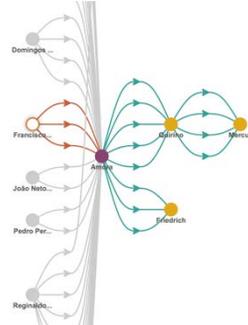


A User-Centered Approach to Transparency and Traceability with Smallholder Supply Chains

A Sourcemap™ White Paper



Field-level transparency and traceability powers actionable risk and sustainability analytics across vast smallholder networks.

Introduction

Dozens of major brands have made commitments to responsible sourcing: ensuring that their supply chains are free of exploitation, deforestation, and legal non-compliance. Before these commitments can be met, companies need to find out exactly where their raw materials are sourced. Worldwide there are more than 570 million farms which use less than 2 hectares of land – so-called smallholder farms. Reaching these farms is essential to improving sustainability and productivity. Existing traceability approaches are too complex to reliably map and monitor such a vast farm area. But thanks to a shift toward transparency in business and a new generation of databases and encryption technologies (including blockchain) it has finally become possible for brands to account for every smallholder in their end-to-end supply chains.

This paper describes the implementation of transparency and traceability platforms for smallholder agricultural supply chains in Brazil, Indonesia, and West Africa. These deployments include more than 200,000 individual smallholders over the past 5 years. Typically requiring only weeks to deploy, the transparency and traceability platforms have all been in continuous use

for more than one year by multinationals in the food and beverage, health and beauty industries.

Description

Supply chain *transparency* (also called supply chain mapping) is an emerging business process whereby manufacturers volunteer information on their suppliers to customers and/or consumers. Leading brands increasingly expect supply chain transparency from their suppliers as a first step to assessing performance and risk of the end-to-end supply chain. Suppliers who are proactively transparent often benefit from better visibility, streamlined certification and the ability to charge a price premium for an otherwise commodity product.

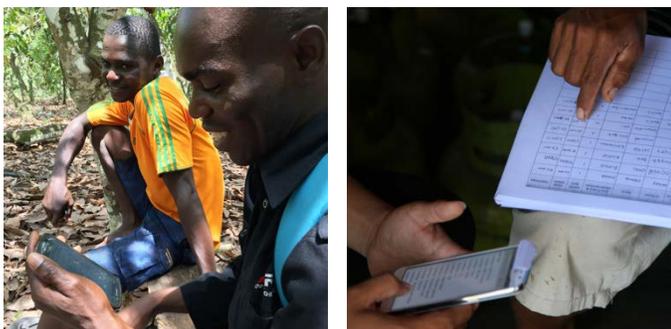
*There are more than
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farms worldwide*

Supply chain *traceability* is the process of recording every transaction to monitor chain of custody across one or more steps of a supply chain. It is essential to verifying the identity of trading partners and providing continuous assurance that products are authentic, safe and effective. In industries such as pharmaceuticals and produce, batch-level traceability is required by law to streamline the identification and recall of potentially harmful products.

While traceability is traditionally limited to tracing finished products to consumers, the combined approach of transparency and traceability enables products of any complexity to be traced through the

end-to-end supply chain: from raw material to processing, manufacturing, distribution and sale. The recent introduction of distributed blockchain ledgers means that even when there is total supply chain transparency, each supply chain stakeholder maintains control over sensitive commercial information.

Together, transparency and traceability allow companies to account for the 'externalities' of business: indirect factors such as risk, sustainability and sub-supplier performance that have a direct business impact despite occurring one or more steps removed, in the extended supply chain.



Two types of proxy data collection for traceability outside internet connectivity: a proxy interview (left) and a proxy capturing transaction records (right).

How it Works

Transparency and traceability are not new to supply chains, but they were too complex to be implemented with large groups of smallholders until recent innovations. Smartphones, enterprise social networks, mobile payments and blockchain have considerably expanded the reach of transparency and traceability to smallholders in forestry, palm, cocoa, coffee, cotton, and other critical commodities. It works as follows: stakeholders from every tier in the supply chain opt in to a central platform by registering online, via mobile app, or, through a 'proxy': an auditor, official, trader or community representative who visits smallholders in person and captures their information on a tablet or smartphone. Then, every transaction between stakeholders is captured through the same platform by uploading the lot number and stakeholder ID at every shipping and receiving step.

