Made in Italy

Safeguarding Artisans From Counterfeiters

dGen

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Made in Italy: Safeguarding Artisans from Counterfeiters

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dGen is a not-for-profit think tank based in Berlin, Germany. We focus on how emerging technology can contribute to a decentralised future in Europe and what this might mean for people, society, private entities, and the public sector over the coming decades.

We're working with a team of researchers exploring how decentralisation will shape our future. Our insight reports focus on specific topics and industries to drive ideas for adoption in Europe. To find out more, please visit us at dgen.org.

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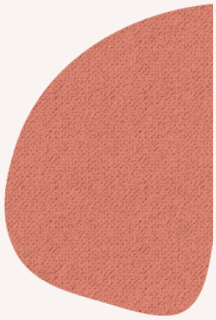
Foreword

New technology is often seen as disruptive, but that is sometimes a misconception. Beyond the buzzword, the next wave of technology can actually be supportive, transformative or evolutionary -- it doesn't have to replace what we already have. Our latest dGen report, entitled "Made in Italy: Safeguarding Artisans from Counterfeiters", looks at exactly that. How blockchain technology can not only improve, but protect centuries-old industries and economies in the heart of Europe.



The topic and location for our report are especially poignant now. Northern Italy has been at the epicentre of the COVID-19 pandemic in Europe. I believe there is nothing more I can add to that commentary other than our hearts go out to everyone impacted.

Northern Italy is also the epicentre of the 'Made in Italy' brand, which is the third most valuable brand globally (if it were registered), and its value is under attack from the global threat of counterfeiters.

Safeguarding the 'Made in Italy' brand has a direct impact on job security and creation in the region. There are hundreds of thousands of jobs at stake when combining all of the workers that make up the sector's workforce. In times of potential economic crisis, protecting these jobs is an acute problem that governments and business owners are all too aware of. This is a great opportunity to look at new approaches to the issue.

Throughout the report, we cover many of the different methods and technologies currently being piloted or in full production. The technologies are there to support the industry, to help it transform its legacy operations and to bring about an evolution that should ultimately help protect more jobs and thus the economic output of the region.

From the whole team at dGen, we would like to thank all of our amazing contributors for their time and lending their expertise in the creation of this report.

Jake Stott & Nick Dijkstra

Founding Board, dGen

Executive Summary

The artisan craft and quality behind the Made in Italy label set Italy's fashion industry apart from other countries and shaped the entire industry. However, changes to production and the labour force that call for faster turn around and lower prices, have led to drastically dropping artisan numbers. In order to maintain the label's reputation and quality, the Italian government has identified protecting its artisan heritage as a prime objective.

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While the entire industry must adjust how products are marketed, sourced, and delivered, this has had a great impact on fine trade workers. Globalisation, digitisation, and increased decentralisation in the supply chain have spurred this, as well as changing client demands. Based on this, the critical success factors for the fashion industry now include:

- omnichannel services
- faster product cycles
- sustainable and ethical practices
- transparency.

These shifts place strain on the whole industry, even as the fashion market continues to grow. Small, established businesses, such as many that employ Italy's artisans, face the most extreme challenges in matching these demands.

Risks of Counterfeiting

The change in marketing and product delivery have also enabled counterfeiting organisations to flourish. According to Nicolas Romero, CEO of Satoshi Studio:

> 'The luxury market is growing at a rapid pace, and the counterfeiting market is growing even faster'.

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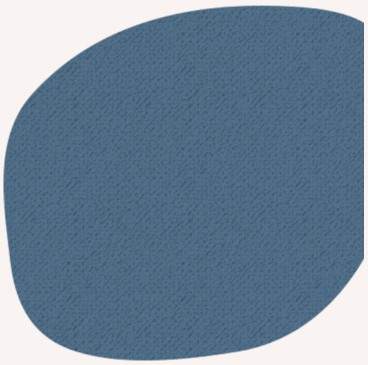
Distributed supply chain models leave room for counterfeit materials to enter the supply chain and online shopping has become a prime vector for counterfeit goods sales. Official research by the Organisation for Economic Co-operation and Development (OECD) on counterfeiting of Italian fashion products shows that the luxury fashion industry is particularly vulnerable because the high value and reputation of its products yield higher returns for counterfeiters.[42]

Counterfeiting drives down trust in luxury businesses and the value of their goods long after the sale of the imitation - lasting effects that greatly impact artisans who market based on the quality of their craft.

