**Supporting Information**

**Unfinished paths
– from blockchain to sustainability in supply chains**

**SI.1. Interview guide (provided in advance)**

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| Interview Guide**NOTES:*** This list might be made available to the interviewee prior to the interview
* Depending on the interviewee’s consent, the interview might be recorded. The material (recording and transcripts) will be treated anonymously and used only within the Sustainable Blockchain Technologies project.
* The expected duration of the interview is 30 min.

**QUESTIONS:**1. Can you provide a short description of your project and the motivation for starting it? What specific problem was this project supposed to solve?
2. What is the current status of your project? And what is planned in the future?
3. How is your blockchain solution different from other non-blockchain-based solutions? Could you achieve the same results with a centralised solution? What would be different?
4. How does using blockchain in this project solve the original problem?
5. To what extent is the problem solved thanks to the blockchain element of your project, rather than thanks to other surrounding conditions (e.g. increased digitisation)?
6. How do you measure the impact of your project and what indicators did you use? If not, how do you think this could be done for your case?
7. Thinking beyond your project, how can we make sure that blockchain will generate positive impact in the future? What needs to be done to assure that blockchain will benefit society at large and not just a selected few?
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**SI.2. Descriptions of themes and selected quotes**

***External constraints***

*External constraints refer to outside factors hindering or slowing down the adoption of blockchain-enabled systems in supply chains. There is a variety of constraints. The lack of digitisation is one. Blockchain-enabled systems and other technologies can only be implemented once paper-based processes in the supply chain are digitised. This is a prerequisite for implementation and there is a lack of digitisation in many upstream parts of the supply chain. Another constraint are social and political instability. Two interviewees mentioned that they were significantly delayed in their implementation due to demonstrations, unrest, and similar issues. Regarding the implementation of blockchain-enabled systems to improve upon existing regulated systems (e.g. cross-border payments or digital identity) there is a lack of regulatory adaption currently hindering some implementations. Additionally, a lack of understanding can be a problem. Stakeholders don’t necessarily understand what the advantage of using blockchain technology is and might therefore not participate in its implementation.*

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| *“If you think about even relatively large mine sites in places like [country Y] that are managed mine sites, there is no technology at all. No scan in or scan out or anything else that might allow you to construct the chain of custody. So, we are trying to create a digital twin for something where there is nothing except a mobile signal. […] Also, there is no digitisation of the supply chain at all. Therefore, you are relying on manual processes for everything along that supply chain.”**“We were supposed to go live [several months ago]. However, [country X] was having political issues at the time and the team that was supposed to do the [product] collection got kidnapped. [For several months] people could not move around the country. If you were caught moving around, the hooligans would attack you and set your car on fire.”**“We invited a bank. We had a couple of calls with them and the blockchain developer company and some of the policy and technical folks. The conclusion at the end of the conversation was that the banking system is going to take a while to catch up to the technology. The regulations that are currently in place that manage the way that transactions occur in terms of currency, particularly across borders and multiple jurisdictions are too complicated to be handled by a simple smart contract. This is not a technological feature or solution that the regulators envision that there would be something that could automate it in this way, particularly again across jurisdiction and different banks and institutions. I think there is still a way to go until we get there, but I think again it’s not a matter of technological capability. It’s more a matter of political will and the ability of a government to adapt its regulations of the banking system.”* |

***Technology related hurdles***

*Blockchain technology is still an immature technology that faces multiple problems such as slow transactions, high costs, scaling difficulties, and the high environmental impact of some blockchains. While there are improvements to be expected, current blockchain-enabled systems have to deal with existing difficulties. Data uploaded to a blockchain is not necessarily end-to-end secured meaning that humans are involved in registering or changing an asset. This is considered a risk by many interviewees and different technologies to ensure correct data entry and editing are tested. One of the main issues stressed by many interviewees is that of governance. Setting up a decentralised network means that 1) you need the relevant actors to join the system, and 2) the participants need to agree on governance mechanisms. This can be anything from which kind of blockchain is used to which data is shared and who can see the data. It was mentioned that governance is the more difficult part compared to the purely technical part. In order for a blockchain-enabled system to bring positive social and environmental impact, though, it is important to make sure that the system design does not only benefit more powerful actors in a decentralised network but is inclusive. This also needs to be considered when setting up system including its governance. Finally, different blockchains are used in different cases around the world. In order for them to not lead to more silos, interoperability between those different blockchains is an issue currently discussed.*

