

Redefining Food Safety:

TRACEABILITY & BLOCKCHAIN SYSTEMS



Table of Contents

Preface	03
1. Introduction	04
2. Hypothesis	05
3. Case Studies	06
3.1. Case I: The Role of Traceability in Landscape Conservation to Ensure Biological Diversity (WWF)	07 - 10
3.2. Case II: Rubber Traceability: SDG Alignment	11 - 14
3.3. Case III: From Bean to Cup: Ensuring an Effective Coffee Value Chain (Sucafina)	15 - 19
3.4. Case IV: Following the Cocoa Trail: A Value Chain Concept (Rainforest Alliance)	20-23
4. Conclusion	24
5. Traceability: How CropIn Does It	25-28

Preface

As our world shifts in a direction towards digitisation and sustainability, unique challenges constantly impede our progress. However, these challenges give room for new opportunities that provide businesses around the globe with creative new ways to capitalise on this growing trend. Digital technologies in the agricultural sector has numerous applications and is oftentimes referred to as the 4th agricultural revolution; the digital revolution. In this context, traceability is one of the key features that is paving the way towards a future of sustainable agriculture, consumer confidence, and redefined standards for food safety.

This report is based on the webinar hosted by CropIn, **"Redefining Food Safety: TRACEABILITY & BLOCKCHAIN SYSTEMS"**. It highlights various applications of traceability along with some of the successful implementations across sectors. From landscape conservation to ensuring an effective value chain, we believe that traceability has the potential to become 'the next big thing'. The case studies in the report are based on the accounts provided by the speakers, who represent different businesses that have partnered with CropIn and undertake their own projects. Some of the topics addressed are as follows:

- The Role of Traceability in Landscape Conservation to Ensure Biological Diversity
- Rubber Traceability: SDG Alignment
- From Bean to Cup: Ensuring an Effective Coffee Value Chain
- Following the Cocoa Trail: A Value Chain Concept

The case studies touch upon and demonstrate how traceability can be used for a broad spectrum of agricultural activities and not just for farming. Blockchain is another technology that has potential applications when paired with traceability but hasn't yet grown in popularity in this case.

Finally, we discuss traceability from our perspective and how we, as a business, implement it in our services, and what it takes to do so. At the end of the day, traceability is emerging as a vital technology at a consistent pace, paving the way for the next global agricultural revolution.



1. Introduction



We need a of a dynamic food system that is safe and reliable for the end-user. Keeping a record of the entire production and distribution history can enable suppliers and agri-food producers to initiate and implement a robust traceability system for supply chain visibility and quality control.

The bond of trust between the consumer and an agribusiness is often built on this traceability information since it tells the consumer the complete story of the production cycle. But how can an agribusiness ensure that they are telling you the truth, the whole truth, and nothing but the truth? Ensuring compliance with the strict standards set by certification organisations across the world is not an easy task.

However, once a business can present a comprehensive report on all its processes, compliance can make the

food product an international sensation among consumers from distinctly different geographies. This is especially true since most products are made up of ingredients that are sourced from all over the country and often even span across countries. We have a global pantry and no matter how strict our regulations and food safety norms are, this widespread canvas makes it difficult for regulatory bodies to monitor each and every ingredient that lands up on our plate.

As a result, more and more companies are seeing traceability as the best way to keep track of what's happening with their products at every stage in the supply chain. Right from the producers and manufacturers to the wholesalers and retailers, everyone is recognising the importance of traceability as a means to increase transparency and minimise risks when it comes to food safety.

2. Hypothesis

Here at CropIn, we believe that our digital systems can be used to redefine the traditional concept of food safety in its entirety. Conventionally, individuals consider 'food safety' to be what goes into your food. Are the ingredients safe? Are there any unnatural preservatives? What about the presence of harmful chemicals?

No. We insist that our farm-to-fork traceability goes back several steps prior to where it all begins. All food comes from the Earth and hence it is essential to investigate all the way down the supply chain from the distributors, to all the players before them before finally reaching the farmers, the source of all produce.

By using CropIn's systems and services, we will be able to provide businesses with **complete traceability** of their products all the way through **their supply chains**, which would ultimately improve food safety.

