Deepening Sustainability with DLT

Exploring innovations in supply chain payments

SFA SINGAPORE FINTECH ASSOCIATION

standard chartered

Table of contents

Executive summary 2

Introduction 3

The current state 5
Corporates and MNCs 6
Financial institutions 6
Regulators and multilateral organisations 7
Certifying bodies 7

Traditional barriers to sustainability in supply chains and payments 8
Lack of transparency 8
Inefficiencies of physical cash 9
Supply chain fragmentation 10
The underutilisation of data 10
High costs of sustainable efforts 11

Why now? 12

Digital solutions for sustainable supply chains 14
A. Blockchain for transaction traceability 14
B. Stablecoins as an alternative 16
C. Defragmenting with smart contracts 19
D. Data enrichment: Amplifying the use of existing and emerging data 21
E. On-chain financing to fund sustainable investments 23

Solution framework 25
Future vision: A suite of apps for integrated end-to-end DLT solutions 29
One step further for purposeful impact: DLT and financial inclusion 31

Outlook 32

Appendix 33

Acknowledgements 34

About the organisations 36

Executive summary

Recent headline-dominating sustainability issues have tended to revolve around the pursuit of net zero. And while this is a critical target for the future of our world and the next generation that will live in it, it is worth noting there are many other sustainability concerns threatening this future.

The United Nations' Sustainable Development Goals (SDGs) highlight the complex and interrelated global challenges. This paper proposes using blockchain as a means to raise levels of transparency and accountability – in order to tackle fraudulent risk, inaccurate data, exploitation and environmental crime – and as a tool to progress some SDGs by enhancing sustainability in overall business practices. They also present a huge private sector participation potential, as we discuss later. However, at the current trajectory, most goals are not expected to be met by the 2030 target.

We believe sustainable supply chains and financial flows present an important opportunity to help boost progress. By ensuring transactions in a supply chain are environmentally and socially positive, we can make grassroot impacts, combating environmental issues and creating inclusive economic growth.

Despite this potential, traditional barriers to sustainability related to payments supporting supply chains continue to limit progress. The main barriers – a lack of transparency, inefficiencies of physical cash, fragmentation, underutilisation of data, and cost – usually affect corporates in many markets and end-of-chain suppliers the most. And these barriers will feel highest for suppliers in emerging and developing markets.

We believe technology – and in this paper particularly focusing on distributed ledger technology (DLT) – could prove the solution to greater sustainability in supply chains and innovations can help tackle some of the underlying causes that hinder the SDGs. So, together with our partner the Singapore FinTech Association, we conducted a detailed study into the applicability of different DLT solutions to overcome the key barriers to visibility, transparency and sustainability-validation of payments in supply chains.

This paper first looks at the current state of play among the various parties in supply chains and other involved groups (regulators, banks, fintechs etc.). It then goes on to highlight the legacy issues that have prevented greater sustainability in supply chains until now. Next, we present various examples of DLT, with use cases on how this can and in some cases is already starting to bring greater sustainability to supply chains.

In our final sections, we look forward to frameworks and combined solutions that we anticipate will help cement sustainability at the core of every supply chain transaction. Yet as we discover via our research, the current DLT solutions available are not a one size fits all, with different supply chain stakeholders drawing differing benefits than others. These solutions will therefore only make the necessary sustainability impact and offer the most promising returns if embraced by all supply chain parties. Moreover, partnerships and co-creation between these groups will help ensure we get back on track to reaching the SDGs – specifically SDGs 9, 12, 16 and 17 – thanks to more unified, inclusive, and sustainable supply chains.

As a global bank with a long-held unique market presence, we are connected to supply chain parties across emerging and developing markets. Given our experience with and connectivity to regulators, other banks, fintechs, and public sector bodies across these markets, we're in a distinctive position to help bring all the supply chain parties together. Marrying this connectivity with our innovation in DLT solutions, we're excellently placed to support our clients and co-creating partners as we work together towards shared hopes for a better world.

Introduction

Distributed ledger technology (DLT) has huge potential to make supply chains – and their transactions – more sustainable. Yet there is currently an underappreciation of its potential role. With this paper, produced in partnership with the Singapore FinTech Association, we aim to drive greater use of DLT in supply chains. DLT solutions can accelerate the mobilisation of capital, enhance transaction visibility, and improve supply chain payment access for small, end-of-the-chain suppliers and buyers.

The use of such technology can help advance progress towards the UN's Sustainable Development Goals – specifically SDGs 9 'Industry, Innovation and Infrastructure', 12 'Responsible Consumption and Production', 16 'Peace, Justice and strong institutions' and 17 'Partnerships for the goals'. Beyond the clear sustainability benefits, these goals have now been widely accepted as a huge business opportunity. According to the Business & Sustainable Development Commission, pursuing the SDGs could unlock more than USD12 trillion in new market value and create up to 380 million jobs by 2030[1].

Distributed ledger technologies such as blockchain are by design ideal for addressing many of the barriers to sustainable supply chains. Under this technology, each transaction is tracked, encrypted, validated, immutable, and tamper-proof[2]. The use of DLT could thus enable greater traceability of supply chain and corresponding payments transactions, and support the verification of sustainability efforts.

To reach this win-win outcome, DLT must be embraced by all participants in a supply chain. This means from large multinational corporations (MNCs) down to first producers in a supply chain – often called 'smallholders' in the case of primary industries such as agriculture. But it also must include financial institutions, corporates, governments, and NGOs; real impact will only be made via widespread awareness and adoption.

To this end, and supported by our study into the different applications of DLT in sustainability efforts, this paper aims to:

- Contribute to the knowledge-building around this critical but complex topic. We then aim to bring our expertise, to further our work with partners and clients on pilot DLT initiatives that contribute positive impact for supply chains and payments.
- Catalyse financial institutions, governments, NGOs, and corporates to adopt a range of DLT tools that break down legacy barriers to sustainability and allow for enhancement of new sustainability initiatives.
- Provide a framework for our clients to guide the optimal implementation of DLT solutions for greater supply chain sustainability.

[1] https://sdghub.com/the-commission/
[2] Traceability vs. sustainability in supply chains: The implications of blockchain. https://www.sciencedirect.com/science/article/abs/pii/S0377221722004076

Defining sustainability

Sustainability was first defined in 1987 as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs[3]'. This agenda is now far more urgent, and given the scale of its potential impact, we believe the private sector needs support to contribute to sustainability. Far more must be done to remove the barriers that prevent businesses from pursuing more sustainable practices – and influencing those in their supply chains. As a bank, our approach to sustainability is as follows:

We're committed to sustainable social and economic development across our business, operations and communities including achievement of the UN Sustainable Development Goals[4].

For this paper, when we refer to making supply chains more sustainable, we are referring to activities that help advance the SDGs – specifically SDGs 9 'Industry, Innovation and Infrastructure', 12 'Responsible Consumption and Production', 16 'Peace, Justice and strong institutions' and 17 'Partnerships for the goals'. For supply chains – particularly in primary industries where our use cases are focused – this will relate to positive environmental impact and improved social implications for those involved in supply chains. For the latter, this relates to financial inclusion, which is a topic central to our sustainability mission and community work.

ESG, for the purpose of this paper, refers to the framework or company practices enacted to pursue greater sustainability.

[3] United Nations Brundtland Commission, 1987
[4] https://www.sc.com/en/sustainability/

The current state

Overview of sustainability efforts among stakeholders – both those internal and external to supply chains

Supply chains are huge and complex. Even the smallest shift can impact every part of the chain, from MNCs to the smallest suppliers. The good news, then, is that financial institutions, regulators, NGOs, fintech providers and other connected parties also have the power to enact wide-reaching change within supply chains.

In this section, we look at the state of play among these different groups. In most cases, it's clear that we're at a turning point for sustainability validations towards supply chains and payments supporting these transactions, with DLT set to springboard to another level.

Corporates and MNCs

Often considered to be at the centre of supply chains, corporates have the power to implement positive change that reaches their end suppliers and buyers. Moreover, these companies are increasingly recognising the SDGs as a foundational benchmark for creating a more sustainable world[5]. As of February 2018, over 40 per cent of the G250 – which comprises the world's 250 largest firms – acknowledged the SDGs in their corporate reporting and recognised the global goals in their CEO and/or Chairperson's statement, according to Harvard Law[6].

Unilever – which produces and distributes approximately 400 items in more than 190 nations – is one noteworthy example. In June 2020, the company announced a set of time-bound targets and commitments to empower a new generation of farmers and smallholders to protect and rebuild their environment, as well as a supply chain free of deforestation by 2023. Together with their allies, they are merging efforts to champion sustainable agriculture[7].

Financial institutions

Financial institutions – banks in particular – have both the power and responsibility to influence greater sustainability in supply chains via finance. Banks are also well positioned to integrate sustainability efforts between supply chain participants and other interested groups. For example, they are increasingly supporting sustainable growth for public sector, NGO, and corporate clients, whilst also balancing the opinions of public sector stakeholders.

We continue to seek innovation for sustainability in supply chains, with opportunities in the agriculture industry – which includes agribusiness, tobacco, fishery, palm oil and forestry – particularly apparent. These are focus industries for us, and sectors that are prone to multiple barriers when it comes to sustainable practices.

The two key elements in our approach are partnership and innovation. In the former, we are working to uncover how collectively we can improve supply chain transparency and support our clients as they strive towards fully sustainable practices. For the latter, innovation will be critical for the advancement of many sustainability initiatives, as showcased by the solutions and research presented later in this paper.

[5] What is SDG and ESG? (2022, October 23). ESG | the Report. https://www.esgthereport.com/what-is-sdg-and-esg/

[6] UN Sustainable Development Goals—The Leading ESG Framework for Large Companies. (2018, October 4). The Harvard Law School Forum on Corporate Governance. https://corpgov.law.harvard.edu/2018/10/04/un-sustainable-development-goals-the-leading-esg-framework-for-large-companies/

[7] Unilever PLC. (2022, August 24). Sustainable and regenerative sourcing. Unilever. https://www.unilever.com/planet-and-society/protect-and-regenerate-nature/sustainable-and-regenerative-sourcing/

Regulators and multilateral organisations

Many groups have for the most part embraced the SDGs as the foundation of their policies and activities. Yet it's also becoming increasingly clear that many of the SDGs, notably those centred on sustainable production and safe and decent conditions for workers, are likely violated by opaque supply chains[8]. As a result, multinational bodies are turning their focus to supply chains. The World Economic Forum, for example, is accelerating digital traceability for sustainable production with various initiatives[9], which speaks to SDG 12 on 'Responsible Consumption and Production'.