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| *“Number one is performance. So, blockchains tend to be slow and when you start getting into supply chain applications, if you start to decentralise the data storage then you have a fair bit of control over the algorithm, so it takes a bit longer in development to make sure that the performance can match up, so that you can actually use it without waiting 5 minutes for your results.”**“It’s about 90% governance, 10% technology. […] The technology is not the problem, but the consortium is. We are currently in the process of drawing up contracts. That takes almost a year. And then you’re not even at the beginning. The blockchain was set up in three months. […] You can get a blockchain. Go to Microsoft or Assure Cloud, there you get a blockchain with 25 nodes in 5 hours, but then you have no one in your ecosystem. And no governance.”**“But this is where it becomes extremely important to understand how the process evolves to ensure that it is inclusive. There is a really big danger if you don’t follow the process critically and flag issues at an early stage that it increases the digital divide that is already there in this world. And we have to ensure that those who have less power have access to these types of technologies if they are beneficial for them.”* |

***Time-consuming development and adoption***

*Implementing blockchain-enabled systems and reaching adoption can be a time-consuming process. Many parts of the supply chain are not digitised at this point, which is a prerequisite for blockchain-enabled systems, and the technology itself is still immature. Blockchain technology is further not the solution for everything as sometimes claimed. Precise use cases will become clearer over time and understanding what kind of system designs work for which cases also needs to be learned. Additionally, it is not as easy as using the exact same blockchain-enabled system from e.g. a mining supply chain and transfer it to an agricultural supply chain. Adaptation needs to be done depending on the case and its environmental conditions. It was further mentioned that it is not clear how actors in the supply chain act when bad behaviour is detected on the blockchain. There are likely no existing mechanisms for such an incident and even in cases that there were, it is unclear if they would be able to address the specific problems arising from the bad behaviour. Another issue that one interviewee described is that the participants, in one specific case farmers, did not trust the organisations coming in with the intend of implementing blockchain-enabled systems to improve their income. Building trust between actors can be a slow process and simply takes time.*

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| *“They [the farmers] didn’t trust me. They still don’t trust me. They don’t trust the system. That’s the function of government. It’s a slow. It’s actually fast for what it is, the year, but it’s a slow thing. It took them 7 years to get to where they started thinking about the system to do this. So, it’s gonna take time and for me as a technologist I want it to happen faster. But I also have to measure back with what I’m trying to do. I’m not building an app on a phone. I’m building an ecosystem and that’s going to demand time. It’s gonna demand acceptance. It’s gonna demand also much more of a human design centric mode than actually just coming up with a solution.”**“If we did detect illegal [activities]. What would our customer companies do with that information? Would they publish that and handle that proactively or would they just pull the product? What are their approaches there? That’s to be determined. […] So it really comes down to the mechanisms implemented in those first miles. For instance, in seafood fishing, how do you enforce that behaviour? Do you not pay the captains of those boats for the fish that they caught illegally and try and push the pressure back to the supply chain? […] It’s quite complex and we haven’t gotten to the point where we can say for certain what the actual mechanisms will be implemented.”* *“For our future plans, we think, one it’s still very early days in blockchain. What does that mean is that the exact solutions and that will win in terms of the protocols that will be used, right now there are many, many protocols. I think over time, because whether they are just better at marketing or technical solutions or a combination of both, a few larger ones will emerge.”* |