It is our theory that traceability is a necessity for robust and sustainable supply chains. Using CropIn's systems and services empowers businesses with **complete end-to-end traceability** of their product, which would ultimately improve the standards for **food safety**.





3. Case Studies

In our webinar: 'Redefining Food Safety: Traceability & Blockchain Systems', we had 5 brilliant speakers, who each discussed how their respective organisations implemented traceability and what their first-hand experiences were in doing so. They spoke about how traceability (and in one instance blockchain) has helped them solve age-old problems and achieve their goals in the process.



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3.1. Case I: The Role of Traceability in Landscape Conservation to Ensure Biological Diversity (WWF)



Speaker: Gaurav Gupta

Head of Conservation Landscape,
WWF Myanmar

Gaurav leads WWF's conservation programme in the Dawna Tenasserim landscape in Myanmar. He is responsible for building strategic alliances and delivering conservation outcomes in partnership with the private sector, civil society organisations, and the Myanmar government, in order to protect the unique biodiversity of this landscape.

3.1. Case I: The Role of Traceability in Landscape Conservation to Ensure Biological Diversity (WWF)

A Global Problem:

It is widely known that our current food system is drastically inefficient. Nearly 33% of all food produced globally goes to waste. On the one hand, there are over 800 million people who go to bed hungry every night while, on the other hand, 1.9 billion people are overweight or obese. This problem is only going to escalate in the upcoming years, as by 2050 it is estimated that 70% more food would be needed to sustain our surging population.

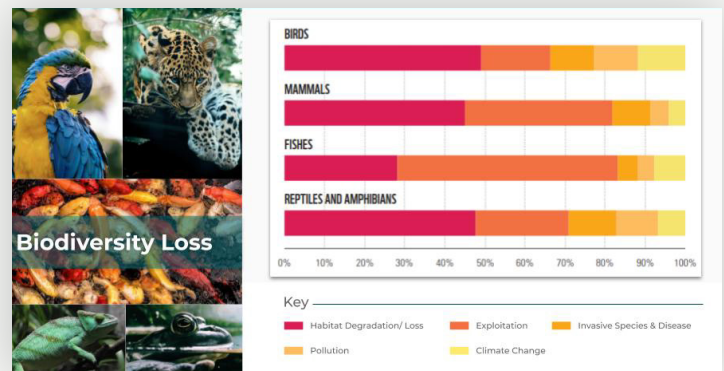
In general, wastage in low-income countries happens at the distribution level, whereas in high-income countries, the waste tends to happen at the consumption level. The reason behind this is simple economics. The supply of produce is high in low-income countries as they generally have a larger primary sector exporting a lot of their produce. However, they lack knowledge, capital, and technical advancements as food ends up getting wasted during harvesting and in storage. At the same time in high income countries, the more technologically advanced systems ensure that the food gets harvested and delivered with minimal wastage. However, due to an indifferent attitude towards the global food problem on the part of the consumers, a sizable portion of food gets wasted.

Challenges:

Over the last 70 years, around 80% of forest cover has been destroyed or irreversibly damaged. Out of this, 73% has been driven by the agriculture industry and related practices. The Living Planet Index (LPI) indicates that since 1970 we have lost about 70% of the total global biodiversity. The primary causes for this biodiversity loss are habitat degradation and overexploitation of natural resources.

Several underlying drivers impact biodiversity loss. In tropical countries, the major issue is a lack of land use planning. Without proper systems in place, agricultural

land is not used to its full potential and farmers end up clearing more forest cover to make room for crops. However, the effective use of crop rotation would instead improve efficiency and the total output on agricultural land. Another issue is that smallholder farmers in these landscapes only have very limited access to resources like government services, high quality seeds, marketplaces to sell their produce, and financial capital for investment. Most of these farmers also hold insecure land titles, and there have been many instances of farmers losing their land over this. However, in recent years, there has been a growing trend by governments across the globe towards providing aid for smallholder farmers.



Agenda:

The following methods have been tried and tested, and enable traceability to ensure farmer welfare and conservation of the regions' biodiversity.

- Integrated land use planning: By planning and managing land use with all the farmers in the region, acres of forest area can be saved as farmers would feel inclusive working within their land and won't find the need to clear more area for cultivation.
- Organise farmers in buffer zones: By building small farming communities within buffer zones.