While counterfeiting is often seen as a victimless crime, the associated issues are generally overlooked, including Intellectual Property (IP) theft of small artists and artisans, unethical labour practices, and unsafe materials, among others. Additionally, artisans generally suffer the most from counterfeiting even though larger companies are more often the target, because they do not have the same resources and know-how to combat these effects. Counterfeiting drives down trust in luxury businesses and the value of their goods long after the sale of the imitation - lasting effects that greatly impact artisans who market based on the quality of their craft.

Anti-Counterfeiting Measures

Despite Italy's relatively stringent initiatives to stem the flow of counterfeit goods and the anti-counterfeiting actions of brands and online platforms, counterfeiting continues to increase. Based on research, lax supply chain security is a major factor in enabling counterfeit products to enter the market. Therefore, by improving supply chain transparency and tracking, anomalies and counterfeit goods will be more identifiable to customs agencies, sales platforms, and purchasers.



Blockchain technology can enable more efficient and secure supply chains, helping the fashion industry to meet the critical success factors outlined, as well as securing distribution against counterfeit materials. Several ways that blockchain solutions could mitigate the threats to artisans are:

- authenticate both goods and raw materials
- a secure and up-to-date ledger of property rights
- enable closer, more profitable relationships between a brand and its customers with greater privacy and data protection
- prove sustainable and ethical practices
- provide post-sale services and authentication of high-value goods.

Blockchain can greatly improve the digitised supply chains already necessary to meet demand for reduced cycle and delivery times. Blockchain's decentralised and immutable nature increases the efficiency and security of these systems, as it cuts out the need for a third party.

Rather than relying on a third-party to relay and store all manufacturing and distribution information, the ledger exists

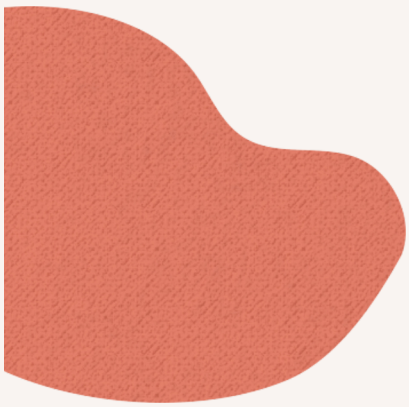
on every connected node. This means that the records cannot be lost or altered, either by internal or external sources. Additionally, as the ledger is updated, every member with access is able to see the most up-to-date version. This has obvious impacts on the efficiency of tracking products through the supply chain, but can also help to secure it, as it reveals any anomalies, so that counterfeit materials are easier to spot.

These same factors make blockchain useful for tracking pending patents and copyrights. At present, the current patent and copyright system are outpaced by rapid production cycles. However, blockchain's time stamped and immutable nature can aid in protecting unregistered designs.