***Identification of current shortcomings***

*Current shortcomings are in many cases drivers for implementing blockchain-enabled systems. This is a rather long list that depends on each interviewee’s experience, but many points have also been raised by a large share of the interviewees. Many supply chains are diffuse and opaque making it difficult if not impossible to locate specific products in the supply chain. There is a lack of knowledge of not only where the products are, but also where they have been produced, how they have been produced, and who has been in contact with them. This makes it difficult to address common issues related to human rights abuses, counterfeiting, and environmental degradation. Interviewees have mentioned that they are not happy with existing solutions. This is due to different reasons. One interviewee mentioned that centralised technology providers gain powerful positions and they had bad experiences with this in the past. Another one mentioned that a centralised solution simply failed when they tried the implementation. It was also mentioned how bag and tag schemes have led to black markets for these tags, how the poorest actors in the supply chain pay for some existing solutions, and how existing legislation unintendedly incentivised bad behaviour. Audits of existing certifications have also been criticised as they are only spot checks and, in some cases, actors could prepare for an upcoming audit. This shows that there is a lack of trust and communication between the actors in the supply chain. There is further a lack of digitisation, which makes addressing several of these issues difficult. Additionally, capital is tied up due to slow and manual processes in supply chains leading to delays in payments and shipments that affect poorer actors more.*

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| *“The supply chain risks in conflict minerals can be anything from illegal taxes taking along trade routes, laundering illicit material into an existing supply chain, lack of due diligence information, smuggling, money laundering, child labour, forced labour, you name it.”**“Right now, if you were purchasing a conflict affected material such as tin on the global market, you see tin one price, tin another price […] and you don’t know the difference. Was it mined from the seafloor destructing the beds? Was it mined from a responsible mine? Was it mined using forced labour? You don’t know. And these companies might have reports, but there are all kinds of problems. How can you know without visiting? And so, if you visit how much auditing has to be done and so the more a company does sustainability action, the more audits they undergo, the more people visit the mine, the more work they have to do, and it costs more to do that. As a result, they price higher in a commoditised market. If you are buying a commodity, then it’s really just the pricing that makes a difference. They are at a disadvantage.”**“If you put in a track and trace solution that costs money. Who pays for that? The miners, the ones you try to help, and someone comes over and says I give you a 30% money laundering bonus to sell illegally to my army. Suddenly, you disincentivise people from acting in a responsible manner.”* |

***Believe in the potential***

*The believe in the potential of blockchain technology and its importance is another driver for implementing blockchain-enabled solutions. Below some examples of that are shown.*

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| *“It’s the future. Embrace it today or embrace it kicking you up the teeth later.”**“For me, it’s the next step of human evolution after the internet.”**“We think that blockchain in agri-food systems is a potential game changer for agri-food systems in low- and middle-income countries over the next 5 – 15 years. That is not something that is going to happen tomorrow. But it will happen faster than many people realise. As soon as some of the initial hurtles are overcome, it will really take off.”**“I think it could be revolutionary in the way that supply chains work.”**“The future world is decentralised. It is inevitable – the full decentralised model is already in motion.”* |

***Motivation***

*There are different motivations of why blockchain-enabled systems are implemented. One major reason is that brands that are already doing well, that have already more sustainable supply chains than others, want to show and highlight that their products are more sustainable. Blockchain-enabled systems are a marketing tool for them that they want to use to distinguish their products from others. Another reason is that companies want to manage their risk. If the company does not know where and how their products have been produced, they cannot know if e.g. human rights abuses have taken place to do so. It is seen as a way to proactively address these issues. Other companies have set ambitious goals regarding their social and environmental impact. They don’t yet know how to reach these goals. Thus, they are exploring different potential solutions of them being blockchain. Finally, there are actors that do not want to build a system that is owned by one entity only, especially if they are bringing competitors together into one network. They themselves would not join a centralised system. Similarly, some actors would not join a network where their data is uploaded on someone else’s server*

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| *“They want to protect their brand against supply chain risk. No one wants to be in the news next to child slaves. With companies facing huge fines in the previous years. These are significant threats to companies. It’s not just out of the goodness of their heart. It’s to protect their brand and to have access to the market. But there are also compliance reasons. They wanted to be relatively straight forward to show that they are being responsible. Companies are not people, but they are made of humans. And these people generally are not psychopaths. They want to do good in the world. It’s just they don’t always have the ability and by having the data included in the material of where it came from and under which conditions it was produced, it gives more confidence into what they are buying.”**“It was important to us from the outset that we build a system that does not belong to a single entity, that it is not centrally owned by us. It is important with this topic to create trust. […] It is important to us to not create a singular solution for us. We want that others join. So, the question arises: Would a competitor log in and enter data?”* |

