

## Implementing Blockchain for The Luxury Supply Chain

The aim of this report is to analyze the adoption of blockchain technologies by luxury brands in hopes of improving their supply chain. It will first delve into the advantages of using blockchain followed by its challenges, then recommendations and a conclusion will be made. By the end of this report, it should be clearer as to whether the use of blockchain technology in the fashion industry's supply chain can be beneficial or not for companies.

Firstly, let us dive deeper into what exactly is blockchain. It is defined as “a distributed database that is shared among the nodes of a computer network”<sup>1</sup>. It first came to light along with the adoption of crypto currencies, non-fungible tokens (NFTs) and decentralized finance (DeFi) applications as it plays a crucial role in keeping a decentralized record of transactions. The main difference between regular databases and blockchain is regarding the data's structure. In blockchain, information is collected in groups of blocks with varying storage capabilities which are also linked to previously filled blocks, only then forming a blockchain. Implementing blockchain for the supply chain would work similarly as it does with crypto, it would be used to track textiles from the manufacturer to the retailer. By using blockchain, each transaction among the parties in the system can be analyzed and tracked, it maintains a list of records which can be shared by all, unless on a permissioned network. Using a decentralized network for a supply chain comes at a time where customers are demanding more transparency regarding where their clothes are sourced and the authenticity of the garment used. As of now, existing planning systems used to record supply chain transactions are not fully reliable due to human error and as they do not precise who did what when. Therefore, by rather implementing blockchain technology, it is possible to access times panted information about which participant did what when. Indicated in the ISO

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<sup>1</sup> Hayes, Adam. “Blockchain Explained.” *Investopedia*, Investopedia, 5 Mar. 2022, [www.investopedia.com/terms/b/blockchain.asp](http://www.investopedia.com/terms/b/blockchain.asp).

9001, there are three general requirements for product traceability, all of which can be accomplished by using blockchain<sup>2</sup> :

1. Establish the identity and status of products
2. Maintain the identify and status for products and,
3. Maintain a record of serial and/or batch numbers.

There are two different types of blockchain networks which can be used in our scenario, either a private based blockchain network on which only permissions participants can have access to the ledger or a consortium blockchain network in which only selected participants can be in charge of the validation process while keeping access to the ledger to the public if needed. With the supply chain's globally dispersed and complex network configuration, using such technology will give the possibility to then track materials across multi-tier apparel supply chains. This shift to a more environmentally friendly supply chain also comes from suppliers themselves, according to McKinsey and Co, sourcing sustainable materials has become a main priority to fashion brands, furthermore highlighting the need to impose blockchain technology.

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<sup>2</sup> <https://the9000store.com/iso-9001-2015-requirements/iso-9001-2015-operational-requirements/identification-traceability/>

A few companies have already gone ahead and integrated blockchain into their supply chains, the biggest ones include Hugo Boss, AURA Consortium (including LVMH, ConsesSys

Organization/Blockchain Consortium	Blockchain Project Description
1. AURA Consortium	<ul style="list-style-type: none"> <li>LVMH partnered with ConsenSys, and Microsoft Azure formed the AURA consortium to lead and call for industry-wide collaboration to examine and deploy blockchain technology for product traceability and authenticity. Prada and Cartier have recently joined the consortium.</li> <li>AURA aims to prove authenticity to customers and track products from the origin of the raw materials to the point of sale.</li> </ul>
2. Arianee Consortium	<ul style="list-style-type: none"> <li>The Arianee consortium is an industry-wide collaboration that aims to develop standards for the digital certification of valuable assets using the Arianee protocol, based on blockchain technology.</li> </ul>
3. HUGO BOSS	<ul style="list-style-type: none"> <li>Hugo Boss, the luxury clothing and fashion goods brand, has collaborated with ASTRATUM to develop Tracey, a blockchain platform to track products across their supply chain and ensure their authenticity.</li> </ul>
4. Chargeurs Luxury Materials	<ul style="list-style-type: none"> <li>Chargeurs Luxury Materials, a world-leading wool supplier, has developed a label named Organica Precious Fibers based on blockchain technology to ensure the quality of its fibers and enable traceability from the sheep to the retail customer.</li> </ul>
5. Martine Jarlgaard	<ul style="list-style-type: none"> <li>The first garment piece to be tracked using blockchain technology was a jumper by Martine Jarlgaard. By partnering with Provenance and A Transparency, information was recorded about the product as it flowed across the supply chain in a blockchain application.</li> </ul>
6. C&A Foundation	<ul style="list-style-type: none"> <li>A blockchain pilot led by Bext360 has been carried out to trace organic cotton from the farm to the ginning process with a plan to extend it to the consumers.</li> <li>In the pilot, blockchain was used as a secure data platform that integrates information across the supply chain. Other technologies such as machine vision, artificial intelligence, and on-product markers are used to ensure the accuracy of the data stored on the blockchain.</li> <li>Several organizations have been involved, including C&amp;A Foundation, Fashion for Good, Organic Cotton Accelerator, and several brands, including Kering, Zalando, and C&amp;A.</li> </ul>

and Microsoft Azure) and C&A.

