

From the perspective of cooperative management, information latency has many costs. Physical copies of paper-based transaction receipts must be transported from the field to the cooperative's office and staff must be assigned to the task of digitizing receipts by hand before any analysis is possible. Manual digitization diverts valuable staff time that could be spent much more productively, particularly in the chaotic months of peak harvest. Furthermore, transaction data is often not available to cooperative managers for weeks, if not months.

Information latency also increases the risk associated with price setting at the cooperative level. In interviews with cooperative staff like Javier Dominguez Arbildo, a manager with Sol e Café of northern Peru, we learned that cooperatives often form agreements with their buyers that allow them to fix the price of the contract when they see fit, using information about inventory and the international price of coffee as guidance. Without up-to-date knowledge about his inventory, Javier is unable to make time-sensitive decisions about when to fix the price of his contracts, which places his cooperative at a disadvantage in the international market. With real-time information, however, Javier can dramatically reduce the price risk for his cooperative, a persistent source of anxiety and often a significant cost for cash crop cooperatives.

Finally, information latency has a negative impact on cooperatives' ability to access capital. With capital requirements in the \$100,000-\$2,000,000 range, producer cooperatives are often perceived as too large for microfinance lending programs and too risky for traditional banks. Without access to capital, cooperatives are unable to grow their operations, invest in productive infrastructure, or pay farmers at the time of harvest. As a result, farmers that struggle to cover production costs may forego the social benefits and future dividends paid by their cooperative in favor of selling to local middlemen buyers for slightly higher upfront prices.

Information latency seriously limits the visibility of banks and other lenders into cooperative operations, increasing the risk associated with lending. If cooperatives were able to track the volume and quality of product in real-time as it moves through the commodity chain, they could provide that information to lenders. With information acting as collateral, cooperatives can access capital and achieve the liquidity necessary to pay farmers higher upfront prices.

The consequences of information latency have plagued the specialty coffee industry for decades. However, specialty coffee is an industry where quality and reliability are seen as the dominant factors of success. The importance of information management has largely been overlooked. We created Acopio because we believe solving the problem of information latency will foster transparency in the industry and unlock new opportunities for millions of farmers in the developing world.

The Acopio Solution

Our Approach

We believe that technology-enabled processes can facilitate significant efficiency gains in cash crop industries and ultimately increase the incomes of small-scale farmers around the world. To this end, we have created web and mobile-based information management tools that facilitate the flow of data within cash crop supply chains, thereby helping rural smallholder farmers (1) increase their operational efficiency; (2) gain access to credit and fair trade/organic certification; and (3) improve relationships with their buyers in the specialty market.

Our technology is primarily a platform for data collection and distribution. After observing procurement and data collection during coffee harvests in East Africa, El Salvador, Mexico, and

Peru, and speaking with cooperative managers and data collection officers, the team developed requirements for a data collection platform capable of serving the needs of rural agricultural cooperatives. These requirements include:

1. Data collection with and without internet connection or reliable electricity;
2. Streamlined data collection process that reduces the possibility of error;
3. Efficient data synchronization with a central database accessible by multiple offices; and
4. Flexibility to analyze data and produce reports for different stakeholders (e.g., banks, importers and roasters).

With this set of requirements in mind, we developed a browser-based application capable of caching data collection activities for offline use. Building it for the browser allows Acopio to be ‘hardware agnostic’, meaning that users can access the data collection functionality on any computer or mobile device that has a web browser. Designing for mobile devices, which can operate independently of reliable electricity, is critical to enabling data collection in areas with little or no reliable electricity.

The Acopio system auto-completes and auto-calculates as many fields as possible to ensure consistent, high-quality data

Backend	Application	Frontend
<ul style="list-style-type: none">▪ Scalable PostgreSQL database with support for geographic data▪ UC-Berkeley hosting with plans to move to Heroku for full scale deployment	<ul style="list-style-type: none">▪ Ruby-on-Rails framework for data management, user account management, and quickly deployable software-as-a-service model▪ HTML5 for offline caching	<ul style="list-style-type: none">▪ HTML5 + CSS3▪ Responsive web design via media queries to support mobile devices▪ jQuery to support autocomplete and live data verification

input. As soon as the device achieves an Internet or cellular data connection, it syncs to a cloud-hosted database. Once uploaded, information can be accessed by different functional areas within a cooperative, such as accounting, quality control and sales. These departments can analyze the data with confidence, knowing that they are working with the latest data. The Acopio system also features an interface for data visualization, allowing users to view up-to-the-minute data in a dashboard form. The system will ultimately offer cooperatives the ability to easily share their

data with stakeholders outside the cooperative, including banks and other financiers, importers, roasters, retailers, and consumers.

Our approach to software development has followed the “Lean Startup” model, wherein we rapidly prototype new features and functionality, deploy them to the field, and evaluate success and opportunities for improvement.

Competitive Landscape

We conducted a competitive analysis to best understand hurdles to adoption and challenges to our model. The most likely alternative to our product is the status quo. Many cooperatives, importers, and roasters view quality and reliability as their top priority, while traceability and transparency solutions are “nice-to-have’s”. However, as government regulation, producers and consumers begin to demand more information and accountability, stakeholders will be pressured to adopt better methods for tracking products as they move along the value chain.