***Trusted & secure ledger***

*One of the key advantages of blockchain technology is its virtual immutability. Data that has been entered cannot be changed afterwards. It also means that with blockchain technology something that has been created, for example a certificate for organic farming, cannot be used more than once preventing double-spending. With checksum tests is can be ensured that 1kg of coffee beans going into a process an actor cannot produce 10kg of coffee. More complex algorithms can also be used on the data to ensure plausibility and detect anomalies. The availability of data, especially publicly available data, can furthermore be verified by third parties. All this increases the trust in data stored on a blockchain.*

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| *“It’s a database. It’s nothing else, but a database. A database that can’t be modified. A database that allows various counts of parties, which have different needs, to participate. It is creating democratisation of access, because nobody can stop you from getting in. As long as you’re providing the information.”**“You can verify that yourself. That data is the same data. We didn’t go back and update it and try to rewrite history.”**“If you have a system for tracking and tracing the inputs and a system which would allow you to do a check-sum on the transactions so that if I as a producer of the input sell you two bags and you start selling four of those bags, then I know there is something wrong at your end.”* |

***Building a decentralised ecosystem***

*In decentralised ecosystems not one entity or person owns the platform. This seems to be especially important when participants don’t trust each other, competitors are involved, or if the size of network becomes very large. Many actors can be involved and make their voices heard. It allows participants to work together and find win-win situations and can create network effects. Once example that was mentioned a couple of times is that when company A conducts an audit, company B knows this and can do their audit at a different supplier increasing the audit coverage. The biggest challenge to building decentralised ecosystems is to find a governance model that is beneficial for all actors involved.*

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| *“If you were to try to do this with a single database, who would host it? […] Who would be the central authority that would be trusted to host some monolithic database? So, it lends itself to a distributed ledger approach. […] if you wanted to get all of those participants to subscribe to a central platform, who on Earth could host it?”**“You have to convince people to join and you can only achieve that when it’s not the big company that comes and says “I have this blockchain solution. Enter your data.” Then the competitor comes and says “I also have a blockchain solution. It’s decentral. Enter your data here.” Instead that needs to be carried together and everyone has to have an advantage. To find that is not always so easy.”* *“We know that there is one competitor that has almost the same supply chain as ours and uses the same system. That is exactly what is meant by network effects. It means we have tier 1 integrated. Tier 2, tier 3, tier 4 are integrated. Then the next company comes and has the same integrated again. That means work and costs are reduced. That is a determining criteria.”* |

***Self-sovereign decentralised data management***

*With blockchain technology participants can maintain ownership of their data and themselves decide who they want to share their data with and for how long. It is also possible to proof something without revealing the actual information. For example, a company needs to have a minimum amount of capital to qualify for a specific project. The company does not have to reveal the exact amount of capital, but the cryptographic algorithms used on data on a blockchain can proof that the company has more capital or not. Numerous interviewees agreed that the self-sovereign decentralised data management is one of the key improvements that blockchain technology brings and it can also be a driver for getting participants to join a blockchain-enabled system.*

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| *“Different partners don’t have to always show everything. If they can themselves manage whom they make which data available to, then that is an advantage and that is possible with blockchain.”**“People always mistrust, when they give data somewhere. Then they will be used anyways and it wouldn’t work in the first place. When we say „dear tear 1, please give us a list of your entire supplier chain. Put it in the system and I swear we will not use if for your purchasing negotiation.” Tier 1 does not want that. He will be afraid that we will use it for something. But if he can himself direct which data he will share with whom – until when and how and keep the data and it’s decentralised so that it doesn’t belong to someone, we see the opportunity that other players – especially those in the middle – will join.”*  |

***Tokenisation and smart contracts***

*Tokenisation together with smart contracts can be used to automate processes. For example, payments can be conducted automatically after fulfilment of a contract reducing payment times tremendously. It was mentioned that it currently takes a long time (e.g. 30 days or even several months) to settle payments in supply chains. Automating and improving these processes can be very interesting for all actors involved. Tokens can also be used to connect consumers with producers through all kinds of different schemes such as tip-the-farmer schemes, micro-lending, and crowdfunding. Consumers can see where their favourite products are from and support producers directly.*