The AURA consortium was formed to deploy blockchain technology for product traceability and authenticity, having Prada and Cartier recently join the consortium showcases what more brands are bound to do in the future. The aim of the consortium is also to prove that the products sold are authentic, this is essential to combat contraband and ensure reliability at all times. The authentication of products will be done by tracking them from the raw material's

origin to the point of sale. This process will prove beneficial to both consumers and brands as their relationship will be tighter knit due to transparency, higher product quality (or standards of production). The brand Hugo Boss, in collaboration with ASTRATUM developed Tracey as a blockchain platform on which they can track products and ensure authenticity. This is in hopes of following more sustainable development goals while discovering where to provide changes in their supply chain. Finally there is the C&A foundation who with a blockchain pilot led by Bex360. Their aim is to trace organic cotton from the farm to the ginning process, blockchain was used to create a secure data platform, integrating information found on the supply chain. This is being done with other brands, such as Fashion for Good, Kering, Zalando and C&A. They are also using other technologies such as AI and machine vision to further ensure the accuracy of the data on blockchain nodes. These types of technologies can also be used by other companies to increase the trust between the stakeholders, especially regarding the blockchain adoption. Fiber Trace is an example of a company which uses different technology to track their products, instead of blockchain, they use a natural luminescent pigment which is embedded into the fiber to then be identified at a later stage in the supply chain, it can also help monitor what materials end up in the finished products. This is also beneficial to customers as there is an increasing awareness regarding which fibers are used in the clothing process, especially since certain, such as polyester have a negative impact on the environment when being produced. The environmental aspect is something which will be further analyzed in this paper when looking into applications which could be implemented to help customers identify more clearly where their clothing material came from and what is it made out of (an app similar to Yuka where customers can scan a bar code and a rating will be given to the clothes depending on how they were sourced/made).

Now that we have looked into examples of companies using blockchain for their supply chains, let's analyze its advantages, whether it be improving the transparency traceability and sustainability of apparel products. The biggest advantage of adopting blockchain for the supply

chain is the improved transparency<sup>3</sup>. More transparency comes with a faster, cost-efficient delivery of products as producers can now trace exactly where the irregularities happen and fix them. An example of such irregularity can be execution errors, something very human such as a mistake in inventory data, missing shipments and so forth, these are usually expensive and difficult to then find within the supply chain. These inefficiencies would otherwise have a bullwhip effect on the supply chain, removing them is highly advantageous to both producers and sellers as they can now find solutions together. To promote further transparency, smart contracts can be implemented between them; providing the opportunity for cross-organization automatization (when conducting business transactions). In the long term, this will increase the trust between fashion stores and their producers/distributors, enabling better group synergies in the future while enabling them to be treated more fairly. Another aspect of this transparency is related to the actors in the supply chain, sharing a general ledger will bring to light the payment data. This is important as often, there are high risks of exploitation of the first vulnerable production networks, by dealing with them more responsibly, companies will have a greener brand image, therefore attracting more consumers.<sup>4</sup> By adding these payments data in the general ledger, vulnerable supply chain actors who are usually left behind can secure financing more easily as they would have the possibility of providing financial information to banks. For most companies, the security aspect of using blockchain is extremely advantageous, as transactions are stored in the shared ledger through cryptographic technology, the integrity and availability of the transactions are ensured, reducing the need of performing audits. Sharing all this data, especially with the use of smart tokens creates more trust between these actors, as Heinz Zeller<sup>5</sup>, the principal sustainability director at

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<sup>3</sup> Gaur, Vishal, and Abhinav Gaiha. "Building a Transparent Supply Chain." *Harvard Business Review*, 14 Apr. 2020, [hbr.org/2020/05/building-a-transparent-supply-chain](https://hbr.org/2020/05/building-a-transparent-supply-chain).

<sup>4</sup> OECD. OECD, 2019, *Is There a Role for Blockchain in Responsible Supply Chains?*, [mneguidelines.oecd.org/Is-there-a-role-for-blockchain-in-responsible-supply-chains.pdf](https://mneguidelines.oecd.org/Is-there-a-role-for-blockchain-in-responsible-supply-chains.pdf).

<sup>5</sup> "Blockchain: Unlocking the Value Chain for Better Traceability." *GLOBAL FASHION AGENDA*, 22 Jan. 2019, [www.globalfashionagenda.com/blockchain-unlocking-the-value-chain-for-better-traceability-2/#](http://www.globalfashionagenda.com/blockchain-unlocking-the-value-chain-for-better-traceability-2/#).