Once smallholders are registered, the platform can also be expanded to collect additional data on compliance, sustainability and productivity of the smallholder farm and household. This information serves as an essential baseline to determine the issues facing the supply chains, and by visiting the farm at least once a year the conditions can be monitored for progress.

All collected data (registrations, transactions, and baselines) are uploaded in near real-time: data entered online joins the database instantaneously while data collected using the mobile app is synchronized as soon as the proxy connects to the internet. Once the data joins the central database, a series of dashboards are updated for review by various stakeholders. Farmers, traders, cooperative and farmer organizations, warehouses, processors and manufacturers can each keep track of the farms and the individual batches of products they make or buy. Some stakeholders, especially corporations tracking responsible sourcing standards will see the aggregate performance of their supply chain compared with pre-established targets. Customers can also be given access to a database showing a map of every farm supplying their finished goods. To learn more about the potential of supply chain visualization to unravel actionable intelligence from extensive supply chain networks, see the companion paper on [End-to-End Supply Chain Visualization](#).

User-Centered Design

Smallholder traceability can be challenging because of the vast number of stakeholders and the socio-economic divides between producing communities, traders and the different processors, manufacturers and brands across the supply chain. A successful transparency and traceability solution needs to bridge a number of divides:

- Different languages and technical jargon used at every step of a supply chain
- Differing levels of access to hardware, software and the internet in different locations
- Various types of formal and informal business accounting practices

- Privacy, security and other data regulations in each locality involved

A user-centered design process is essential to ensuring rapid deployment and ongoing adoption of a transparency and traceability solution, a process that involves representatives from each tier in the supply chain. The collaborative approach extends through the life of the supply chain, through design workshops, on-the-ground configuration and testing, and ongoing service, support, and updates to the platform.

User-centered design helps ensure that traceability is adopted at every tier of the supply chain

Agile Deployment

A phased or 'agile' deployment approach saves time and resources by providing multiple opportunities for adjustments along the way. Whenever possible, design workshops and implementation should occur in-person to increase alignment and save time. A typical rollout is as follows:

Weeks 1-2: Discovery

A comprehensive review of historic supply chain data, sustainability and performance indicators and targets.

Weeks 3-4: Design workshops

Representatives from every step in the supply chain participate in collaborative needs-finding and design discussions.

Weeks 5-6: On-the-ground implementation

A forward deployment team is sent to a representative region to implement the transparency and traceability data collection surveys and online forms and train pilot users.

Weeks 7-9: Ongoing data collection

Once the pilot platform has been launched, the data is continuously monitored to ensure adoption, accuracy and verifiability of results over 3-6 weeks.

Weeks 10 and onwards: Supply chain-wide rollout

The pilot platform is hardened and a series of interactive and offline training materials are disseminated to the broader supply chain.

Ongoing: Verification

The task of verifying ongoing, accurate and timely data collection needs to be assigned to stakeholders at every stage of the supply chain, as well as to third-party auditors and certifiers to ensure the quality and completeness of the platform.

Quarterly Target reviews

When transparency and traceability are carried out to monitor progress toward responsible sourcing and performance targets, it is recommended to hold quarterly target review meetings with key decision-makers. Targets may be adjusted as necessary; all changes are tracked.

Annual: Indicator review

When collecting sustainability and performance data it's important to keep the data collection surveys consistent as long as possible, but an annual revision of the questions, answer options, help documentation, indicators and text is usually necessary.

Optional: Integrations

As an option, brands and manufacturers may choose to integrate the data collected through the transparency and traceability platform with legacy third-party purchasing systems such as ERP, PLM, CRM.

Findings

Since 2013, Sourcemap has implemented smallholder transparency and traceability platforms in four countries (Côte d'Ivoire, Ghana, Brazil, Indonesia) engaging 50,000 smallholder farmers directly and more than 200,000 others indirectly. The first implementation required 18 months to complete, largely because the platform was initially deployed remotely and usability problems were not evident to the implementing engineers. The most recent implementation required 6 weeks thanks in large part to the following learnings.