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| *“The consumer can then invest a token [… towards] a certain famer. From a list, they can select one of the farmers. This token is then transferred to the wallet of the farmer and he spends it – on what we call responsible spending. You cannot transfer it to fiat currency and buy liquor or cigarettes. He can buy e.g. trees from it. If you invest in trees, you have a proof that it was planted with the geo location and a photo of it. That makes it verifiable impact. We can quantify what the tree does over its lifetime, which is verifiable because the farmer shows where it is, and we can monitor it over time. Other programs are healthcare or microloans.”* *“The other aspect of blockchain that we looked into that I think is critically important […] is the potential of smart contracts to play a role. Where transactional agreements can be executed without an exchange of paperwork and signatures. I think we’ve seen an example of how that has worked with respect to the bank transaction using on purchasing [a product]. They were able to conduct in a matter of two and a half hours a transaction that normally would take 10 days to complete and in [this] business – like any business – time is money. If you can create efficiencies in supply chain transactions that automate payments upon execution of contract deliverables, you’re creating incredible efficiencies that could dramatically drive the collection of data by creating incentives, but also the transparency and the traceability of those products.”* |

***Connecting supply chain actors***

*With a blockchain-enabled system actors in the supply chain can connect. They can share data and see information from others. Every actor’s voice can be heard. This was previously not possible. The brand did not know if the suppliers did great things as one interviewee mentioned. It is also possible for consumers to connect with the producers of their products. Examples that were mentioned in the interviews include tip-the-farmer or micro-lending schemes, but other things are possible as well. Additionally, having a decentralised network may supplement or even replace some official systems. If a farmer can show records of transactions related to a micro-loan, he may use this information to get access to a loan or a bank account.*

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| *“Basically, the whole story behind a product can be told by different people, because everyone has their own part of the story. You just have to make sure that their part of the story is shared in a trustworthy way. That’s what you use blockchain for to connect different parts of the story in a trustworthy way that no one can change, and no one can edit the story. You don’t get the problem that 7 people whisper something in each other’s ears and the last version says something completely different. You get everyone to say their own thing out loud. Everyone can hear what everyone in the chain said about the product and get a better image.”**“Or you can use blockchain technology to create a crowd funding campaigns for farmers or create end of supply chain finance products – people borrowing money to each other. Or helping out with cashflow issues and stuff like that. Basically, once you connect many actors in one supply chain on the platform and they all have a wallet, you can do so many different things. Especially if all those actors are identified. But all those things require extensive testing. They are all new. There are some companies working on every single use case and testing it. It takes quite a long time for it to adapt”* |

***Providing market access***

*Blockchain-enabled systems can provide market access through different ways. Automated and faster payments can reduce the lag in payments creating liquidity, which especially for the poorer actors in the supply chain can allow them to participate. They may also be able to more easily gain access to financial services – as described in other themes – which enables them to invest in new produce or the like which was previously difficult. This makes it possible for them to participate in the market. For other actors using blockchain-enabled systems may be a way to sell to new consumer groups. For example, showing transparency and proving that no human rights abuses took place in the production of a product may allow a brand to sell to market with stricter regulations or a different consumer segment.*

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| *“We’re going to see these trends towards those first adopters who engage in whatever projects they engage in to adopt blockchain technology are going to increasingly get access to these markets.”**“Then you can set up payments, a finance system. [The farmers] often don’t have enough money to pay for the next produce. They need to already invest in new seeds. […] the problem is that they often only get paid a couple of months later after selling their products. They have a lack of cash flow. Things like that could be improved with blockchain technology.”* |

***Reduce likelihood of bad behaviour***

*Blockchain-enabled systems can reduce the likelihood of bad behaviour through different mechanisms. First, honest mistakes as well as fraud and other bad behaviour can more easily be detected if caught on the blockchain. A seller cannot receive 1kg of a product and sell 2kg of it. This kind of bad behaviour will easily be caught and thus disincentivises bad behaviour. Furthermore, increasing transparency shown by other actors in the supply chain puts pressure on bad actors to either become transparent again or eventually stop selling at the same markets.*