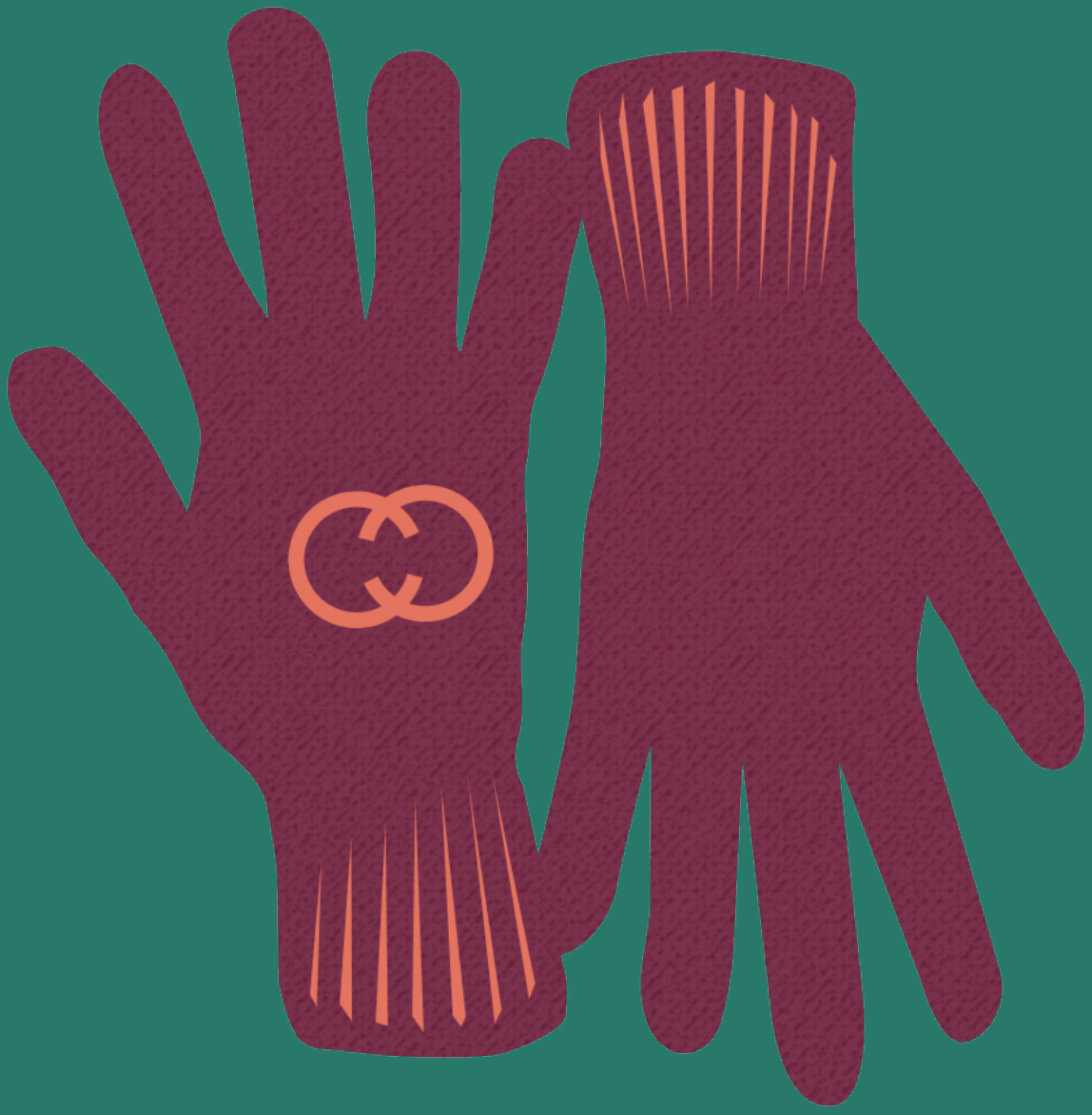
Steps need to be taken to make blockchain services more scalable and address how comprehensive the blockchain ledgers will be - whether only hosting one company, or hosting multiple companies.

While the capabilities of blockchain to improve and secure the supply chain are yet to be fully explored, several use cases make strong arguments for the utility of blockchain to improve these systems. Blockchain has the potential to enable luxury fashion companies to expand their post-sale services and authenticate goods, especially in its ability to allow individuals to maintain ownership over the data they generate. However, to do so, steps need to be taken to make blockchain services more scalable and address how comprehensive the blockchain ledgers will be - whether hosting only one company, or hosting multiple companies.

While blockchain solutions are actively being explored by large fashion companies, they are also necessary to protect artisans, especially in the face of growing counterfeiting and declining family run businesses. Multiple steps have been taken to protect this section of Italy's heritage, including training programs to address the current and predicted market gap. However, the view that artisanal labour is no longer valued or needed prevails, and means that providing protections for those already operating are even more important.



There are some initiatives, such as Arianee, a blockchain registry open to multiple companies, which helps companies authenticate and provide services to their clients. These types of registration services need to be integrated into large online platforms, like Amazon, to verify sellers and authenticate goods. This is important, as these sales platforms inadvertently host large amounts of counterfeit goods. Overall, there are major shortcomings in providing scalable methods for reducing the counterfeiting that steals their designs, impacts their reputation, and undercuts their market.