Hugo Boss said, concerning blockchain, that “the trust created by the tokens through smart contracts fosters long-term partnerships between business partners”. He also mentioned that blockchain does in fact enable businesses to focus on “steering toward more sustainable practices”, highlighting one of the most important advantages of implementing a distributed ledger technology for supply chains. As mentioned before, the switch to more sustainable consumption patterns is a key driving choice in the global market. IBM’s US Retail Index for 2020 showcased that sustainable and environmentally responsible investments were up by 68% due to more awareness of environmental issues.<sup>6</sup> With fast fashion being viewed in a negative light, reputable companies do not want to be associated with the other bad apples, therefore feeling compelled to show to their customers that they are environmentally friendly. And finally, as blockchain for the supply chain does not use any mining, such as with crypto, its much more environmentally friendly. Another advantage of implementing blockchain will revolutionize the fashion world as its concerning counterfeiting. According to the Global Brand Counterfeiting report, it is estimated for there to be up to \$100 billion in estimated losses due to the growing extent at which luxury goods are being counterfeited. This is a major problem for luxury houses as their clients may lose their trust in them due to them accidentally buying a counterfeit on a secondary market. Yet, if using blockchain technology, these products will be able to be tracked, even as they move onto the secondary market, ensuring customers that they are buying the real item.<sup>7</sup> Overall, the use of blockchain technology for fashion houses comes with many benefits which could act as a differentiating factor against their competitors. Let’s now move onto the challenges of adopting it, to see if it is really worth it.

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<sup>6</sup>“How Smart Contracts Trigger Swift Action to Take Russian Goods off the Market.” *Everledger*, 28 June 2021, everledger.io/how-fashion-brands-are-taking-advantage-of-blockchain-apparel/#:~:text=Blockchain%20connects%20the%20apparel%20supply,that%20prioritise%20authentication%20and%20trust.

<sup>7</sup>“How Smart Contracts Trigger Swift Action to Take Russian Goods off the Market.” *Everledger*, 28 June 2021, everledger.io/how-fashion-brands-are-taking-advantage-of-blockchain-apparel/#:~:text=Blockchain%20connects%20the%20apparel%20supply,that%20prioritise%20authentication%20and%20trust.

Regarding the challenges behind blockchain adoption, we can first-of-all point out that none of them come forth as actual disadvantages but rather difficulties in adopting it. There are two types of challenges, the non-technical challenges which include governance or value chain cooperation followed by the technological challenges which are regarding data privacy and so on. Starting with the non-technical challenges, the most important one is the inclusion of informal actors, it was mentioned that an advantage of the supply chain is the fact that producers who were invisible before in the supply chain can now be heard. That is, if they want to; using blockchain technology will only be efficient if all supply chain actors are willing to collaborate. If there are not, it will create discrepancies along the supply chain as the full journey of the product will not be able to be recorded. Yet, while some actors might simply not want to implement blockchain, many others just do not have the technological advances to do so. The first actors of the supply chain are often low-income and operate basically anonymously in regards to the big players of the chain, they do not have the sufficient infrastructure to input data onto the general ledger<sup>8</sup>. To beat this challenge, companies should invest in the countries in which their suppliers are so that the de-facto barriers to entry are reduced, for example they could focus on building mobile infrastructure. Sure blockchain will enable there to be a more trusted network, there may be a few challenges in actually achieving that. That is so as a governance mechanism needs to be created to determine the rules of the system, all players must be in agreement which could take an extensive period to figure out. Furthermore, blockchain needs a consensus protocol to maintain a singular historic version of the transactions, agreed by everyone, to make sure that all transactions are accepted. For this protocol and to ensure that all transactions are accepted, proof-of-work, like in cryptocurrencies, could be used, yet it does not need to be used if the blockchain is permissioned and private. Another method to use instead would be a round-robin protocol which allows

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<sup>8</sup> OECD. OECD, 2019, *Is There a Role for Blockchain in Responsible Supply Chains?*, [mneguidelines.oecd.org/Is-there-a-role-for-blockchain-in-responsible-supply-chains.pdf](https://mneguidelines.oecd.org/Is-there-a-role-for-blockchain-in-responsible-supply-chains.pdf).

to verify who has to create the next block amount the participants. A point to take into consideration is that the implementation of blockchain is costly, therefore as of now, only luxury brands have the option to do so as they have the financial capital needed. Therefore, smaller brands might find it harder to adopt blockchain technology especially as their supply chain might not necessarily need it, if small and efficient enough. The final challenge concerns counterfeited products, even with a secure blockchain, a counterfeit product could still be introduced into the supply chain. To address this, companies can first tokenise their products, as mentioned before or conduct audits when products first tier the chain. With the advantages and challenges of blockchain adoption listed out, I will now go further into what companies can do in regards to their supply chain to be more environmentally friendly.