Governments across the world are also working on and enacting various legislations to embed certain sustainable practices into supply chains – particularly regarding production and sourcing. Examples range from the EU's directive to ensure traceability of beef "from birth to death"[10], to the Indonesian government's new requirements[11] for certification in palm oil production.

Certifying bodies

The rise of certifications in supply chain production has also marked a turning point for sustainability.

In addition to helping protect the environment and ensure the upholding of employment welfare standards, certification can spring forth commercial benefits for entities and markets, such as:

- An introduction to new distribution channels with manufacturers or retailers that require input materials to be certified
- Access to international markets through mutual recognition programmes
- Competitive advantage via preferred vendor status with buyers that seek sustainable solutions
- Links to products or organisations with more sustainable production points.

Being a sustainability-conscious business with authenticated sustainability efforts will be key going forward for competitive edge, and not just for suppliers. As a buyer, the benefits from adherence to standards, guidelines and certifications include:

- Increased transparency and pricing through acknowledgement and disclosure of sustainability risks
- Ability to attract and sustain capital as financial institutions increasingly demand transparency and accountability of sustainable practices
- Lower cost of capital
- Brand strengthening.

[8] #Envision2030: 17 goals to transform the world for persons with disabilities | United Nations Enable. (n.d.). https://www.un.org/development/desa/disabilities/envision2030.html

[9] Circular Operations and Value Chains through Traceability. (n.d.). World Economic Forum. https://www.weforum.org/projects/accelerating-digital-traceability-for-sustainable-production

[10] Food Traceability, Heath & Consumer Protection Directorate-General, 2007 https://food.ec.europa.eu/system/files/2016-10/gfl_req_factsheet_traceability_2007_en.pdf

[11] Research, S. E. (2021, June 29). Identifying Small Wins towards ISPO Certification of 1 Million Palm Oil Smallholders in Indonesia in 2025. Khor Reports https://www.khor-reports.com/blog/2021/6/30/identifying-small-wins-towards-ispo-certification-of-1-million-palm-oil-smallholders-in-indonesia-in-2025

Traditional barriers to sustainability in supply chains and payments

Lack of transparency

The lack of visibility and transparency in supply chains causes two main issues, in relation to sustainability. First, it enables behaviours that undermine sustainable outcomes. And second, it renders tracking, monitoring and authenticating of sustainability initiatives – old and new – very difficult.

With pressures from regulators and shareholders, and with intrinsic pressures to do the right thing, corporates are demanding more transparency in their supply chains. They want to ensure with greater certainty that payments to their suppliers are traceable, secure and efficient, and that every level of supplier in the chain is also following sustainable practices.

Yet, a 2021 Bain & Company survey found that up to 60 per cent of executives have no visibility into goods and payments in their supply chain beyond their first-tier suppliers[12]. Taking agribusiness as an example, end-suppliers are typically several layers down. Here, we summarise the common sustainability-transparency issues in the context of agribusiness, as an example:

Environmental

Few mechanisms exist to validate that payments for agricultural products are verifiably linked to responsibly managed sourcing, and not to environmental crime or activities leading to degradation.

Social

Lack of transparency can result in social issues including human trafficking and labour abuse such as unpaid or withholding of wage payments. This is particularly damaging to suppliers at higher risk of illegal or abusive practices. One step further, opaqueness creates an environment that can make it easier to launder money that is then used in activities that undermine sustainability objectives, such as human trafficking.

Governance

According to a recent report by the Financial Action Task Force (FATF)[13] there are several concerning impacts that result from this lack of transparency:

- Environmental crime is estimated to be amongst the most profitable proceeds-generating crime in the world, generating between USD110 billion and USD281 billion in criminal gains every year.
- With pressures from regulators and shareholders, and with intrinsic pressures to do the right thing, corporates are demanding more transparency in their supply chains – which also correlates with SDG 12 on responsible consumption and production.

[12] Saenz, H. (2021, January 21). Three Ways Traceability Can Fulfill the Sustainability Promise. Bain. https://www.bain.com/insights/three-ways-traceability-can-fulfill-the-sustainability-promise-wef/

[13] Financial Action Task Force (FATF). (2020-21). https://www.fatf-gafi.org/publications/environmentalcrime/environmental-crime.html

Inefficiencies of physical cash

Cash remains dominant in many emerging and developing markets. While the resulting inefficiencies bring obvious economic challenges, they also create social issues that can undermine sustainability objectives.

The limitations of cash are numerous: it's hard to keep track of, it creates bottlenecks, and is time consuming to reconcile, prone to many errors. Smallholders often bear the effective cost of these inefficiencies, yet these are not the worst they face. Cash also puts suppliers at risk of theft and fraud – which in turn is costly to mitigate. However, with formal financial services such as bank branches, tellers and ATMs often lacking in rural areas where suppliers in these markets work, there is often no other option. All this elongates the problem of financial exclusion, which continues to be rife in emerging markets.

The diagram below highlights examples of typical cash inefficiencies and the specific consequences for supply chains in such markets.

Costs, inefficiencies and unsafe shortcomings of handling physical cash, where the lack of record and opaqueness hinder onboarding into the financial system

20% revenue

Nearly 20% of revenues (USD 21.5 million) in cocoa industry is spent on licensed buying companies[14] and agents[15] on facilitating cash payment.

3x payment efficiencies

In Rwanda, tea factories typically take up to 15 days on average to pay the farmers. By digitalising payments, the payment delivery now takes a maximum of 3 days[16].

100 manual labour and non-tracebility

In Uganda, 100 staff members are deployed to manage cash payroll, including 64 field security guards and armed police to pay wages in cash mode to 8,000 workers in tea estate plantations[15].

1 robbery per month

In Nigeria, the Coca Cola truck drivers distributing cash in the country are victims of robbery as often as once a month[15].

This is not a minority issue. Smallholders – largely dependent on cash – account for around 85 per cent of the 525 million farmers worldwide[17]. In Indonesia, for example, more than one million smallholders are an essential element of the palm oil sector. Approximately 38 per cent of cultivation area and 35 per cent of production output are attributed to them[18].

Yet the average transaction for palm oil can reach USD500, which is typically inconvenient for farmers to carry around. Moreover, cash counting can easily result in manual errors.

[14] BTCA and World Cocoa Foundation 2020
[15] Better Than Cash Alliance Report
[16] Nair, Onoand Mapfumo 2018
[17] The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. (2016, November). https://www.sciencedirect.com/science/article/pii/S0305750X15002703
[18] Global Market Report: Palm Oil. IISD, State of Sustainability Initiatives. https://www.iisd.org/system/files/publications/ssi-global-market-report-palm-oil.pdf

Supply chain fragmentation

Unnecessary layers in supply chains disproportionally increase costs, rendering the important ongoing goal of shortening supply chains inaccessible.

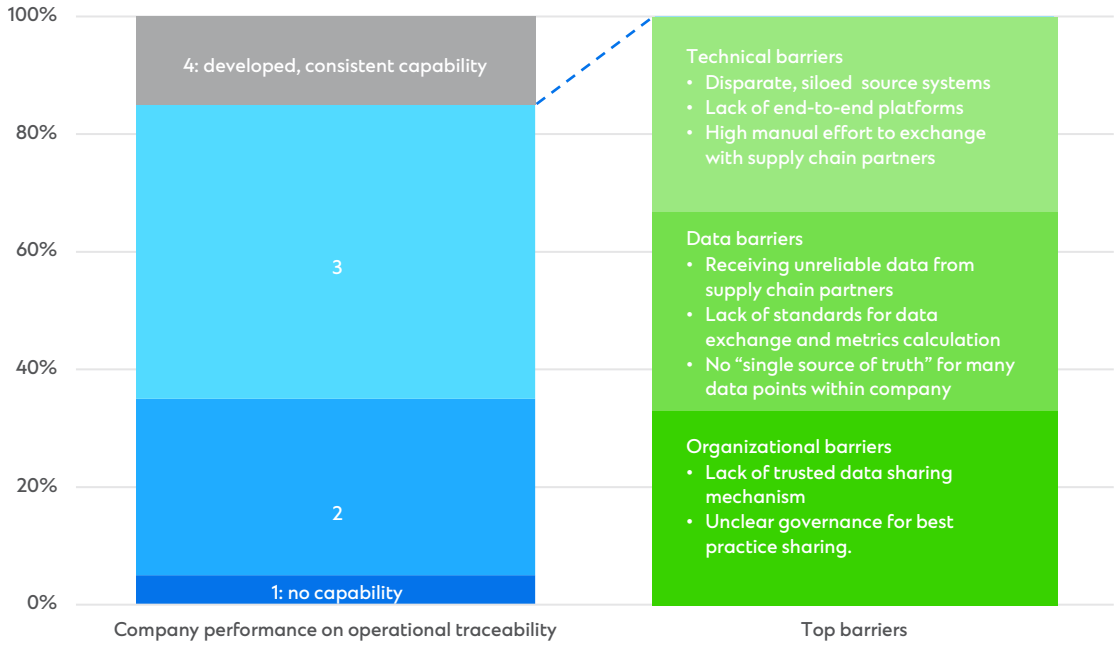
Fragmentation also tends to come at the greatest cost to end suppliers; those at the end of a chain tend to be the most vulnerable and at risk of inequitable treatment. These suppliers operate in predominantly informal local markets in emerging and developing countries, characterised by weak links between producers and buyers. Fragmented or a lack of access to formal markets, including supply chain partners and wholesalers hinders suppliers from selling their goods at competitive prices and earning critical cash flow. Suppliers may then pursue a less stable method and sell to cash-rich traders at frequently negotiated rates. These types of informal transactions typically produce low returns, unstable cash flows, and place suppliers at a higher vulnerability to financial shocks. All of which, undermines sustainable outcomes for suppliers' livelihoods.

The underutilisation of data

Identifying the sustainability of transactions and activities in supply chains is particularly challenging in emerging markets. And the further down the supply chain, the harder it typically is. Data can be extremely powerful in overcoming opaqueness and measuring sustainability – whether from new initiatives or ongoing transaction activity. Yet most supply chains are far away from effectively utilising its potential.

The three main barriers to achieving greater traceability with data are illustrated below.