A second alternative is Sourcetrace, an enterprise-level solution that offers tracking solutions to large-scale cash crop businesses. After speaking with the founder and learning more about the product, we believe that we are not competing for the same customers. First, small-scale agricultural cooperatives are unlikely to afford Sourcetrace’s product. Second, Sourcetrace is currently focusing its efforts on solutions for the financial services sector (e.g., mobile banking) rather than on small agricultural producers.

A third alternative is the Relationship Information Tracking System (RITS) from Sustainable Harvest (SH), a specialty coffee importer. SH is a strong advocate of increased transparency and traceability in the coffee sector and RITS offers some functionality that overlaps with Acopio.

This is the closest alternative to our solution, with a few key differences. First, the RITS system is being developed with proprietary technology and runs only on an Apple iPad, while we offer a hardware-agnostic system that is affordable and scalable. Second, the RITS system requires Internet connectivity to function, while our system operates independently of a reliable Internet connection. Finally, RITS is not currently available to organizations outside the SH network and we are unaware of any plans to bring RITS to market as a commercial product. We are in close communication with Sustainable Harvest and have discussed a potential collaboration.

Partnerships

The international coffee value chain involves a complex multitude of stakeholders, beginning with coffee producers and ending with coffee

Acopio’s stakeholder relationships	
Producer	Multiple cooperatives in Mexico (Maya Vinic), Nicaragua (COOMPROCOM), and Peru (Sol e Café)
Lender	Root Capital of Cambridge, MA
Importer	CooperativeCoffees of Americus, GA
Roaster	DOMA Coffee of Post Falls, ID
Retailer	VINT of Louisville, KY

drinkers. In researching this area and developing our product, we have established relationships and partnerships with a number of actors.

The Market

To date we have focused our efforts on specialty coffee cooperatives in Latin America. In the United States, the specialty coffee industry is growing at a blistering pace, with revenues expected to top \$18 billion in 2012.⁵ In addition to the market potential, many cooperatives in the

⁵ Hayden Kwast. “The coming specialty coffee supply crisis: How re-incentivizing the value chain can help mitigate the threat”. August 2010.

Latin American coffee sector have the technological and financial proficiency to ensure successful implementation. Finally, with multiple cumulative years of experience working in Latin America, along with Spanish fluency, our team decided that our efforts would yield the greatest results in Latin America.

Our goals of reducing information latency and increasing access to capital have guided our business and software development and have significant implications for our go-to-market strategy and future implementation plans. First, we have secured a strong partnership with Root Capital, a social investment fund that focuses on lending to small and medium sized businesses in the agricultural sector. This partnership has enabled us to easily access cooperatives, which significantly reduces one of the major obstacles to adoption. We have leveraged Root Capital's pool of client cooperatives to learn about existing processes and inform the design of improved processes. As we further develop the software, we intend to further leverage the lessons learned with these cooperatives to reduce switching costs and lower the barrier to adoption.

Second, we have focused our interactions with cooperatives and other stakeholders on understanding the key bottlenecks preventing trade financing in coffee. For example, high monitoring and evaluation costs are one of the most significant overhead costs of banks that lend to small and medium enterprises. This is due to higher risk levels involved not only with large loans but also with agricultural financing in general. With this in mind, we have begun incorporating elements of monitoring and evaluation reporting into our product design

Social Value Proposition

Acopio’s social value proposition rests on the theory that a technology platform through which smallholder cooperatives can increase efficiency, acquire affordable and reliable financing, and gain access to high value specialty buyers will ultimately increase the income and quality of life for smallholder farmers and their families. More specifically, Acopio will achieve social impact through the following metrics:

- Time and cost savings of data entry and evaluation;
- Increased disbursements of working capital/capital expenditure financing; and
- New export contracts with specialty buyers

By deploying Acopio’s tools, agricultural cooperatives can increase profitability through cost savings and improved access to financing and markets. These factors result in improved livelihoods for producers. We believe that Acopio will influence the impact indicators seen in the following Social Impact Value Chain:

Inputs	Activities	Outputs	Outcomes
<ul style="list-style-type: none"> ▪ Acopio ICT tools for agricultural cooperatives ▪ Near real-time information dashboards for stakeholders along the value chain 	<ul style="list-style-type: none"> ▪ Decreasing information latency within the cooperative and along the value chain ▪ Increasing access to financing ▪ Increasing visibility in the specialty market 	<ul style="list-style-type: none"> ▪ Cost savings at the cooperative ▪ Information-backed decision making at cooperatives ▪ Increase in loan disbursements to cooperatives ▪ Increase in deals with specialty buyers 	<ul style="list-style-type: none"> ▪ Increased profitability at cooperatives ▪ Larger profits retained by producers ▪ Increased access to pre-harvest financing ▪ Higher quality and volumes ▪ More deals with specialty buyers at a premium price

To quantify the social value of Acopio’s outcomes, we evaluated the estimated cost savings at each cooperative as well as the potential increase in profit for producers from increased access to financing and markets. Drawing from a study done on the costs savings at coffee cooperatives in

Latin America in 2009,⁶ mobile phone data collection was shown to save \$10,100 for internal control at a cooperative of 3,000 producers. Internal control consists of collecting surveys about farmer practices, evaluating them, and reporting the results to certifiers. Using this data as a basis for our evaluation, we expect that Acopio will save an average-sized cooperative a total of \$8,080 per year by decreasing the cost and delay involved in internal inspection, procurement and reporting. These costs savings translate into larger amounts of profits retained by member producers.