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| *“I mentioned a variety of technologies being used. That’s what we use things like machine learning for. Anomaly detection. [Person B] gave me a few examples of anomalies. There is a whole variety of potential anomalies of what might happened including people’s attempt to manipulate data. Finding those and therefore flagging something as suspect is what our various machine learning algorithms are doing.”**“There is a slide that somebody else made, it illustrates beautifully. You’ve got the market. It looks like a candy store. You’ve got a green carpet going up to it. It’s got the legitimate [product] and each side of the green carpet is a fence like a picket fence, and you’ve got the legitimate [product] going to market and outside of the fence is [the illegal product]. If it can’t get over the fence, it can’t get to market. It’s like backwards engineering. [… You] can actually backwards engineer compliance to get into the market.”* |

***Identification of efficiencies***

*Automation of payments and contracts can simplify processes such as the entering a country through a port. This saves both time and money. Having more and trusted information about you supply chain may also allow to identify areas where efficiencies can be achieved.*

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| *“Actually, more important, the cost-saving to make processes more efficient. Where if you do your financial settlements on the blockchain you get 80% efficiency. That is only for the financial settlements, but if you would introduce a fully digitised with a blockchain layer certification, you get very high efficiencies.”**“In some cases, I’ve heard that they don’t settle up until months after the shipment is transferred. That obviously is a relic of a paper contract and fiat currency system that requires multiple exchanges of paper and signatures and verification of product that could be automated using an electronic system incorporating a blockchain solution.”* |

***More sustainable consumption***

*Blockchain-enabled systems can incentivise sustainable consumption. The assumption is that when consumers have better and trusted information about the products they want to buy, they can make more informed decisions. Blockchain-enabled systems can further facilitate a closer interaction between consumers and producers through e.g. tip-the-farmer schemes, micro-lending schemes, or buying products from specific areas only. One interviewee mentioned that they are testing if offering these different kinds of services to the consumers drive loyalty and keep consumers returning.*

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| *“Then you also have a tool on your packaging to communicate with consumers, end-users about that product. Whether it’s the authenticity of the product or the history, the provenance of that product by linking together that unique ID like a QR code to all of the upstream and production and even some of the downstream information. Related to the product to give a consumer full view. That was our vision from day one.”**“We just took [a product], just with a QR code. And the first person, who walked into the shop, unscripted, we asked them whether they were interested in the [product]. It didn’t have any labels on it and [what kind the product] was. And we just invited this lady to scan [the QR code], which she did. And she looked at her phone and said “so this is answering all of the questions that were just questions marks before. I got all this information.””* |

***More sustainable production***

*Sustainable production can also be incentivised by blockchain-enabled systems. By having information about their supply chain, companies can identify hotspots in terms of impact and take action to improve them. This can be done in different ways. The company can incentivise specific behaviour, e.g. reduction of environmental impact or no human rights abuses, and pay a premium for the proven achievement of these targets. They can also add such targets as a purchasing criterion giving advantage to those who perform best. The company can further go in and specifically support suppliers to reduce their negative impact. Various options exist for brands once they know where impact hotspots are.*

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| *“So, what I wanted to do is to have a system where you can have the carbon footprint of your individual product as well as having a possibility to make an influence on it. If you look at the Carbon Disclosure Project, they say about 80% of the carbon footprint of your product comes through the supply chain. The key for me was the supply chain and at the end the idea was that every actor in the supply chain provides the carbon footprint he is providing to the product. Then you can come up with a real carbon footprint of your product and you can also do this vice versa. You can tell your supply chain “I want to reduce my carbon footprint by 10 or 20% annually or I pay you a premium if you reduce the carbon footprint by a certain amount or whatsoever”. Those are mechanisms we want to develop and provide suppliers and companies the possibilities to really have an impact on the carbon footprint of their supply chain.”**“And allows them to make decisions. I think that there’s probably an important aspect is getting all the power to make a decision. If you go and look at one phone versus another, you can’t tell is one better than another, does one have fewer slaves than another, but the problem is that if you are buying batteries or screens or components, it’s the same problem. you’re a buyer and all you see is someone is offering me a screen for this price. Well, I take the cheaper one. Or I take the one that meets my needs. unless you can find a way of including due diligence data, company level data, what sort of practices are going on in this supply chain, you have no way of seeing it.”* |