How well are you able to deliver on operational traceability, and what are the barriers you face? [19]



Such barriers are particularly limiting for the growth and mainstreaming of certification. In the agribusiness industry, certification is increasingly vital for smallholders to remain competitive in supply chains, in addition to the obvious environmental benefits. The lack of data may create a barrier to the mainstreaming of certification, or contribute to controlled or "managed ecosystems"[20].

[19] World Economic Forum / Bain & Company Supply Chain Traceability Survey, 13 July 2020, N=131
[20] Toward Sustainability | The Roles and Limitations of Certification. (2012, June). https://www.resolve.ngo/docs/report-only.pdf

High costs of sustainable efforts

While many companies are aware of the importance of sustainability, embarking and continuing this endeavour costs money. The gains are more often long term than immediate.

At the supply chain level, the expensive nature to embed greater sustainability is a heavy burden that often falls on the end-suppliers – who can least afford it. Two specific examples are as follows:

Certifications

While certification has become top of the agenda for many multinationals and regulators, it's often perceived to be difficult and expensive. For example, in Vanuatu in the South Pacific, the monthly minimum wage is only USD290, which is ten times lower than the annual audit costs for organic certification which can range between USD2,000 and USD10,000 in the country[21]. Yet sometimes, there is no choice but to become certified. For example, in Indonesia, independent smallholders in the palm oil industry are required to be Indonesian Sustainable Palm Oil (ISPO) certified (Indonesia's version of sustainable palm oil certification) by 2025[22].

To meet the principles and criteria of such certification, a more forward-looking approach would be for smallholders to change the practices to produce sustainably. Many buyers and downstream companies around the world are already pursuing initiatives to support smallholders to produce more sustainably while still increasing productivity and thus income. Yet, there is more that can be done. For example, in the case of Indonesia's palm oil industry, tens of thousands are being supported in this way out of the millions of independent smallholders in the country.

Infrastructure

Focusing again on the agribusiness industry as an example, farms hitting maturity can be a challenging time for smallholders. As crops and other outputs start to decline in yield, smallholders need to invest in replanting and similar activities. These periods are already fraught with pressure, as smallholders struggle with a slowdown in income during the replanting period. For example, Indonesian palm oil producers need significant capital to replant sustainably (e.g., without slash-and-burn techniques or authentic seedlings). During that period, they would lose their source of income, in addition to the cost of replanting sustainably (USD3,460/ha[23]). These obstacles for smallholders will need to be met with corporates' collaborative efforts in supporting sustainable produces with premiums and an infrastructure to support such transactions.

[21] United Nations 2020 https://vssapproach.unctad.org/wp-content/uploads/2020/06/Vanuatu.pdf

[22] Research, S. E. (2021, June 29). Identifying Small Wins towards ISPO Certification of 1 Million Palm Oil Smallholders in Indonesia in 2025. Khor Reports. https://www.khor-reports.com/blog/2021/6/30/identifying-small-wins-towards-ispo-certification-of-1-million-palm-oil-smallholders-in-indonesia-in-2025

[23] Future Smallholder Deforestation: Possible Palm Oil Risk. (2020, June 15). Chain Reaction Research. https://chainreactionresearch.com/report/future-smallholder-deforestation-possible-palm-oil-risk/

Why now?

While most of these barriers to sustainability in supply chains are deep-rooted, several recent developments, initiatives, and other driving factors are now spurring real change. Here, we highlight the main factors that have brought us to an important turning point.

A shift in corporate attitudes

- Sustainability is now more about doing the right thing. Corporates want to improve our world, rather than simply ticking a CSR-box.
- Corporates also increasingly see the business opportunity:
  - USD12 trillion will be added in global economic value if the SDGs are met[24].
  - Making sustainable value chains a reality presents an opportunity for businesses and financial institutions to generate value and seize commercial possibilities. The value of agriculture solutions are projected to add USD665 billion[25].
  - If companies incorporate and integrate ESG into their plans, this could create an additional USD8 trillion[26]. Financial returns, ESG risk management, and brand reputation are the primary three motivators for ESG integration.

Regulatory momentum

- Rising sustainability concerns have driven regulators to take greater action. In a number of jurisdictions, reporting ESG elements are being made either mandatory or under active consideration. For instance, a mandatory government-led certification scheme initiative in Indonesia is required by 2025, the private sector has worked to keep up and strengthen its own commitment to ESG norms.

The Indonesian government recently introduced the Indonesian Sustainable Palm Oil (ISPO) initiative, a government-led certification scheme where ISPO requirements for smallholders are mandatory by 2025[27].

- Regulators are for example cracking down on labour-related abuses. In a move aimed at countering forced labor abroad, the US Customs and Border Protection (CBP) issued withhold release orders (WROs) to prevent goods suspected to have been made with forced labor from entering the US[28].

[24] Business & Sustainable Development Commission | BSDC. (n.d.). Business & Sustainable Development Commission (BSDC). http://businesscommission.org/
[25] ibid
[26] World Business Council for Sustainable Development (WBCSD). (2018, November 15). The Commission. SDG Business Hub. https://sdghub.com/the-commission/
[27] Research, S. E. (2021, June 29). Identifying Small Wins towards ISPO Certification of 1 Million Palm Oil Smallholders in Indonesia in 2025. Khor Reports. https://www.khor-reports.com/blog/2021/6/30/identifying-small-wins-towards-ispo-certification-of-1-million-palm-oil-smallholders-in-indonesia-in-2025
[28] https://edition.cnn.com/2019/10/01/politics/cbp-trade-forced-labor/index.html

The rise of certification

- The value of certification is more and more understood (refer to the earlier section on this).
- Increasing realisation that this has become particularly prominent in the agribusiness industry, with a number of certifications emerging in recent years (see appendix).

A worsening backdrop

- Greater incidents of disaster and humanitarian crises have revealed the need to take more urgent action to make our economies and societies more sustainable.
- Criminals frequently mix legal and illegal goods and payments early in resource supply chains to conceal illicit sources, which makes it more difficult to detect suspicious financial flows later in a chain.
- Criminals may launder gains from environmental crimes such as illegal mining.

Technological developments

- Emerging technologies are now able to help turn supply chain sustainability needs into an operational reality.
- The majority of businesses successfully targeting sustainable market opportunities today are built on digital technologies[29].

[29] Gartner, 2022
https://www.gartner.com/en/newsroom/press-releases/2022-04-06-gartner-forecasts-worldwide-it-spending-to-reach-4-point-four-trillion-in-2022

Digital solutions for sustainable supply chains

As an emerging technology, DLT In our study – as shown in the results presented in the following sections – Standard Chartered and SFA assessed which DLT solutions look set to be resilient to the evolution of this space. In particular, the solutions best placed to continue to support sustainability in supply chains as interactions between different DLT elements change.

We looked at how DLT can overcome the key barriers to creating more sustainable supply chains. Below are the key learnings and insights. Note, the numbering of the solutions here corresponds with the barriers highlighted earlier.

A. Blockchain for transaction traceability

Goods

Blockchain has the potential to create full mutual visibility in supply chain transactions. Imagine a buyer who has ordered goods from a supplier. When the machine used on the supplier's side initiates the shipment of the items, the goods are given a unique token or an identity such as a QR code. In addition to payment information, this token may contain other types of data. By having the machine register the token on a DLT platform, the current status of the order is communicated to all parties involved in the logistics of the goods.

The goods are then delivered in several intermediate phases. At the respective junctions, intelligent machines inspect the goods using the associated token during the lifecycle stages in the receipt of the goods. An international shipment may make its first stop at customs or with port authorities. A machine inspects the items at customs and automatically calculates the customs fees required depending on the weight, size, etc. To calculate customs duties, a supplier's equipment receives the information collected by the customs agency.

Real-life example

IBM
Established in 2017, IBM's Food Trust connects an ecosystem of suppliers, manufacturers, retailers, and other stakeholders to meet the demand for smarter, safer, and more sustainable food supply chains. A blockchain-powered solution helps ecosystem participants eliminate supply chain bottlenecks, enhance their reputation for quality, ensure safety and regulatory compliance, and build a sustainable supply chain with less waste and spoilage[30].

Bext360
Denver-based fintech Bext360 has a cloud-based software and an app which employ Stellar's open-sourced blockchain technology to create sourcing records. Environmental impact can be measured and tracked via Bext360, which is implemented worldwide and therefore can trace and receive data of dozens of suppliers. This is now operational in the United States, Europe, Ghana, Paraguay, Somalia and beyond[31].

[30] IBM Food Trust - Blockchain for the world's food supply. (n.d.). Singapore | IBM. https://www.ibm.com/sg-en/blockchain/solutions/food-trust
[31] Bext360: Blockchain for a Transparent, Sustainable Supply Chain. (n.d.). Techstars. https://www.techstars.com/the-line/startup-profile/bext360-blockchain-for-a-transparent-sustainable-supply-chain

Payments

Using blockchain to automatically record information about a company's business practices – not only vessel movements, but also payment records of workers, or interactions with regulatory and enforcement agencies – can then be analysed to produce insights, for example, on treatment of workers. By connecting this information to producers on the blockchain, downstream buyers can more easily access a wider range of extensive data to assist and inform due diligence processes.

The outcomes of these evaluations and payments can be uploaded to the cloud in a blockchain system by auditors and linked to a producer as part of their blockchain record in a system. This structure would allow any downstream actor to quickly check certifications or audit the results of any supplier they're associated with. This would work as their profile would then be linked to tokens of any good or material produced by that business.

Real-life example

Bext360
The company also uses blockchain technology to make payments directly to farmers, communities, banks, and other stakeholders. Bext360 wants to provide an avenue for these farmers to receive a fair and immediate payment for their beans. Wholesalers and retailers can embed the technology and integrate the platform via APIs with their own website, supply chain management systems and point-of-sale systems[32].

Fresh Supply Co.
This company provides affordable blockchain applications for agricultural producers. The applications allow logistics tracking, payment transactions and API-led connectivity[33].

Store-of-value such as e-wallets and on-chain accounts

Payments could also be exchanged between blockchain-based bank accounts or wallets, for automated payments. This would bring cost efficiencies in micropayments with small fractions involved.