Furthermore, we estimate that the increase in access to pre-harvest financing and specialty markets will enable producers to grow higher quality “specialty” coffees that fetch a premium at market. The premium for organic production is currently \$0.30 per pound, which is achieved when organic producers can find a buyer willing to pay the premium. There are costs associated with organic certification and production, and it can sometimes be difficult to sell the entire organic crop at the full premium. We therefore assume that only 15% of the potential amount of benefit from organic premiums can be realistically achieved as a result of market visibility through Acopio. Our resulting social value calculations are conservative and have a correspondingly high likelihood of success.

We also take into account the possibility for cooperatives to trade directly with buyers as a result of using Acopio. These types of deals occur when a roaster looking for high quality product connects with a cooperative growing high quality coffee. Direct trade premiums can be even greater than organic premiums, but are harder to come by. We therefore assume that only 15% of

⁶ Yael Schwartzman, Mario Vila, Tapan Parikh. “Automating Internal Control at a Coffee Cooperative using Mobile Phones Improves Efficiency and Accountability”. 2009.

direct trade benefits can be attained through Acopio. Using these figures as a baseline, we calculate that individual producers will benefit from a \$122.10 increase in profit per harvest as a result of better access to financing and markets.

Our five year projection is to engage with 300 cooperatives with an average of 800 members per cooperative and an average working capital requirement of \$250,000. Reaching this goal, Acopio will have saved cooperatives over \$2.4 million and increased the livelihoods of 240,000 producers by a total of \$29.2 million. This results in a net present value of \$30.5 million.

Additionally, Acopio has the potential to directly impact the performance of financial capital totaling over \$60M through our collaboration with Root Capital.

Acopio amplifies the impact of agricultural cooperatives through cost savings and directly benefiting producers by increasing profitability of their activity. The revenues generated from coffee production are usually the primary source of income for most producing families. The amount of money a producer receives for his crop during the harvest must suffice for the rest of the year to buy food, provide for education, housing, and health care for their families. By increasing the livelihood of farmers Acopio can make a significant difference in the quality of life of the producers it reaches. Acopio also encourages the transition to organic practices by decreasing the cost involved in certification/internal inspection as well as providing the market access necessary to be able to sell such coffee at a premium. Organic production protects local ecosystems, is safer for producers and consumers, and better for the environment. As a technology that can be applied at cooperatives around the world across different cash crops, Acopio has the potential to empower cooperatives, improve quality of life for small producers, and help protect the environment.

We have based our financial and social valuations on numerous interviews with industry experts, months of field research, and a thorough review of published academic research. We believe that our estimates are realistic and achievable.

Progress to date

Since early 2011, we have achieved four major milestones:

1. Completed Two-month Field Research in Mexico

Acopio team members spent the summer of 2011 conducting research in the coffee producing regions of Oaxaca and Chiapas, Mexico. We interviewed coffee farmers, cooperatives, and lenders with the goal of testing our assumptions and refining our concept.

2. Secured a Strong Partner

We have developed a formal partnership with Root Capital, a social investment fund that has lent over \$330 million to small and medium business around the world. Root Capital fits particularly well with our model, as working capital financing for coffee cooperatives dominates their portfolio.

3. Field-tested Technology Solution in Nicaragua

This past fall, Acopio launched a pilot effort with COOMPROCOM, a Nicaraguan coffee cooperative that is also a client of Root Capital. We rapidly built a working prototype that allows for data collection on a mobile device or a PC with or without an Internet. We also built out the rudimentary functionality required to instantly share the data collected. We are currently applying what we learned in this exercise to the creation of a robust, fully scalable system that reflects the requirements of our stakeholders.

4. Validated Concept through Competitions and Awards

In the past year, we have won the following competitions and awards and raised in excess of \$47,000 in funding.

- First place in the CITRIS/Big Ideas Competition (Spring 2011)
- First place in the UC-Berkeley School of Information Information and Communications Technology for Social Enterprise course (Fall 2011)
- In-kind support from Root Capital (Fall 2011)
- Clausen Center International Business Fellowship (Summer 2011)
- UC-Berkeley School of Information Nonprofit Internship Grant (Summer 2011)
- First place in the Big Ideas Competition – Scaling Up category (Spring 2012)

Conclusion

We have spent the past year interviewing potential users in the field, building software tools, forming relationships with critical actors in the value chain, and gaining industry knowledge and experience. With the support of various students, advisers, and institutions on the UC-Berkeley campus and beyond, we now intend to complete our Master's program and launch a venture designed to take on the problem of information latency and help farmers in the developing world increase their incomes.