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- Leverage analytics to address the underlying drivers: All the data collected can then be analysed to arrive at the best solution for the problems in the region.
- Track all transactions from farm to fork: By recording all transactions between all stakeholders starting from the farmer, supply chain activities can be tracked all the way down the supply chain to the final buyer.
- Register farmers' livelihood details: Digital profiles of all farmers can be uploaded to a central database, along with their geo-spatial location, the crops that they are planting, whether or not they are following the recommended farming practices, etc.

Solution:

While the use of traceability makes it possible for organisations to track farmers efficiently based on their geospatial coordinates, satellite monitoring and remote sensing technologies enable them to capture deforestation in areas identified as no-go zones. Satellite images of the targeted area taken periodically can be overlaid over old ones to check if there has been any loss of forest cover. In areas where logging activities have been identified, the organisations can initiate further investigations and the farmers engaging in

unsustainable crop production can be removed from the supply chain. However, the goal is not to penalise these farmers, but rather to support their livelihoods, especially in the buffer zones. These farmers, who now have better access to financial services and are organised based on the land use plan, show a greater inclination towards conservation of the biodiversity in their region. Ultimately, this results in slowing down and preventing further biodiversity loss through the use of traceability in the long run.





3.2. Case II: Rubber Traceability: SDG Alignment



Speaker: Kavickumar Muruganathan

Agri-commodity Sustainability Specialist,
Technical University of Munich (ex-Halcyon
Agri Corp Ltd.)

Kavickumar is a seasoned sustainability, communications, EHS, and risk management professional with over 10 years of experience across Europe, APAC & Africa. His specialities include ESG risk, digital strategy, renewable energy, circular economy, sustainable finance, ethical supply chains, sustainability strategy & reportings, and greenhouse gas inventory.

He holds a Masters Degree (Environmental Management) from the National University of Singapore and an MBA from the Manchester Business School.

3.2. Case II: Rubber Traceability: SDG Alignment

Agenda:

The natural rubber industry is one that faces constant challenges, such as illegal logging and deforestation, inadequate wages for farmers, as well as other social and environmental issues. Through the use of technology and ultimately traceability, many of these challenges can be tackled, while also aligning with the United Nations' Sustainable Development Goals (UN SDGs). The following are methods in which these goals can be achieved.

- Technology as an end to end measure for traceability
- Aligning intertwined goals to maximise impact
- Leveraging data to create a positive social impact

Opportunities:

Harnessing technology to identify risks & opportunities in natural rubber supply chains:

The use of CropIn's digital solutions — farm management, satellite imagery, and AI technology — enables the collection and analytics of data. Actionable insights derived from it can benefit the farmers by helping them improve their agri-productivity and subsequently the crop yields.

Enabling technological literacy and creating social mobility:

Technology needs to be successfully implemented on both ends, providing farmers with the opportunity to educate themselves and join the growing network of digitisation.

SDG Alignment:

Nearly 95% of all farmers in the natural rubber supply chain are smallholders, out of which a majority of these farmers live below the poverty line. Using technology and services such as CropIn's allow all these farmers to be registered and tracked along with their geotagged

plantations. This further empowers stakeholders in the supply chain to achieve several UN SDGs, some of them even overlapping each other.

For example, gathering gender details of the farmers helps arrive at an accurate estimate of their gender proportion. The collected data can then be used to work towards the 5th SDG, which is Gender Equality, and the 10th, which is Reduced Inequalities. Additionally, by ensuring that farmers receive higher wages, they are automatically aligning with the 1st, 8th, and 10th SDGs, which are No Poverty, Decent Work and Economic Growth, and Reduced Inequalities respectively. Several parameters are being tracked to provide complete traceability. Some of them are:

- The density of the plantation (number of trees/unit area), which is tracked through satellite imagery;
- The age of trees in a plantation, which gives farmers a better idea of when to harvest, cut down, or replant new trees; and,
- The total land area

All these parameters help build a detailed profile of the farmer and plantation, which can then be analysed to accurately predict how much yield the farmers would get under prevailing conditions and how much they could potentially produce in the long run by adopting sustainable practices and maximising efficiency.