Cashless payment methods that enable direct transfers to on-chain accounts, wallets, or wearables could be made available for traders when purchasing supplies. Consider this example:

- Each supplier within a corporate's ecosystem has access to a store-of-value such as a digital wallet or account on-chain that may be used to track sales payments and cash-based voucher transactions.
- The buyer's wallet or account is debited for payments to the provider as directed by the buyer.
- The new wallet or account balance for the credit is communicated to the corporate.
- The revised wallet or account amount is communicated to the corporate as events and physical account statements.
- The DLT ledger is the source of truth for the corporate's underlying client.
- The solution might also be paired with offline software such as feature phones or hardware such as wearables for distribution.

Supply chain platforms for agribusinesses and commodity data inputs could be integrated with on-chain wallets or accounts. DLT-supporting banks like Standard Chartered could perform the function of a payment bank in the areas of cash management, which may form the basis of the underlying mechanism for a 'smarter' store-of-value possibly such as smart wallets, accounts on-chain, or wearables. The bank could promptly process payment to payees with a DLT-published transaction while ensuring it's securely recording financial events with the visibility to check on payment transfer status.

[32] Bext360: Start-Up in Sustainable Supply Chain Digitization. (2020, August 5). Supply Chain Digital. https://supplychaindigital.com/supply-chain-risk-management/bext360-start-sustainable-supply-chain-digitization
[33] Fresh Supply Co Brings Blockchain to the Farm. (2021, December 7). https://www.eurekareport.com.au/investment-news/fresh-supply-co-brings-blockchain-to-the-farm/150751

B. Stablecoins as an alternative

Stablecoins – a form of digital currency – is an alternative rail to physical cash in supply chain transactions, helping bring equitable financial inclusion to suppliers.

Real-life example

Oxfam and Sempo
Completed in 2021, a total of USD2.7 million was dispersed among 4,470 local beneficiaries and 345 vendors via stablecoins as part of the UnBlocked Cash programme by Sempo and Oxfam[34]. According to the partners, 90 per cent of the vendors reported that the programme benefited their business.

Digitised fiat versus public stablecoin

The above UnBlocked example showcased two types of digitisation below:

B(i). Public Stablecoin

UnBlocked Cash in Venezuela used USD Coin (USDC), a publicly-traded, stablecoin backed one-to-one with USD held in an audited bank account. This enabled beneficiaries in Venezuela to transact with vendors, who could then cash-out via AirTM[35], a peer-to-peer marketplace of currencies. USDC was then able to be efficiently exchanged in a liquid marketplace to a vendor's preferred currency – usually Venezuelan bolivars or the Colombian peso. Finally, with both Sempo and AirTM supporting USDC and Ethereum, a public blockchain, the integration and partnership was simple.

B(ii). Digitised Fiat

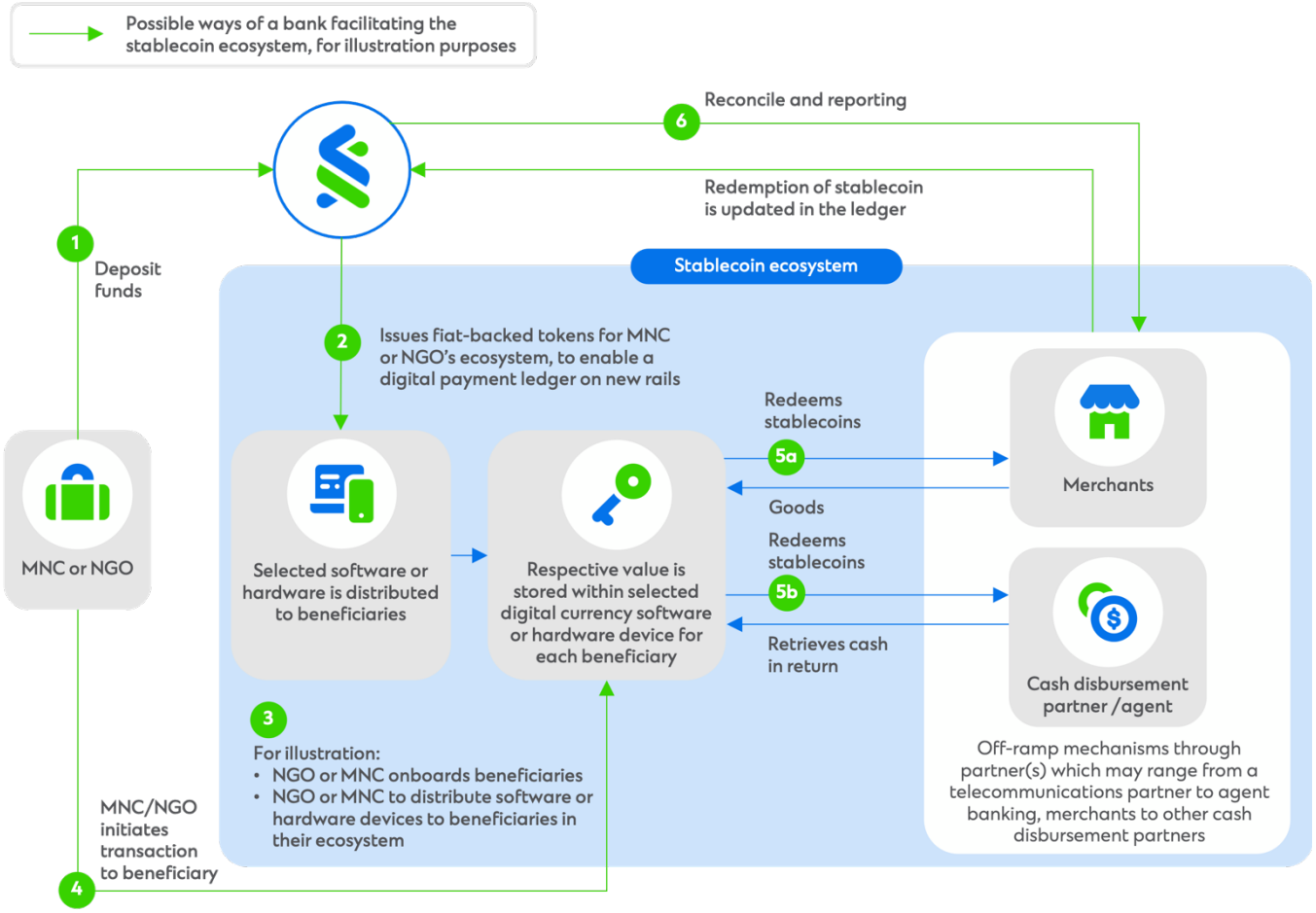
UnBlocked Cash in Papau New Guinea and Vanuatu also used versions of the platform that enable the tokenisation of fiat on a blockchain[36]. In Vanuatu, funds are held in a trust account, managed by accounting firm Barrett & Partners. This provides some advantages over traditional cash and voucher programming, such as speed, lower costs, and increased transparency and tracking of funds. However, it does not leverage the full potential of blockchain technology.

Enabling the above two options can be made possible by the flexibility of an open-source platform that plugs-in to the power of a decentralised and public blockchain such as Ethereum. It enables low-cost transactions and allows a complex international programme such as UnBlocked to be set up quickly.

[34] UnBlocked Cash Project: using blockchain technology to revolutionize humanitarian aid. (2022, May 25). Oxfam International. https://www.oxfam.org/en/unblocked-cash-project-using-blockchain-technology-revolutionize-humanitarian-aid
[35] Circle Partners with Venezuela to Send Financial Aid with USDC. (n.d.). https://www.circle.com/blog/circle-partners-with-bolivarian-republic-of-venezuela-and-airtm-to-deliver-aid-to-venezuelans-using-usdc
[36] Unblocked Cash: Piloting Accelerated Cash Transfer Delivery in Vanuatu. (2021, October 13). Oxfam Policy & Practice. https://policy-practice.oxfam.org/resources/unblocked-cash-piloting-accelerated-cash-transfer-delivery-in-vanuatu-620926/

An illustrative stablecoin example

Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
MNC deposits Funds in a bank account	The bank issues a stablecoin on behalf of MNC or NGO, to enable payments through a new digital ledger	MNC or NGO onboards beneficiaries e.g. farmers, and distributes software or hardware to Beneficiaries	MNC initiates payment transactions to beneficiaries in their ecosystem	Beneficiary is able to be off-ramped either by merchants, cash disbursement partner or through a cash machine	The bank updates ledger, (if 5a is chosen: pay out vendors on payout schedule) and provide reconciliation and reporting services



To summarise the above, the typical process for issuing a coin to help replace cash in supply chains would involve:

- Minting the coin
- Burning the coin when spent
- Supporting conversion systems for coin/fiat access
- Holding fiat accounts
- Allowing an entity to initiate coin payments to suppliers and fiat payments to vendors from a bank system
- Management and governance of the coin
- Producing analytics

This concept could form the premise of embedded payment solutions within an ecosystem for stablecoin issuance, pay-outs, notifications, and information enquiries.

Considering the agribusiness sector as an example, producers of goods such as palm oil and rubber have become of recent interest as possible beneficiaries of such a concept.

Real-life example

IDEMIA

To enable offline digital currency payments, the IDEMIA secure wallet solution leverages tamper-resistant certified hardware chips. The use of such government-grade hardware chips allows balance management, federal reserve policy implementation, user authentication, and key storage. To further enhance payer protection, the secure wallet can integrate biometric authentication while maintaining transaction privacy. IDEMIA secure wallet solution works with smartphones, phones, biometric payment cards, SIM technologies, wearables, and even connected machines[37].

Cashing-out stablecoins for supply chain purchases

- Stablecoins can also be issued as voucher-based digital currency, for beneficiaries to purchase goods and services.
- For example, farmers can redeem such coins from merchants. This could be based on biometric authentication, allowing organisations to track the end receipt.
- E-wallet partners could create digital wallets. For disbursements in hard-to-reach areas within traders' ecosystems, having a cash voucher-based DLT record enables transactions with lower risk of fraud.
- For NGOs or public-sector organisations trying to reach their beneficiaries, a secure digital identification wallet could be used to coordinate access to their intended benefits and services with the help of DLT. Beyond providing beneficiaries with convenience and privacy, the use of trusted digital identities could also benefit such organisations by ensuring clear beneficiary targeting, lower risk of double registration and fraud, reduced administrative burden of registering and maintaining identities, and reduced delays in disbursement.
- It can also serve to reduce administrative and transaction expenses, and to coordinate payments with other players managing related initiatives.
- Reporting could be shown in real-time with enriched information traceable on a blockchain, helping supply chain participants gain payment traceability and stronger accountability.