Introduction

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Italian Artisans

Taken through the lens of the Made in Italy label, this report seeks to understand the fashion supply chain, how it is vulnerable to counterfeiters, and how this endangers the artisans who make up the label. With globalisation and digitisation, artisan numbers have been declining; this paper explores specifically how counterfeiting further endangers this trade by exploiting these aspects. Blockchain technology has been acclaimed for its potential benefits in supply chain management, raising the question of whether it can help diminish the production and distribution of fake products. When used in tandem with other innovations, could it help ensure the sustainability of small businesses behind luxury fashion?

The Fashion Industry

Analysts expect the industry to grow at an annual average rate of 8.4% from 2020 to 2024,[1] but the luxury brand sector is characterised by higher performance and stronger demand, especially the top 20 global brands.[2]

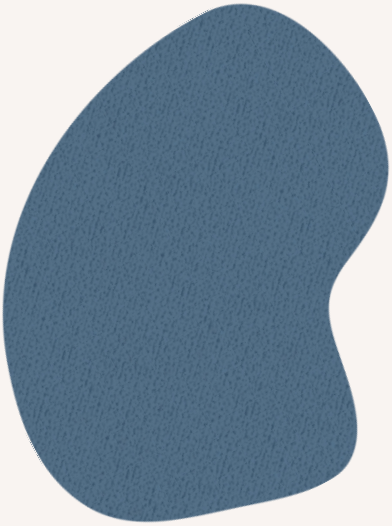
Fashion is a profitable business; industry revenues are expected to reach $US 718bn in 2020, with the largest sector - clothing - valued at $US 460bn.[1] Analysts expect the industry to grow at an annual average rate of 8.4% from 2020 to 2024,[1] but the luxury brand sector is characterised by higher performance and stronger demand, especially the top 20 global brands.[2] Industry experts characterise the luxury sector as defined by continuous change, rapid production and market cycles, and omnichannel participation - connecting all locations and services so that all channels, both online and physical, advertise and offer the same products and services.

Digitalisation

The internet has increased communication and access to services. This is two-fold, in that it can stimulate business, but the demands for rapidly improved services endanger any businesses that will not, or cannot comply.

Although online platforms have greatly improved access to items, businesses also need adequate omnichannel services to market and deliver effectively and efficiently across all channels, as well as match demands for faster delivery.[6][7] This is difficult for any company, and a number of large department stores have declared bankruptcy as they were unable to adapt quickly enough. This is generally much harder on small, established businesses who previously relied on footfall in

stores, as they don't have the resources or know-how to launch effective online channels.[2]



That being said, digitisation has not been entirely bad for small businesses, as some emerging companies have taken advantage of social media to launch new businesses and find new markets. These companies are characterised by extremely effective communication with their client base and rapid response to demands, acting almost as lean startups. They also have the added benefit of appearing more transparent, and generally more environmentally friendly than older counterparts, and have used this to further expand their businesses.[2]

Additionally, online platforms provide a vector for data collection about customers and their purchasing preferences. This enables businesses to perform Digital Clienting,[6] in which products and adverts are targeted much more precisely and effectively. However, this is available to only larger businesses, as small businesses do not have the money to support data collection software, storage, and analytics. A downside to data collection has also emerged, as it instills distrust in clients. With calls for increased transparency and data protection, it is difficult to find the line between collecting extremely helpful information and scaring off customers by collecting too much information. This means there is space for businesses to succeed on both sides of this divide.

'A paradigm shift[...] made possible by technological advances which constitute a reversal of conventional production process logic. Simply put, this means that industrial production machinery no longer simply "processes" the product, but that the product communicates with the machinery to tell it exactly what to do'.[10]

While it can endanger manufacturers and retailers, they also clearly stand to benefit substantially from digitisation. Moving beyond merely providing online channels, digitisation can automate stock tracking and replenishment, increase understanding of how and when consumers wear products, and legitimise products, reducing counterfeiting. Smart fashion, a leading area of interest in the sector, integrates sensors into clothing, which can track and automate a number of things.[8] Smart technologies are an integral part of the Industry 4.0 concept,[9] defined as:

> 'A paradigm shift[...] made possible by technological advances which constitute a reversal of conventional production process logic. Simply put, this means that industrial production machinery no longer simply "processes" the product, but that the product communicates with the machinery to tell it exactly what to do'.[10]

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foreshadows even further fashion supply chain disruption. This has potential to greatly improve many parts of not only the supply chain, but also post-production services. Ultimately, this should improve both manufacturer and customer experiences. However, making sure that small business owners, who are used to brick and mortar shops, are not cast aside in this transition, means finding a place for them in the broader industry. There are also substantial issues with data protection that need to be addressed.