Digitisation success story:

A Singapore-based logistics and supply chain launched a project in a small region in Indonesia to map out 1000 smallholder rubber farmers in the process of developing

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an industry solution for traceable and sustainable natural rubber. Rubber plantations associated with each of these farmers were also geotagged for end-to-end visibility of the supply-chain. The organisation captured over 16 socio-economic & agronomic parameters to analyse yield over income statistics. The project was done as a pilot and there were many unexpected challenges in the process, however it eventually proved to be beneficial as it improved farmer welfare.

Some of the findings from this pilot study are as follows:

Firstly, low yields from the plantations resulted in farmers earning less than the minimum wage in Indonesia. This necessitated investment for new planting efforts to improve the yields, and consequently the income. For a majority of these farmers, access to finance was limited and without proper land title deeds, it was difficult for them to provide local banks with collateral that would help secure a loan.

Secondly, these farmers required extension services in

the form of capacity building, recommendations for good tapping practices to improve yields, access to good quality fertilisers, and finally in the form of market knowledge, such as the right price and the best market options to sell.

Lastly, ground truthing would be required to verify the otherwise qualitative data that was collected from the farmers. Hence, it was essential to revisit farmers periodically to review and verify this information and also harness other forms of technology, such as satellite imaging, to verify rubber-growing areas, validate the hectareage of the farmer plots, and determine tree density, which would pose a time-consuming challenge.

Traceability is a crucial element in a natural rubber supply chain given that it is currently disconnected and disjointed, and technology could be an enabler. However to do so, it would be necessary for the technology solution to be scalable and accessible by as many people as possible. Besides, farmers and traders are required to possess some technical literacy or otherwise be educated on it.



SUCCESS STORY

6 UN SDGs Achieved

- 1 NO POVERTY
- 5 GENDER EQUALITY
- 8 DECENT WORK AND ECONOMIC GROWTH
- 10 REDUCED INEQUALITIES
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 15 LIFE ON LAND

Project Area Challenges

- Low yields resulting in low incomes that are below minimum wage
- Investment for new planting needed
- Extension services for farmers required
- Ground-truthing

Project Region: Indonesia, South-East Asia

1,000+ smallholder farmers digitised and rubber plantations **geo-tagged** for visibility through supply-chain stakeholders | **16 Socio-Economic & Agronomic** parameters captured to analyse yield over income statistics

Capacity building via extension services, market knowledge and on-ground training reinforced through **data-driven ground truthing**



3.3. Case III: From Bean to Cup: Ensuring an Effective Coffee Value Chain (Sucafina)



Speaker: David Behrends

Head of Global Coffee Trade and Managing Partner, Sucafina

David is the managing partner and head of coffee trade at Sucafina, a leading sustainable “farm to roaster” coffee company whose history stretches back to 1905.

He has over twenty years of experience in coffee trading and traceability/blockchain systems with some of the leading organisations such as Louis Dreyfus Corporation, Noble Group / COFCO and Farmer Connect. David has completed his executive studies from IMD Business and INSEAD in leadership and business management.

3.3. Case III: From Bean to Cup: Ensuring an Effective Coffee Value Chain (Sucafina)

Opportunities:

In today's day and age, consumer attitudes are shifting rapidly towards a new direction, giving businesses many opportunities to capitalise on in the process. The new generation of millennials and post millennials possesses a higher degree of technological knowledge and expect to have data given to them. They are also more aware of data privacy and often won't believe the bold claims a business makes unless otherwise proved. This causes a persistent push towards traceability and supply chain transparency from these consumers.

To keep up with this shift in consumer attitudes, brands and retailers are exploring new means of engagement and face increasing reputational and regulatory risks. Traditionally consumers who buy from a supermarket would make a decision based on the packaging of the product. However, in a digitised world that is realising a massive potential other ways of consumer engagement as a result of the COVID pandemic, these businesses need to adopt new strategies. Through traceability and transparency, brands can provide data as a means of deeper engagement with the consumer, and also to gain a competitive advantage over other brands.

Processors and traders are looking for better data analytics and ROI information on operations and sustainability efforts. As these businesses are getting better equipped with technology, they can gain a deeper insight into their supply chain. This would allow them to compare factors like efficiency and productivity in real-time at each stage of their operations. Digitising the supply chain exposes weak links, allowing them to make room for improvement. Traceability permits these businesses to measure the impact of their sustainability efforts with greater accuracy.