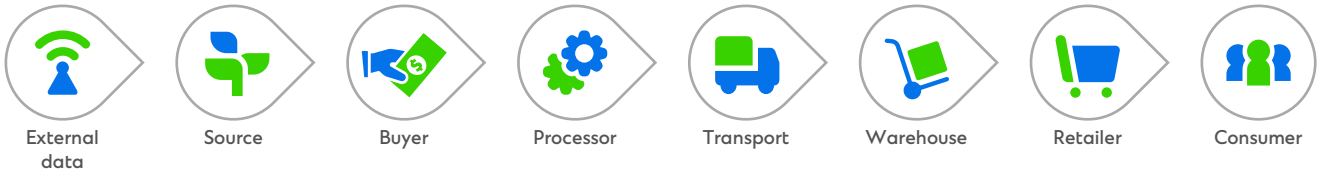
[37] Secure wallet solution for offline CBDC payments. (2022, September 15). IDEMIA. https://www.idemia.com/secure-offline-cbdc-wallet

C. Defragmenting with smart contracts

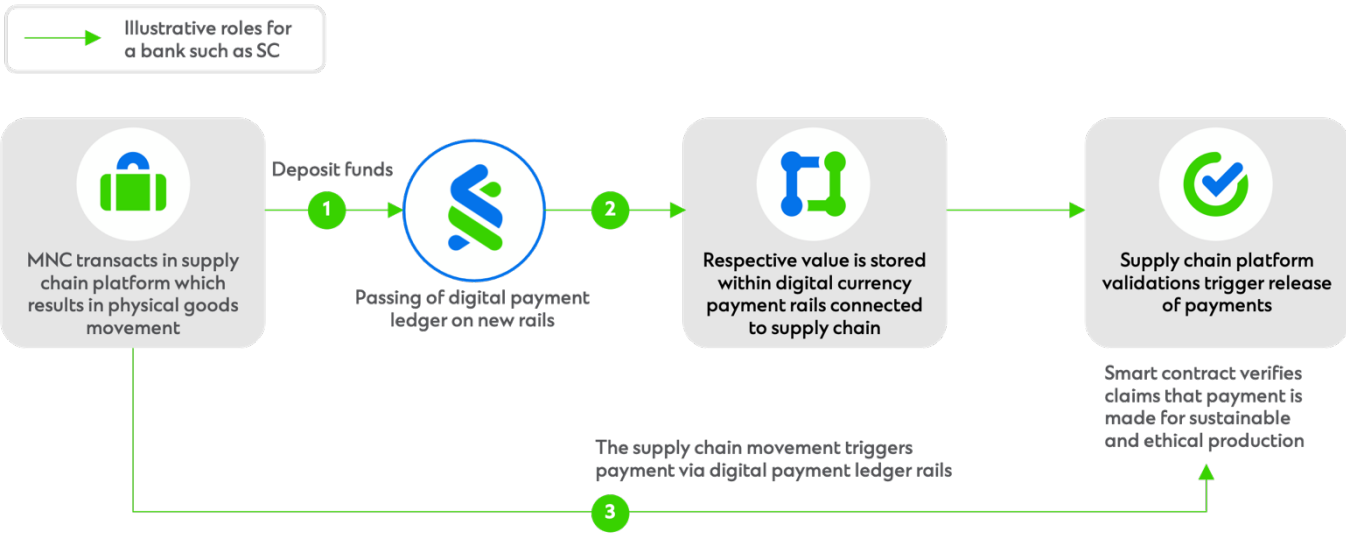
The Monetary Authority of Singapore defines smart contracts as virtual agreements encoded on DLT that can be automatically reconciled based on logical condition[38]. In the below application, a contract could be cast in 'IT language', which would then automatically trigger payments. A financial institution or corporate could program payment timings to be triggered automatically upon the fulfilment of a specific condition. One possible supply-chain sustainability application could be tying the releasing of funds to certain milestones that encourage smallholders to attain certifications.

Such programmability built into smart contracts replaces the function of middlemen in ecommerce and supply chains. With programmability, it's now also possible to condition payments to be released on a blockchain only when a buyer is satisfied. This ultimately helps with defragmentation, for example, by allowing farmers to sell their crops directly to buyers.

The transacting ecosystem depends on the particular leg of the value chain selected for participation:



Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
Buyer or seller enters into a relationship with the bank	Buyer and supplier business details on sustainable events or activities are programmed into smart contracts	Supply chain event occurs	Smart contract verifies the sustainable activity based on a pre-agreed basis for payment release and processing	Debits the payouts to supplier and fees to client and may apply certain discounts or premiums for sustainable activities	The bank provides reconciliation and reporting services with confirmations sent to both buyer and seller



[38] Smart Contract for Blockchain/Distributed Ledger Technology (DLT). (n.d.). https://www.mas.gov.sg/development/fintech/technologies---blockchain-and-dlt

Steps for supply chain programmability of payments:

Programming of restrictions into desired sustainable payments of supply chains

The organisation activates a trigger for supply chain-associated payments supported by the smart contract(s) and bank infrastructure

When the supply chain event is activated and targets are met, the smart contract verifies the claim

Payment processed and released for sustainability-linked activity

Smart contracts: Incorporating sustainability data into payment infrastructure

In another applicable example, an e-commerce player could work with a fintech and/or a bank to introduce integrated payments functionality to an app.

Real-life example

Walmart
The supermarket giant launched DL Freight in 2021 to automatically synchronise data to reduce discrepancies in invoice reconciliation and allow carriers to be paid on time

If every check is successful, the recipient's device initiates a payment through its wallet. The machines' wallets include the corresponding confirmations of the completed transactions. These confirmations could be sent to both the buyer and the supplier, for instance, via an app in the form of structured data records, for accounting, or in the form of an invoice that can be downloaded. It would then be possible to trigger the subsequent new shipment of goods.

It's also feasible to configure for certain reductions to be applied automatically. On the other hand, if errors or defects are discovered, the supplier would be notified, and it may be possible to impose a chargeback.

Real-life example

Accenture
The company launched the Circular supply chain programme with MasterCard and Amazon Web Services to enable businesses to complete quicker payments and trace transactions along the supply chain with smart contracts.

D. Data enrichment: Amplifying the use of existing and emerging data

Transactional data – for example on sales – is typically sought-after by financial institutions and corporates in a supply chain.

Data enrichment capabilities with DLT could be highly useful in the agribusiness industry. Besides acting as a payment representative, a stablecoin issued on behalf of a MNC could also be configured with utility functionalities to enable smallholders to receive fertilisers, for example.

Utility management could even serve as records of smallholders taking steps to improve or enhance their businesses with sustainability in mind – becoming more easily obtainable verifiable proof, in order for them to become certified.

Standard Chartered and SFA envision that data validation could better inform and connect smallholders with financial institutions, buyers and input producers, while the blockchain infrastructure can store provenance data for particular inputs and maintain the necessary privacy.

The central illustration of data enrichment and the ecosystem relationship

Real-life example

Hara

AgriTech providers in Indonesia such as Hara aim to develop entire ecosystems for effective data sharing to counter the challenge of incentivising data sharing with the financial sector. HARA is a Dattabot-owned start-up that has developed a suite of data acquisition apps powered by blockchain, which ensures decentralised storage and security of agricultural data[39]. Data providers such as crop and livestock farmers, as well as NGOs, agribusinesses, cooperatives and companies with IoT and satellite solutions, supply data to the Hara data exchange platform via a mobile and web portal. To enable farmers to share their data, Hara deploys a network of field agents, typically tech-savvy individuals who are underemployed. The field agent's role is to assist farmers with registering their profiles on the Hara app and collecting agricultural data. An incentive system based on tokens awards both farmers and field agents with discounts on fertilisers and seeds through local partners engaged with the ecosystem. To enable data sharing from companies with relevant data, including agribusinesses and cooperatives, Hara uses the same tokens as a reward. This allows data providers to transact with tokens in the system or convert them into local currency, after Hara's data exchange has verified the quality and consistency of data. Hara issues tokens to all corporate and institutional providers listed on the data exchange that share data, with a share of these tokens allocated to receive basic ratings on data quality and compensate for the work that goes into validating data. As a result, there is a revenue stream from both data providers and data buyers.

Solutions like Hara's in markets like Indonesia can help the formal financial sector reduce the cost of data acquisition and, crucially, de-risk smallholder financing through new and critical data points.

The emergence of such data tools highlight the need for intermediation and aggregation in agricultural data sharing in particular[40]. It also showcases the value data aggregation and analytics can offer to actors leading these activities.

[39] About Us | HARA. (n.d.). HARA Agriculture. https://www.hara.ag/about-us

[40] Data sharing in the agricultural sector | Support Centre for Data Sharing. (n.d.). https://documents1.worldbank.org/curated/en/851711521095180329/pdf/124304-WP-PUBLIC-AgriBookMar.pdf

E. On-chain financing to fund sustainable investments

As an alternative to traditional financing, on-chain financing allows for financing requests to be raised and dispersed directly on a blockchain. This is a viable option for financially excluded suppliers to access capital.