Real-World KPI's

In early implementations, considerable time was spent attempting to translate corporate targets into actionable data that could be feasibly collected on the ground. Initially, targets were too vague ('farmers have stable livelihoods') and surveys were designed by experts with little on-the-ground experience (questions such as 'What was your household income in the past year?'). The result was a series of lengthy, complex surveys asking questions that farmers were unlikely to be able to answer or had no motivation to answer sincerely. Months of effort were spared by going directly to producer communities with a clear idea of high-level corporate metrics, and working with producers themselves to understand what questions are answerable and what corresponding indicators are realistic.

Translation

Translating corporate targets into questions that are answerable by smallholders relied on user-centered design of the data collection templates themselves. In ideal cases, respondents to the surveys are asked to talk through their thought process as they answer various questions (or as they interview a farmer). The resulting learnings are used to modify the questions and hint text, and the survey is rolled out within less than an hour to another user for live testing. Some of the learnings are very specific to local conditions, so that a global smallholder traceability platform will have slightly different wording for each growing region. For example, a high-level target such as 'access to fertilizer' has to be translated into specific quantities and brand names used in the region being surveyed. The same attention to local detail applies when discussing growing seasons, for example calendar months are not as relevant as 'before/after the small/large rainy season' for respondents in West Africa.

Verification

Early implementations of mobile and online transparency and traceability suffered from the lack of an explicit verification workflow, leading to inconsistency and non-compliance. Verification serves a number of functions: ensuring that field staff and

proxies are meeting targets to visit smallholders, verifying adoption on the online platform, and scrutinizing a sampling of submitted data for errors and inconsistencies. Additional verification in the form of scanning and reviewing raw data from farmer ledgers, and in-person audits of farm practices and household conditions was essential to understanding the accuracy of data collected. Verification was handled by appointing local staff and independent certifiers to review a specified number of entries directly in-platform, and submit the results as a separate data collection template so that it could join the database of transparency and traceability data.

Connectivity

Despite recent advances in global internet connectivity, all of the areas in which smallholder transparency and traceability were implemented had little to no mobile internet connectivity. The mobile app was specifically designed to work securely and robustly for days or weeks before re-connecting to the internet. Data is stored encrypted on the device and protected by a password, and automatically uploaded to the virtual private cloud platform once a connection becomes available. Taking advantage of built-in metadata (IMEI, GPS, timestamp) had numerous advantages including ensuring authentic on-site data collection and creating an audit trail for all submitted data.



Examples of target-tracking dashboards for corporates (left) and cooperatives (right)

Mutuality

During onsite implementation, a number of participants (smallholders, traders, cooperative and

farmer organizations) expressed interest in dashboards they could use to monitor their own performance. Sourcemap implemented cooperative- and processor-level dashboards for these groups to see their own registered members, overall transaction numbers and performance against social and environmental criteria. Providing feedback at every level of the supply chain adds an incentive to ensure continuous adoption and verification of data collected.

Logistics

Given the cost and time required to visit many smallholder farms, particular attention has to be paid to efficiently planning the logistics of any smallholder transparency and traceability implementation. This include designing any data collection surveys to be as brief as possible (ideally 10-20 minutes). In some regions fuel costs are the greatest expenditure in smallholder outreach, so planning field visit routes efficiently and reducing visit frequency can have an important impact on implementation success. Given the cost of travel and the likelihood of device failure, it

is essential that field teams have backup power sources and smartphones on hand.

Conclusion

Over the past five years, Sourcemap has implemented real-time traceability solutions for some of the world's most remote, complex supply chains. A number of design process and technological innovations helped reduce the implementation time from more than one year to under two months. In every case, however, the success of smallholder transparency and traceability was driven by one factor above all: alignment around a shared corporate vision of responsible sourcing for every tier in the supply chain. Whether by providing material and financial incentives, direct and indirect engagement, useful benchmarks and analytics, successful projects are market by a mutual benefit throughout the supply chain that makes the value of transparency clear to each participant involved.