Similarly to what the scanning app Yuka does, such an app could be created which, when scanning the barcode (or token) of a specific clothing item, we can tell where it came from, the environmental impact it had and whether it is counterfeit or not. In doing so, we, as consumers would be able to tell exactly how much of a negative impact the company is actually having on the environment. This would give consumers the upper hand as they would be directly able to tell whether a brand is greenwashing or not. A company currently going through with this idea is Burberry, in association with IBM's blue internship program, they have been working on a prototype called Voyage<sup>9</sup>. They are working on creating, through the Burberry app, a function allowing consumers to track a garment's product journey, "Voyage also allows consumers to configure their own sustainability preferences and receive tailored product recommendations based on their selections. Consumers can even add additional stages to a garment's logged lifecycle, for example if it has been upcycled."<sup>10</sup>. Giving consumers a chance to make a more informed decision

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<sup>9</sup> "Burberry Partners with IBM to Develop a Prototype System to Improve Product Traceability." Edited by CPP- LUXURY, *CPPLUXURY*, 2020, [cpp-luxury.com/burberry-partners-with-ibm-to-develop-a-prototype-system-to-improve-product-traceability/](http://cpp-luxury.com/burberry-partners-with-ibm-to-develop-a-prototype-system-to-improve-product-traceability/).

<sup>10</sup> "Burberry Partners with IBM to Develop a Prototype System to Improve Product Traceability." Edited by CPP- LUXURY, *CPPLUXURY*, 2020, [cpp-luxury.com/burberry-partners-with-ibm-to-develop-a-prototype-system-to-improve-product-traceability/](http://cpp-luxury.com/burberry-partners-with-ibm-to-develop-a-prototype-system-to-improve-product-traceability/).



concerning their shopping habits, but also giving fashion companies who operate in a sustainable manner an upper-hand on competition. Going back to a point mentioned beforehand, customers would therefore also be able to tell directly whether something they are buying is counterfeited, and also helping second-hand markets by allowing them to authenticate their goods. Creating an app that does such a thing but for all clothes created would require enormous amounts of data and time as each individual clothing brand would need to have implemented blockchain. Yet it is possible that companies, similarly to what Burberry did, will start the process of creating their own scanning app for their garments after having had adopted blockchain.

Overall, this report put forth the idea that blockchain will revolutionize the way that luxury brands handle their supply chain and the relationship fostered between all stakeholders. Their relationship can be based on trust, transparency and efficiency due to blockchain technology, while there are a few challenges to implementing blockchain, they can be easily overcome with time. The biggest adoption challenge lies with first-producers and their lack of available technology to be able to input data into the nodes. Some of these challenges could be eliminated by joining a consortium such as what other brands did in association with LVMH. By doing so, some troubles that come with personally implementing blockchain will be limited, these companies will also have the option to share resources where they see fit along the supply chain. As they would be sharing their supply chain data with each other, companies will have the option to work together to help each other out in case of supply deficiencies along the chain. In a way, it would be better for companies to follow in LVMH's footsteps and create consortium in which they 'share' the blockchain technology to hopefully be able to share certain resources when needed, which, in the long term could prove to be more sustainable and efficient for businesses. It would also be recommended for companies to put forth an app, specifically for their own apparel, as it would create a tighter knit with their consumers who would be given the opportunity of checking

what material was being used and how eco-friendly the company's supply chain is. It would further incite companies to switch to greener practices as those who do not, have a worsening brand image. Yet, as it was previously pointed out, it will take a few more years for such apps to come forth as there would need to be a unilateral adoption of blockchain technology among fashion houses. We will have to wait longer if we want other sectors to start using blockchain, for example IBM is currently undergoing their food trust project in which they allow businesses to track their produce. As they have the necessary technology to create such a service, they are in turn selling it (blockchain technology) to other brands (Walmart etc) in exchange for a monthly fee which depends on the size of the company, ranging from \$100/month up to \$10000/month<sup>11</sup>. This seems like a more reasonable option for small businesses who lack the necessary funds to invest in blockchain technology. While this report solely focused on blockchain adoption for luxury houses, we saw that it could also be adopted for the food supply chain. This can only leave us asking ourselves as to what other industries would benefit from the implementation of blockchain for their supply chain?

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<sup>11</sup> Chapman, Sophie. "IBM Launches Its Blockchain Produce Tracker, IBM Food Trust." *Supply Chain Digital*, 17 May 2020, [supplychaindigital.com/technology/ibm-launches-its-blockchain-produce-tracker-ibm-food-trust](https://supplychaindigital.com/technology/ibm-launches-its-blockchain-produce-tracker-ibm-food-trust).

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