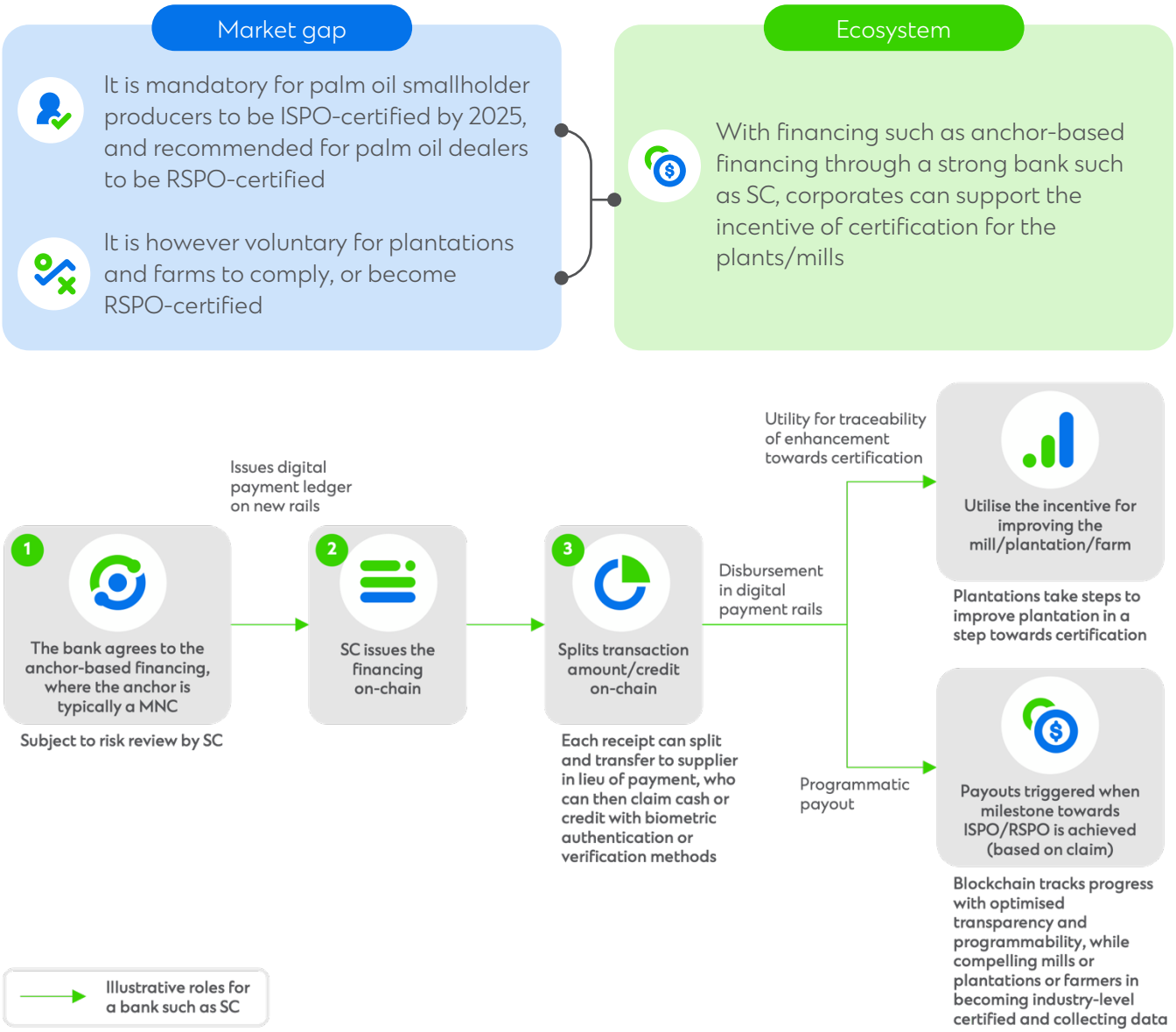
One use of such financing could be the investment in certifications – traditionally a cost barrier. Standard Chartered and SFA continue to explore ways to support the increase in ESG-certifications and greater compliance with best practice in different industries.

Incentive mechanisms are one option, such as anchor-based financing where a bank such as Standard Chartered takes on an MNC's risk to fund smallholders in becoming certified where risk reviews are acceptable. Under this concept, an anchor would be incentivised to compel smallholders to complete certification, where disbursement and crediting would occur securely and immutably on-chain. A process example is as follows:

- Programme provides an ESG-certified certificate of entitlement and QR key to a biometrically-enrolled beneficiary.
- Beneficiary uses the certificate and QR key to receive goods/services from a local merchant upon successful biometric verification.
- A fintech supports and/or enables the tracking of supplies and adopts smart programming.
- A bank like Standard Chartered sends an invoice on behalf of the merchant to the anchor. Enterprise resource planning then enables the creation of automatic payment files, and releases funds to the merchant.
- Smart tools allow the anchor to use data analytics to assess according to its objectives, and potentially refine their programmes.

By creating opportunities for digital traceability solution providers to collaborate directly with certification providers, certifications can be built directly into traceability data flows. Certification providers can then be sure they have the most accurate information to issue their certifications.

Illustration for the case of a palm oil scenario



A component of consideration for certification could be a price premium, which would incentivise sustainability efforts. Transparency also would enable users to track price and inventory, enable buyers to bid for best prices, and bring a boost to revenue and productivity management.

Real-life example

Hijro (formerly Fluent)
The company developed a blockchain based financial operating network for global commerce featuring real-time business-to-business payments, supply chain financing, and a peer-to-peer working capital marketplace that provides banking partners and non-bank lenders alike an avenue for enabling finance in global supply chains[41].

[41] Hijro. (2022, October 18). Companies | Tracxn. https://tracxn.com/d/companies/hijro.com

Solution framework

Finding the best fit in supply chain implementation

With the variety in both barriers and DLT solutions to supply chain sustainability, approaches will need to vary across different supply chains. Further, we know that many corporates struggle with visibility into their supply chains. According to the Supply Chain Traceability Survey by the World Economic Forum and Bain & Company[42], less than 15 per cent of executives believe their current capabilities can deliver traceability-related use cases consistently. This then makes it that much harder to assess the strength and applicability of different solutions.

As such, we've applied our research results to establish a framework that can help financial institutions and corporates (as well as NGOs and other supply chain participants) to understand their options and the associated sustainability benefits. For this framework, we've used a consistent set of benefit criteria that is quantified for each solution. A description below the chart explains these criteria in more detail.

While applicability will vary depending on industry and many other factors. Overall, we found that a sustainable ledger with DLT traceability forms the basis where the rest of the solutions can build up from, intertwined with solutions based on programmability and on-chain financing to fulfil most of the high-level criteria. Data enrichment are powerful add-on options, while public stablecoins may be the most limited for direct impact based on the current state of solution development. As with SDG 9 on 'Industry, Innovation and Infrastructure', the industry must rethink innovative ways to unlock hidden value and strengthen the infrastructure, procedures and capabilities along the entire value chain.

[42] Saenz, H. (2021b, January 21). Three Ways Traceability Can Fulfill the Sustainability Promise. Bain. https://www.bain.com/insights/three-ways-traceability-can-fulfill-the-sustainability-promise-wef/

Criteria for optimal solution sets	A. **Sustainable ledger with DLT traceability and store-of-value**	B. **Stablecoins :** taking B(i) Public Stablecoin in this example	C. **Programmability**	D. **Data-enrichment and utility functionalities embedded**	E. **ESG certification-linked financing on-chain**
Traceability and visibility					
Cash efficiency					
Accountability					
Enhanced security					
Improve data quality					
Institutional grade					
Scalability					
Digital trust and interoperability					
Financing to remove barriers to market entry					

Criticality

Traceability and visibility
Cash delivery can be ensured, traced and proven. The client is able to monitor the traceability of flows within their ecosystem on demand.

Cash efficiency
Solution reduces cost of handling physical cash.

Accountability
Solution helps clients improve their sustainability efforts.

Enhanced security
Enables greater security with edge cryptography, beneficiary biometrics for authentication against beneficiary fraud and counterfeit cases, to reduce risk of loss and stolen cash during physical transportations and long manual processes. Solution safeguards against fraud and paper-based risks.

Improve data quality
Solution provides the opportunity to improve data quality within an ecosystem.

Institutional grade
Solution meet the standards of institutions to enable institutional adoption and reduces institutional and development gaps between partners in supply chains.

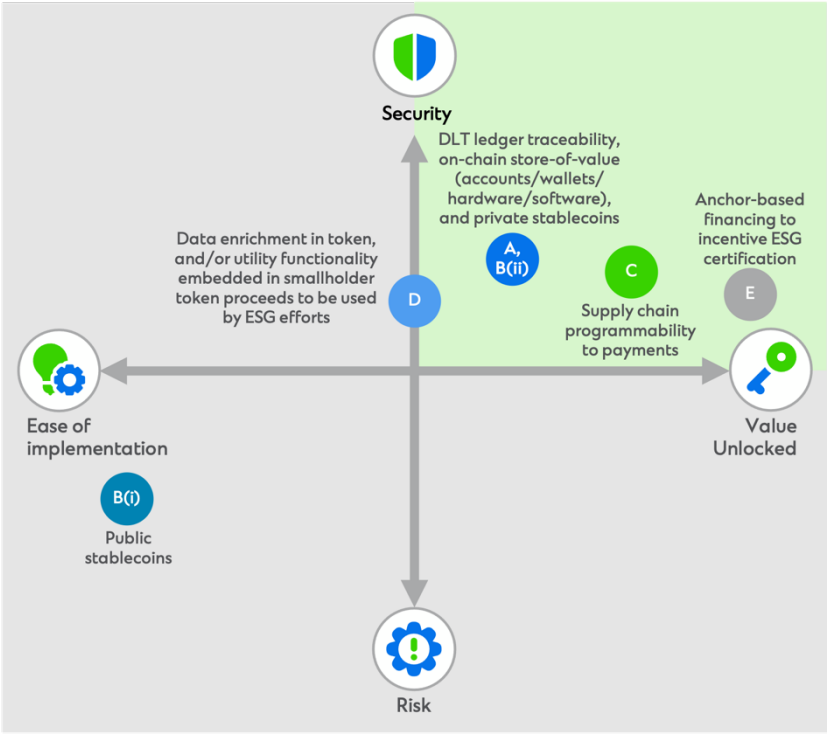
Scalability
Can be scaled across borders.

Digital trust and interoperability
Digitisation of cash offers client the ability to digitise processes as much as possible, increasing access of payment options to deep-tiered suppliers within corporate and institutional ecosystems.

Financing to remove barriers to market entry
Solution assists clients as they expand operations while attempting to build stickiness within an ecosystem. There is an opportunity to facilitate more transactions and flows in untapped segments while increasing recurring transaction volumes.

Implementation feasibility

We also mapped these solutions against a metric of trade-offs in the diagram below. This aims to serve as a feasibility guide to help interested parties assess the real-world ease of implementing these solutions. We found that the green quadrant delivers the most optimal value, security and risk-mutualisation.



Our central recommendation for implementation: Partnerships

While such innovations bring the promise of resilient and sustainable supply chains within reach, no single organisation can do it alone. None of the various benefit criteria highlighted in the framework table can be maximised by any individual stakeholder when efforts are made in silos.

We believe the best way to maximise these benefits – for the good of the broader sustainability agenda – is to focus on collaboration and partnerships.

Supply chains are intricate ecosystems with numerous participants, where the need for a resilient network of alternative suppliers may even increase complexity at some points. To accurately track activity in real time and ultimately ensure sustainability across entire supply chains, all actors – even competitors within an industry – must collaborate on a far larger scale than at present.