Farmers and cooperatives are beginning to use digital tools to maximise efficiency. For instance, coffee farmers are using technology for precision agriculture, to boost yields and lower the cost of production. Through digitisation, they can be connected to the global ecosystem. This also allows data to flow back to the farmers, giving them information about where their beans are going and in what products they are being used. Digitalisation is also paving the way for differentiation. At one end of the supply chain, digital tools are enabling farmers to obtain better pricing for the products, while at the other end buyers are able to differentiate between a farmer who produces sustainable versus one who does not.

Agenda:

- **Digitalisation is a great start towards standardisation:** It enables data to seamlessly flow through different stakeholders. This facilitates interoperability, allowing data to be collected under one network and to be passed to another without losing the credentials and the data's proof of validity.
- **Data ownership rights matter:** The disadvantage of using the internet today is that individuals don't own most of their data online. Nonetheless, it is important for each actor in the supply chain to have ownership over the data they upload onto a system. Sucafina's vision is for farmers to be able to own their data, control it, and ultimately monetise it in the future, particularly when the increasing demand for traceability could make data more valuable than the product itself.

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■ **Harnessing data for good is a team sport:**

Several companies want to use farmer sustainability work, and traceability as a competitive advantage, however, it should be a necessity. To this extent, Sucafina is committed towards working open source, sharing their data in order to benefit the farmers, and other businesses as well.

- **Connectivity is key:** The digital revolution in coffee is led by the use of mobile phones. The penetration of mobile phones is as high as 80% in East-African countries, and the resultant connectivity is critical to build the new digital ecosystem. For traceability, connectivity is critical in a digital ecosystem.

Success Story:

In the East African countries of Rwanda, Burundi, and Uganda, Sucafina partnered with CropIn to digitise the records of over 75,000 and create their digital identities using blockchain solutions. This has resulted in an insight-driven supply chain, allowing them to effectively tackle sustainability issues. Keeping a digital record of what the farmers produce, the quality, and their income enables Sucafina to give the farmers validation that they have received a fair price and, in return, Sucafina gets authentic, sustainably-grown produce.

Blockchain and its application in traceability:

All these transactions and data needs to be stored securely. For Sucafina, blockchain is the best and most suited technology at the moment to achieve the same. Blockchain is the same technology that underpins Bitcoin and is considered very secure. Although blockchain has potential, it has generally been regulated by many governments worldwide since it is entirely open sourced, which takes control away from the governing bodies and puts it in the hands of the public.

Once someone enters the data on the blockchain, each person who is a part of the transaction gets a copy of the data in their computer, which gets automatically updated every time a new block is added, providing end-to-end traceability. For example, if a farmer and Sucafina have an agreement on a price and enter that data, the farmer gets a record of the data stored under their identity, and Sucafina stores that farmer's confirmed pricing at their end as the first block on the blockchain. This data then goes to the roasters who enter their own data, then to the distributors, and finally to the consumers. Sucafina had partnered with Smuckers, an American brand, who provided them with the ability to place a QR code on their packaging. Consumers can scan this simple QR code to



**From Bean To Cup:
Ensuring An
Effective Coffee
Value Chain**



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view the details of the product, including which farm the coffee came from, the duration and the journey it took, the quality of the beans, any certificates of sustainability (such as that from Rainforest Alliance), and all the real prices paid through the blockchain, which would remain completely unadulterated. This is a simple application of

how blockchain has been used with traceability to provide credibility to the consumers. However, the technology is still being tested in this sense to find the perfect balance as consumers do not entirely trust it yet. Nonetheless, its applications clearly have immense potential in the long run as data security is a trend on the rise.





3.4. Case IV: Following the Cocoa Trail: A Value Chain Concept (Rainforest Alliance)



Speaker: Henk van Rikxoort

Lead Farm Intelligence, Rainforest Alliance

Henk van Rikxoort leads the Farm Intelligence initiative at the Rainforest Alliance. He is initiating and leading global innovation and ICT for development programs within the organisation. Currently his main focus is Farm Grow, an initiative that is expanding the use of individual digital farm development plans for cocoa producers in West Africa. Henk joined the Rainforest Alliance in 2013 and pioneered the climate change program as well as the first-mile program, which has grown into the main focus of the organisation today. Henk holds a Masters degree in Development & Rural Innovation and a Bachelors in Tropical Agriculture at Wageningen University.