***Reducing market inequalities***

*Reducing market inequalities can be achieved in different ways. Granting access to markets for actors that were previously excluded can lead to a more just distribution of income. Increased liquidity for the poorer actors supports them in participating and profiting from the global economy as well. In their projects, several interviewees target poor actors specifically to improve their living situation and reduce asymmetries with bigger players. Blockchain-enabled systems can facilitate data ownership redistributing some kind of power to less powerful actors. The technology can also supplement or even circumvent traditional systems that bring disadvantages to e.g. the poor, who, for example, are “too expensive” for existing banking system.*

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| *“In [country A’s] context, the reality is that you don’t have […] farmers yet. You have people with a couple of [plants] in the back of their house. And those are the poor farmers. Normally, the exporter would go and buy a few. They were getting 5 cents a kilo and let’s say they got 50 dollars for the year. Now they will get at least 80 cents and, in the situation, brought on by COVID-19, they could be getting almost a hundred times of what they were getting before. So, you’re moving somebody from poverty to cash in the bank.”**“Basically, the whole concept of creating a more decentralised platform, where people are more in charge of their data that is not in the hands of anyone, but multiple of people. That is much more facilitated if you use blockchain technology. It creates a better, more just environment.”**“The reason farmers are in such a bad position is they don’t have access to all the systems that we built. That gives them a big disadvantage that in a free economy they cannot compete. What blockchain does is it allows us to circumvent many of those systems. They don’t need an identity. They don’t need certain certifications to do business internationally. They don’t need to register their business or anything. They could basically online get all the trust they need and interact with anyone without middlemen. Without platforms. Without anything in between.”* |

***Reducing human rights abuses***

*Human rights abuses can be reduced by brands and consumers having trusted information about products. Consumers can make informed decisions buying only products for which it’s proven that no human rights were abused. Brands can take action on knowing where improvements can be made. They can incentivise good behaviour through premiums or new purchasing criteria. They can also directly support actors to get better. This way pressure is put on bad actors. Overall, the assumption is that with more transparency, bad actors are in the long-term either pushed to become transparent and more sustainable or get squeezed out of the market.*

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| *“There is plenty of documentation to support those claims. It seems like there is an increasing frequency in recent years either because now it’s getting exposed kind of like everyone has a cell phone now and everyone is getting images of police brutality. So, it was very likely always there, it’s just now it’s finally being exposed and now we finally have tools we can use to address it.”**“Where personally I think it plays an even more important role is with respect to the attributes of human rights and labour rights and IUU fishing in order to drive behaviour on the water. Because once we get a system, once blockchain is ubiquitous, the expectations that you either engage in a blockchain system or you don’t get access to any markets. We’re going to see these trends towards those first adopters who engage in whatever projects they engage in to adopt blockchain technology are going to increasingly get access to these markets. They are going to be the ones who are probably already doing the right thing. They’ll get that recognition of having done the right thing and looking at blockchain as an investment rather than a cost and they are going to secure that access to that market. And potential secure a premium, because those are buying from them can be confident that it’s not involved in human slavery or labour violation or illegal fishing.”* |

***Reducing environmental impacts***

*Environmental impacts can be reduced in similar ways than human rights abuses. Knowing where impacts occur, and under which circumstances their products have been produced lets a brand take action on them. Similarly, consumers can make more informed decisions when they know the environmental impact of the products they buy. Unlike with human rights abuses, they may be willing that their products have some environmental impact as long as it’s lower than the impact of other products. Again, the assumption is that over time bad players will get pushed out of the market as more is known about products’ environmental footprints.*

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| *“The whole rational for responsible sourcing is to avoid environmental damage like deforestation to try and stamp out a route to market for a material that is mined by forced labour or child labour in supply chains to try and prevent suppliers who are damaging water sources in their lithium ponds in [place Z] from being able to sell their material on a global market. So, all of this is about achieving positive impact through greater transparency.”**“Because [using blockchain technology the fisheries managers would] know exactly what has been caught. It’s all recorded. There is no sort of […] lack of information going in. That’s extremely important. That is basically a pillar of our confidence and our fisheries managers being able to manage the migratory fisheries. It’s hugely important”**“Basically, we need to establish and renew, actually regenerate the incentives in the agricultural supply chain. We need to take into account externalities like environmental footprint, social footprint, and it requires new business models.”* |