Working together, banks, corporates, regulators, and other supply chain stakeholders can maximise the effects of all-encompassing solutions by combining components from the green quadrant above, to amplify the point of SDG 17 'Partnerships for the goals' on strengthening means of implementation through multi-stakeholder partnerships.

Partnership will also be a critical factor in ensuring the applicability of these solutions by both for-profit and non-profit organisations. The fostering of best practice exchange relies heavily on non-profit organisations, including international and industry associations. A shared framework for gathering, analysing, and comparing DLT inputs that can act as effective triggers for payments and financing would also help in coordinating these efforts.

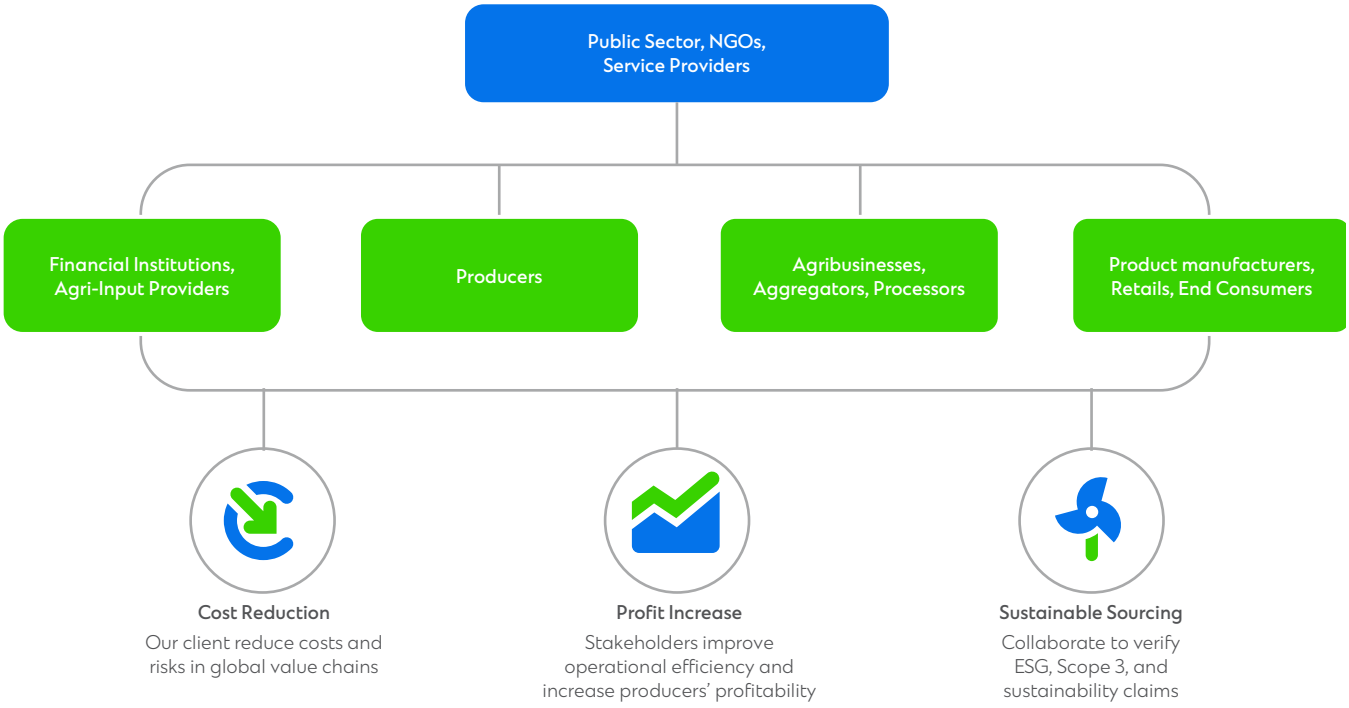
We believe our partnership with SFA and the resulting findings of this paper can serve as an important example of the value of partnerships in driving the supply-chain sustainability agenda. And through the power of this collaboration, we have derived a future-state concept that combines the various solutions outlined above, for maximum impact.

Future vision: A suite of apps for integrated end-to-end DLT solutions

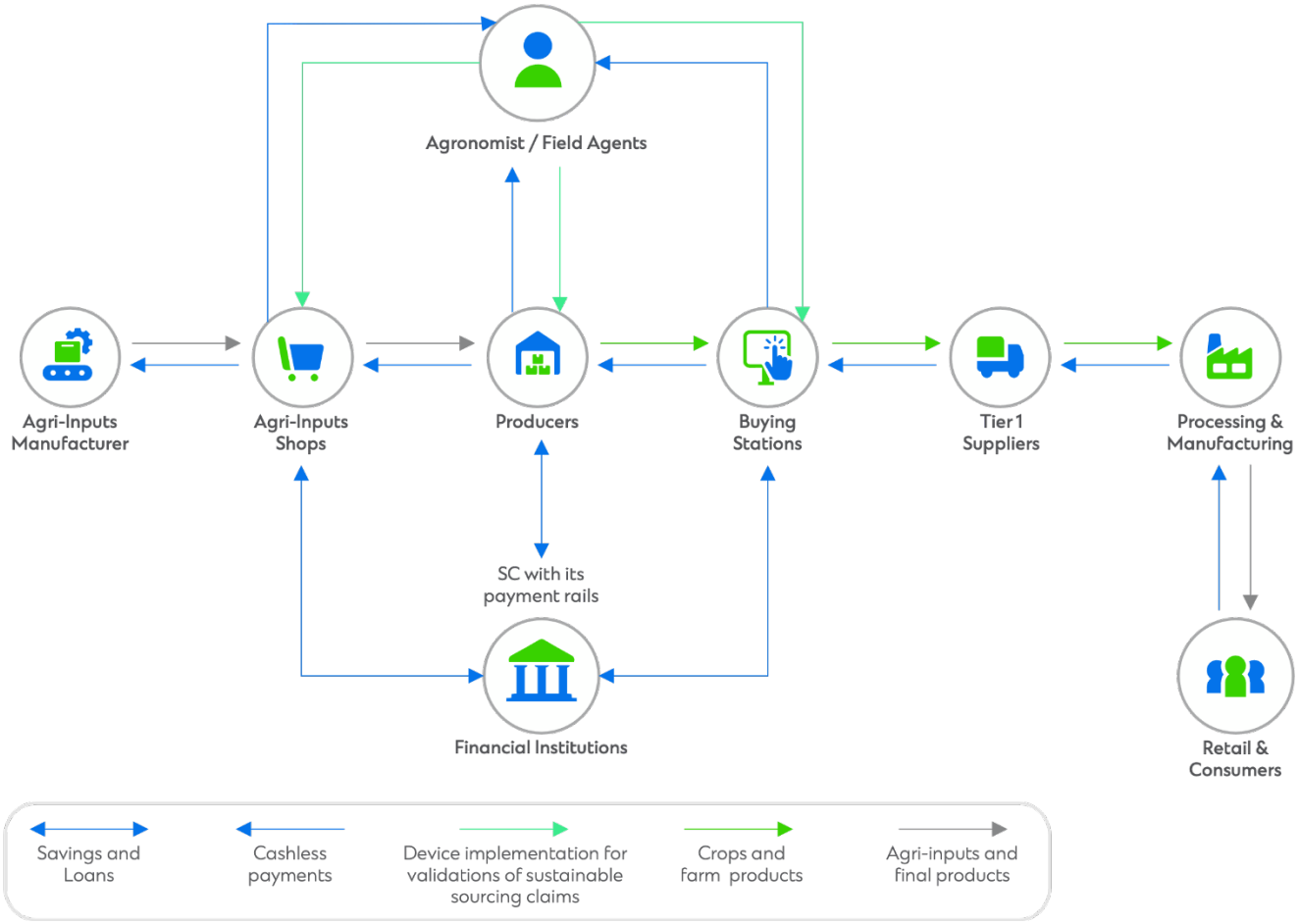
The world of DLT is constantly evolving. And while there's no one-size-fits all approach to overcoming the barriers to sustainable supply chains, banks like Standard Chartered and their digital partners can help to connect the options. This can then enable corporates and other interested parties to access different solutions in one place, drawing out the sustainability benefits faster and more efficiently.

Our Digital Currencies Team continues to work with our clients to help streamline their access to such technologies. At present, we offer a combined approach via our payment and API technologies. Our future vision is an end-to-end suite of integrated solutions with collaborative stakeholders such as fintechs, that becomes an embedded system for financing sustainable supply chains. This ultimate idea behind this ideal end-state is to boost cash flow towards more sustainable transactions and help small producers meet sustainability standards. For this to work, we would effectively need to create a new ecosystem that depends on collaboration between parties, as illustrated by the below diagram:

Ecosystem



An example of how such an integrated approach could work in the agribusiness sector is illustrated below:



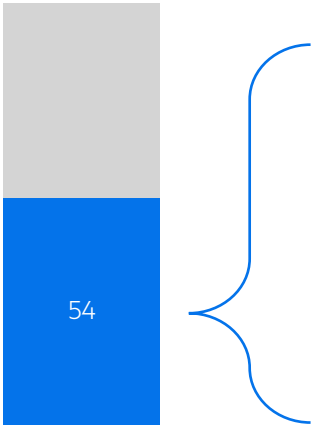
Under such an example, and in the spirit of partnership, each player in the supply chain would have a different role:

- Supply chain partners: Track the physical movement of inputs and single origin trading of sustainable produce.
- Associations: To serve as an on-the-ground platform for extension services for supplier mapping, inspections, training, device implementations, and verifications.
- Technology partners: for SaaS web and mobile solutions, including for land use analysis and IOT for every actor along supply chains.
- ESG-embedded properties in on-chain disbursement.
- Access to facilitate supply chain programmable payments.
- A Management Information System (MIS) from seed to table, and an Enterprise Resource Planning System (ERP) for responsible businesses.
- On the back of that, there is more data available and it builds the ecosystem.