3.4. Case IV: Following the Cocoa Trail: A Value Chain Concept (Rainforest Alliance)

Opportunities:

- Farmers need support over several years to improve and renovate their farms to become sustainable and profitable. Plus, each farm is different, so farmers need a tailored approach and not a one-size-fits-all solution. Farm renovation can be accelerated when farmers have access to credit.
- Cocoa companies are willing to invest in farmers who are adopting sustainable practices, if this investment leads to higher productivity and sustainably-produced volumes necessary to meet customer demand. This is also influenced by conscious consumers, who will only buy from brands using ethically-sourced cocoa. Here is where traceability comes in.

Challenges:

Smallholder farmers produce the vast majority of the world's cocoa on old farms with depleted soils, which leads to inefficiencies. One of the predominant challenges faced by the industry is the poor economic conditions of the farmers producing cocoa. Many of them live well below the poverty line. The income of the majority of farmers reduces over time whilst the cocoa beans do not meet the sustainability requirements of the industry. Low yields and poor quality is the main reason behind this — as the quality and output of older plants decline, the farmers will no longer have enough capital to invest in new plants and practices. They are also unable to secure funds from financial institutions easily, as many of these smallholder farmers have no collateral to offer, which proves to be another significant challenge for them.

Bringing economic resilience to existing cocoa farms has not succeeded, despite years of investment and efforts to increase yield and the introduction of agroforestry approaches. The cocoa industry will no longer accept deforestation to plant more cocoa and

has pledged to help farmers attain a living income. Intensification of cocoa production on existing land is the only solution to guarantee future supply.

Enabling Partnerships and success story:

Strategic partnerships are essential in the cocoa industry. The smallholder farmers are in desperate need of intervention and aid to increase their productivity on existing lands. The Rainforest Alliance started Farm Grow as a way to help these farmers. It is a digital application that collects data and helps smallholder farmers in the long term to use responsible farming practices that increase their productivity and output.

The partnership begins with the cocoa farmer and the traders who are interested in joining Farm Grow. An extensive interview is conducted and a socio-economic profile of the farmer is built, which includes details of the individuals in the farming households, income stream from cocoa and other incomes the family receives, investment capacity of the farm, and ambitions and plans of the household. Following this, all the plots are visited and the current agronomic status is assessed, including parameters such as type of plant, age of trees, quality of the soil, and the farming techniques used by the farmers. This collected information is analysed to develop a 10-year intervention and investment plan for the household to increase the output and ultimately improve the family's financial wellbeing. Once the plan is determined, the Farm Grow team follows it up with the farmers to check on the progress made by them or make adjustments to the plan if needed.

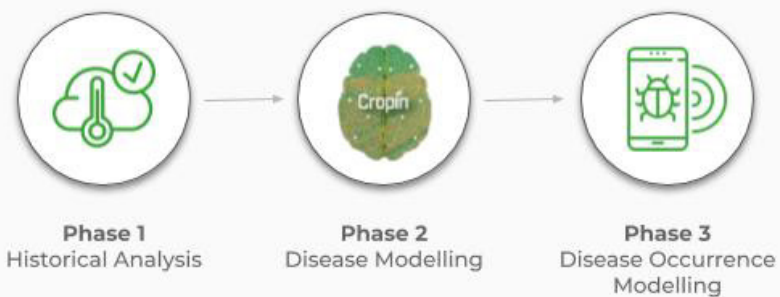
To monitor these plots remotely, Rainforest Alliance partnered with CropIn to use satellite and AI technologies. One of the main solutions that CropIn provides in this case is tracking black pod disease, which

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can be devastating to cocoa crops. By collecting relevant data through satellites and ground truthing and feeding them into an algorithm, farmers can be notified if there is a potential risk of the disease in a certain area. CropIn's systems can also be used to design a unique yield model. The data collected from the smallholder farmers can be used to predict the total crop yield. This data can be compared with the actual yield figures to create graphs that show the relationship between certain parameters and how they affect yield. For example, an ideal temperature graph can be plotted,

which would show at what predicted temperature cocoa yield will be at its maximum. At the end of the day, achieving sustainability at the source is key to attaining the long term goal of sustainable agriculture in the cocoa industry. This can be accomplished using traceability as it provides the ability to know the exact origin of cocoa and follow its journey to the consumer. Building sustainable supply chains and advancing the socio-economic position of smallholder farmers are crucial for long and fruitful partnerships.