One step further for purposeful impact: DLT and financial inclusion

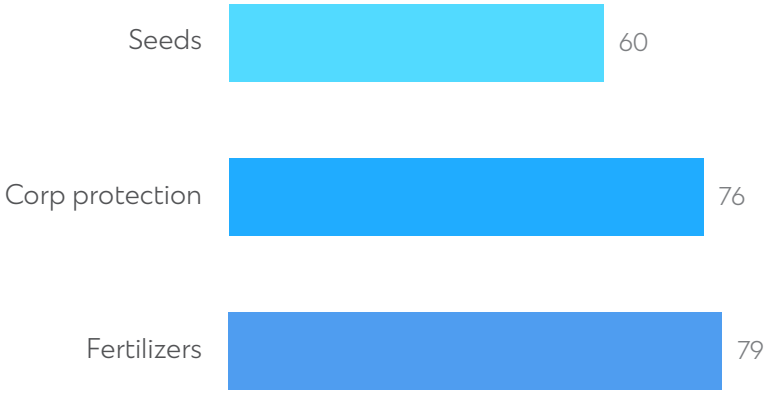
An additional value DLT could bring to the sustainability agenda is the introduction of digital footprints to raise financial inclusion. For example in agribusinesses, data shared via DLT could help farmers create a digital financial identity to allow access to a certain set of services, such as accounts for transactions. This would be in contrast to foundational identities, which are government-issued documents like identity cards, passports, or birth certificates. A digital financial identity for farmers could help lenders to estimate earnings and gauge credit risk, setting the stage for greater inclusion in a DLT-led digital financial system of the future.

Willingness to buy online[43]
% of respondents



Share of farmers who would consider purchasing any inputs online

Interest by input from farmers who would consider online buying[43]
% of respondents who would consider purchasing anything online



>2x

farmers are willing to consider buying online than currently do

How they want the digital experience to be improved

- Tailored pricing including negotiations
- User experience improvement
- Non-standard delivery

The opportunity to grow digital engagement among farmers is significant—with five times more producers open to using digital channels to make agricultural purchases than today's levels.

As a result, initiatives to place these commodity value chains on a more sustainable track are critical to achieving the SDGs .

[43] McKinsey Digital Grower Survey, September 2020 (n=395)

Outlook

We are already seeing increasing engagement between the private sector and NGOs, as well as clients, fintechs, and sustainability tool providers. This progress marks a step in the right direction for the cementing of partnerships. And these are much needed, both for broader sustainability goals but also in the pursuit of impact-maximising solutions like our above-described future state.

The establishment of common sustainability performance criteria and expectations that can be applied across various relevant sectors is also a critical need that is currently lacking. As regulatory guidance expands, we believe industry-wide sustainability integration will become more mature while ensuring cross-jurisdictional compliance with regulatory directives.

Cost evaluation of participating in this collaborative advancement will also need to be carefully considered. We are also seeing the beginnings of more sophisticated and thorough evaluations of sustainability risk factors, which will be critical in benchmarking our collective progress. Standard Chartered is already collaborating with a variety of stakeholders to enhance the measurement of these risks. We hope that as supply chains become more transparent, this paper will help relevant stakeholders improve solution design, resulting in fewer trade-offs and bringing opportunities for solution complementation, rather than conflict.

Window of opportunity: The time to act is now

As outlined earlier in this paper, we are at a turning point for sustainability in supply chains. Not only is the sustainability agenda becoming increasingly urgent (as we continue to fall short in progress towards the SDGs), the advancements in DLT have now reached pivotal momentum. Acting now gives us all the best chance to make the greatest difference.

And if we again take the example of agribusiness, and specifically at AgTech, technological innovations now have the power alleviate the difficulties that agricultural buyers and producers encounter.

Push by modernising CSR agenda

As more customers worldwide turn to products that compensate workers fairly or are made in an environmentally-sustainable way, markets for sustainably produced goods, or 'green markets' are on the rise. According to data and measurement company Nielsen, sales of these products increased by 3.5 per cent in the United States between 2014 and 2018[44], as opposed to 1 per cent for goods without a sustainability label.

Care should be taken to ensure that involving more players in such markets does not subject SMEs to excessive additional costs or compound existing challenges to accessing financing. Allocation of additional resources earmarked for SMEs or smaller financial institutions, to ease the stress and costs of adaptation would help. A social and sustainability-oriented transformation of agricultural sectors can only be realised based on their cooperation and inclusion in sustainability standards and certification schemes.

[44] The Sustainability Imperative. (2015, October). https://unctad.org/news/small-producers-need-help-enter-lucrative-green-markets

Appendix

Examples of critical Certification

- Sustainable Forestry Initiative (SFI) 2015-2019 Standards and Rules, Section 4: Chain of Custody Standard
- SFI 2022 Standards and Rules, Section 4: Chain of Custody Standard
- Chain of Custody, Programme for the Endorsement of Forest Certification (PEFC ST) 2002:2013
- Programme for the Endorsement of Forest Certification (PEFC ST) 2002:2020
- Forest Stewardship Council certification (delivering certification services (FSC®-N003091) in association with the Soil Association Certification Ltd. (FSC-A000525,) which can be combined with SFI and/or PEFC certification from National Science Foundation (NSF).

Taxonomy

- Blockchain: organises data into blocks, which are then chained together. Blockchain is one form of distributed ledger technology
- ESG: stands for Environmental, Social, and Governance; factors are used to evaluate companies and countries on how far advanced they are with sustainability
- Fintech: companies or representatives of companies that combine financial services with modern, innovative technologies
- SDGs: stands for Sustainable Development Goals, global targets set out by the United Nations
- Distributed ledger technology (DLT): a type of technology that support the distributed recording of encrypted data
- Stablecoin: A type of digital currency which aims to maintain its value relative to a specified asset or basket of assets, that is meant to stay relatively constant in value and that is pegged to an asset such as commodities or a fiat currency. It is intended to be used as a means of payment or store of value
- Sustainability: Meeting our own need without compromising the ability of future generations to meet their own needs

Acknowledgements

The key learnings outlined in this report were prepared by:

Lead Authors

Eric Pascal
Head of Digital Currencies
SC representative

Isabelle Sumarli
Project initiative and research study lead
SC representative

Benjamin Soh
Chair of the SFA Green and Sustainable FinTech Committee
SFA representative

Contributors

Suresh Babu Pagadala
Working group contributor for ESG technical insights and solution architecture
SC representative

Charlotte Gregory
Working group contributor for design-thinking journeys and operations
SC representative

Cynthia Liew Mei Xin
Working group contributor for data and research
SC representative

Support and participation from SFA

Reuben Lim
Chief Operating Officer
SFA representative

This initiative was made possible by the collective effort of Standard Chartered colleagues in the Sustainability and broader Transaction Banking departments, and participation and guidance were received from colleagues in Marketing and Media Relations.

Disclaimer

This material has been prepared by Standard Chartered PLC, Standard Chartered Bank and its affiliates (SC Group), a firm authorised by the United Kingdom's Prudential Regulation Authority and regulated by the United Kingdom's Financial Conduct Authority and Prudential Regulation Authority. It is not independent research material. This material has been produced for information and discussion purposes only and does not constitute advice or an invitation or recommendation to enter into any transaction.

Some of the information appearing herein may have been obtained from public sources and while SC Group believes such information to be reliable, it has not been independently verified by SC Group. Information contained herein is subject to change without notice. Any opinions or views of third parties expressed in this material are those of the third parties identified, and not of SC Group.

While all reasonable care has been taken in preparing this material, SC Group make no representation or warranty as to its accuracy or completeness, and no responsibility or liability is accepted for any errors of fact, omission or for any opinion expressed herein. You are advised to exercise your own independent judgment (with the advice of your professional advisers as necessary) with respect to the risks and consequences of any matter contained herein. SC Group expressly disclaim any liability and responsibility for any damage or losses you may suffer from your use of or reliance on this material.

SC Group would be pleased to consult with you regarding the bank's cash management capabilities and Treasury Solutions. In any consultation, SC Group does not provide accounting, legal, regulatory, tax or investment advice. This material does not provide any investment or tax advice. Any statements regarding those matters would be for discussion purposes only. No such statements, nor any forecasts, modelling or other projections, should be relied on by you. This material has been produced for information and discussion purposes only and does not constitute advice or an invitation or recommendation to enter into any transaction or to subscribe for or purchase any products or services and should therefore not be relied upon as such. The information herein may not be applicable or suitable to the specific investment objectives, financial situation or particular needs of recipients and should not be used in substitution for the exercise of independent judgment.

Any financial projections or models included in this material are based on numerous assumptions regarding the present and future business strategy of the entities to which such projections or models relate and the environment in which such entities may operate in the future. These future events are not a guarantee of future performance and are subject to certain risks, uncertainties and assumptions.

SC Group may not have the necessary licenses to provide services or offer products in all countries or such provision of services or offering of products may be subject to the regulatory requirements of each jurisdiction. This material is not for distribution to any person to which, or any jurisdiction in which, its distribution would be prohibited.

SC Group may be involved in transactions and services with clients or other persons who are, or may be, involved in the transactions that are referred to in this material or who may have conflicting interests with you or any other person. SC Group's ability to enter into any transaction (or to provide any person with any services) will be subject to, among other things, internal approvals and conflicts clearance.

The distribution of this material in certain jurisdictions may be restricted by law and therefore persons who receive this document or any Information should inform themselves about, and observe, any such restrictions. Any failure to comply with these restrictions may constitute a violation of the laws of any such jurisdiction. No liability to any person is accepted by SC Group in relation to the distribution of this document or the Information in such jurisdictions. The distribution of this material in any other country locations may require suitable disclosures to be made by the SC Group. Should you receive this material in such other country location, please contact the relevant SC Group member.

You may wish to refer to the incorporation details of Standard Chartered PLC, Standard Chartered Bank and their subsidiaries at http://www.sc.com/en/incorporation-details.html.

About the organisations

Standard Chartered

We are a leading international banking group, with a presence in 59 of the world's most dynamic markets, and serving clients in a further 83. Our purpose is to drive commerce and prosperity through our unique diversity, and our heritage and values are expressed in our brand promise, here for good.

Standard Chartered PLC is listed on the London and Hong Kong Stock Exchanges.

For more stories and expert opinions please visit Insights at sc.com.
Follow Standard Chartered on Twitter, LinkedIn and Facebook.

Singapore FinTech Association (SFA)
Green and Sustainable FinTech subcommittee

The SFA is a cross-industry non-profit initiative, intended to be a platform designed to facilitate collaboration between all market participants and stakeholders in the FinTech ecosystem. We are designed to be an effective platform for members to engage with multiple stakeholders to find solutions to issues.

The Green and Sustainable FinTech Subcommittee Mission: Foster the development of solutions that channel capital towards an inclusive, net-zero carbon and resilient economy in Singapore by working collaboratively with various stakeholders in the industry in 4 key areas of focus. Vision: Promote an inclusive, net-zero carbon and resilient economy.