Model Framework Black Pod Disease



Required but not necessary condition for Disease Infestation



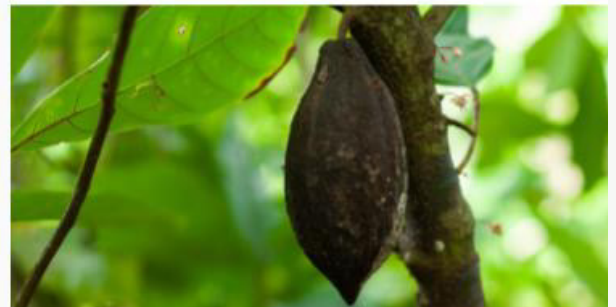
Temperature
Below 26°C



Rainfall
10mm for the
last ten days



RH (%)
Above 85%





4. Conclusion

In conclusion, as proved by the case studies, our hypothesis tests true. Traceability can be used to achieve a broad spectrum of objectives in agriculture and has successfully been implemented in each of the cases above. Although the goals for each of the cases are different, traceability has proved to be the most prominent driver for food security/food safety in the world.

Redefining food safety: Imagine scanning a simple barcode and it provides a historic background on the farm from which the ingredient of your favourite pasta sauce comes from, the farmer details and his activities on the field along with more information on other stakeholders through the supply chain. With credible data like this, you would never again have to doubt the safety of your food. You would even have the choice of buying from brands that only source sustainably-produced products. On another note, blockchain technology is a reservoir of untapped potential not just in the context of traceability and

agriculture but rather for any payments and transactions. As seen in bitcoin, one of the main challenges would be to get people to trust an open sourced system like this in the first place. Perhaps it may take a while before blockchain transactions start becoming more popular but in the long run it is definitely something to watch out for. At the end of the day, any reform in the food industry is triggered by a change in consumer behaviour. A growing push towards food safety due to the COVID pandemic has caused businesses to react to a shift in consumer preferences. This not only benefits the end-consumers but also thousands of farmers across the globe who have been digitised and aided by other stakeholders to ensure they can produce a better quality product using sustainable practices. It also guarantees that the farmers receive a better income and enjoy an enhanced standard of living. To this extent, the long-term benefits for all the actors in the agroecosystem far outweigh the one-time cost of setting up an effective traceability system.

The Cropin logo, featuring the word "Cropin" in blue with a green leaf icon above the "i".

5. Traceability: How CropIn Does It

5. Traceability: How CropIn Does It

Agribusinesses face a number of major challenges when it comes to exporting food produce. Two of the most prominent ones are:

- Ensuring adherence to the set quality and food safety standards during the entire crop production cycle and supply chain.
- Maintaining transparency to earn and retain the end-consumer's trust.

While keeping every step of the agribusiness supply chain transparent addresses the former challenge, food products with labels stating comprehensive information about the product helps build the consumer confidence. Food safety is a growing concern across the globe. With more and more consumers becoming conscious about what goes into their food, it is of utmost importance to assure them that the end-product matches their needs. Some of the other difficulties agribusinesses that seek to overcome when looking to export globally or source from farmers and agents include:

- Supply chain inefficiency
- Building brand credibility
- Ensuring organic and sustainable produce
- Facilitating quick recall
- Monitoring production and harvest
- Adhering to export compliance
- Logistics traceability
- Achieving fair trade and social compliance
- Implementing recommended package of practices
- Building trust between consumer and supplier

Traceability allows monitoring of the product's journey from sowing to selling. The purpose of traceability is to enhance security and safety in the food value chain. A prerequisite for exporting food is to meet the strict requirements on traceability, compliance, and quality control as specified by GLOBAL G.A.P. and other international compliance agencies.

Here are the ways that traceability can address specific problems for the agribusinesses that are sourcing from smallholder farmers for export:



Improved Supply Chain Efficiency

The capability to incorporate transparency to a product value chain will go a long way in ensuring economic benefits. Industry studies estimate that businesses incur avoidable losses amounting to 3% of sales due to lack of supply chain transparency. The visibility of supply chain inventory enables businesses to manage demand effectively and efficiently, reducing waste in the process - all this, by being location agnostic.



Effective Recall Recovery

Traceability mechanisms ensure that businesses revert to normalcy faster than usual, after a recall. And, of course, it significantly reduces the recall costs and recall time due to the ease of tracing back the exact contaminated batch. There are also insurance providers who require product tracing capabilities to underwrite policies. According to the Grocery Manufacturers Association in the U.S., the financial impact of a recall is quite significant: 52% of all recalls cost over \$10M and 23% cost over \$30M.



Strengthened Brand Reputation and Consumer Confidence

Modern day consumers like to make informed decisions and want to know where their food comes from and how and when it was produced. Traceability offers businesses an opportunity to share this information with their consumers, thus improving brand reputation and adding value to the buying process by creating strong consumer involvement and improving consumer communication.



Elevating The Export Game

Agribusinesses can level up their export game and widen consumer reach by presenting detailed data on all its processes. These businesses can meet the international compliance standards like GAP and ALP on a global scale and take on the mentioned challenges by digitising their farms and standardising agricultural operations with cutting-edge technology. In other words, they need a technological solution for agriculture that is both efficient and simple enough to be used by field officers and farmers. The need of the hour is to adopt food safety and traceability as a proactive measure — rather than as a reactive one.

How CropIn ensures Traceability?

CropIn captures total and near-real-time data across the supply chain so that the management can monitor processes on a single interactive dashboard. Let us assume that a farmer in Vietnam is harvesting rice that will be exported to Guatemala and the agribusiness is using SmartFarm® to digitise the entire process. First,

information regarding the seeding process and the farm inputs (such as agrochemicals, machinery and farm implements) the farmer would use will be recorded in the app. Through the crop cycle, the application's satellite imagery capabilities will provide authorised users in the organisation with insights on how the crop is faring across the total cultivated land. The application will then estimate the yield for the season, which can be compared to the actual yield when harvesting is done. Thereafter, the crop is taken to the warehouse for storage. Instead of maintaining documentation on pen and paper, CropIn's solutions will enable the collection and storage of this data in a cloud system to ensure minimum data loss and maximise process efficiency. This also streamlines the supply chain to reduce wastage and enables timely transport. When the crop eventually makes its way to the exporter, they will have comprehensive data on the package of practices, inputs used, alerts raised, crop quality, lab reports, and every other aspect of the crop to ensure compliance with internationally accepted standards. With the help of a unique barcode, the end customer in Guatemala will also have the ability to trace the end product back to the farmer who had sown it in Vietnam, thus achieving complete farm-to-fork traceability.



About CropIn

Copyright © 2021 CropIn Technology. All rights reserved. CropIn is an Earth Observation & AI-led AgTech organization that empowers the farming community to 'Re-imagine Agriculture with Data'. CropIn is focused on helping the world's ag-ecosystem players to sustainably "maximize their per acre value" by combining pixel-level data derived from satellite imagery, in combination with IoT and field intelligence. CropIn is positioned to engage in a multi-disciplinary approach towards AI, Earth Observation, Agriculture, Meteorology and Computer

Sciences, all collaborating together to bring meaningful insight to improve the ag-ecosystem and impact the livelihood of a farmer. CropIn provides SaaS solutions to 225 agribusinesses and numerous governments and non-government organizations present in over 52+ countries. CropIn thus enables businesses to leverage technology to effectively drive their initiatives around Digitization, Compliance, Predictability, Sustainability and Traceability. CropIn has digitized over 13 million acres of farmland, enriched the lives of nearly 4 million farmers, and gathered data on 388 crops and over 9,500 crop varieties. CropIn has 92% score on adaptability, Over 98% client retention rate.

 **SmartFarm**[®]
Farm Management Solution

 **SmartRisk**[®]
Agri Business Intelligence Solution

 **SmartWare**[®]
Packhouse Solution & Traceability

 **RootTrace**[™]
The Seed-to-shelf Traceability Solution to Preserve Global Food Integrity

 **AcreSquare**[®]
A B2b Farmer Engagement Application

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