Made in Italy

Italy is renowned for its long history of culture and fine artistry. This has set the Made in Italy label apart from various other countries, and made it synonymous with elegance and beauty.[12] The Italian fashion industry is a large part of the Made in Italy concept, which functions similarly to a brand, in that it comes with many of the same associations. However, Made in Italy is not a brand, but rather the "Made in" label that comes standard on most products and clothing. Made in Italy is unique in the strong associations the label carries, giving it a status similar to a brand. In fact, if the label was registered as a brand, it would be the third most valuable globally, after Coca-Cola and Visa, which hold the first and second places.[73] Italy's government has understandably made it a priority to protect the label and provide support for the small Italian artisans who built and have come to define it.

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The label is historically characterised by unique resources and competences that provide substantial competitive advantages.[13] [14] Today, Milan is regarded as the embodiment of Italian fashion, and at the forefront of the fashion world globally, but innovative fashion design and manufacture is evident throughout Italy. The Italian fashion industry provided its French and American counterparts with materials and fully finished fashion items for many decades.[16]

The Made in Italy reputation can only be understood by examining its origins. The modern Italian fashion industry developed after the end of World War II as a highly integrated system of material resources, designers, and manufacturers.[16] It began with craft based production systems, rather than large industrial complexes, since many Italians learned traditional family specialist trades. Artisans laboured in small workshops, applying their skills, intuition, and creativity to develop contemporary, readily reproducible fashion styles at affordable prices, aided by the low labour rates of the period.[16] [17] Italian fashion was quite different from the formal French couture, and strongly appealed to the large American department stores.[18]

Over time, the artisans used the knowledge they acquired from producing fashion products for retail customers to create their own fashion collections. Ermenegildo Zenga, Max Mara, and Iceberg are all examples of artisans who created their own lines.[17]

Italy's artisanal roots are dwindling as manufacturing and selling practices change, but the artisans who made a name for the Made in Italy label are still the backbone of maintaining the quality and attention to detail that preserves the reputation. These small emerging fashion companies also helped to shape the fashion industry, as they were highly versatile and changed the styles they manufactured every six months, setting the stage for current seasonal fashion lines.

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Aided by government support, Italian designers created an Italian identity, and fashion to adorn the body, rather than the mass production characteristic of the United States (US).[16] Their designs were influenced by global art and culture captured in an Italian context.[16] All of this separated the Italian fashion sector from other countries, a distinction which persists to this day, defining Italian fashion as the height of luxury and quality. Setting Italian designs and quality above other countries though, has also made Italian products the focus of many counterfeiting operations, which endanger this legacy and Italy's future in the luxury fashion industry. However, playing off the tradition of innovation, Italy remains a prime market for leading the industry into the future of design protections.

In recent years, Chinese companies have adopted several strategies to infiltrate the Made in Italy fashion sector, as the label brings access to a large client base. Young Chinese designers are studying Italian fashion in Italy to learn Italian design skills with the goal of replicating them. However, beyond learning from Italian artisans to benefit from the label on an individual level, Chinese companies are also opening factories in Italian cities, such as Prato - one of the most famous producers of Italian textiles - and employing Italians in high level positions to learn from them. These factories import materials from China at much lower prices than Italian made materials, and subsequently create lower quality fashion goods. However, they still have the Made in Italy label due to the final factory's location in Italy; their ultimate aim is to compete in the luxury sector, despite the fact that the products are often made from lower quality materials than other Italian luxury goods.[19] This type of strategy is of considerable concern to traditional Italian designers and manufacturers, because it

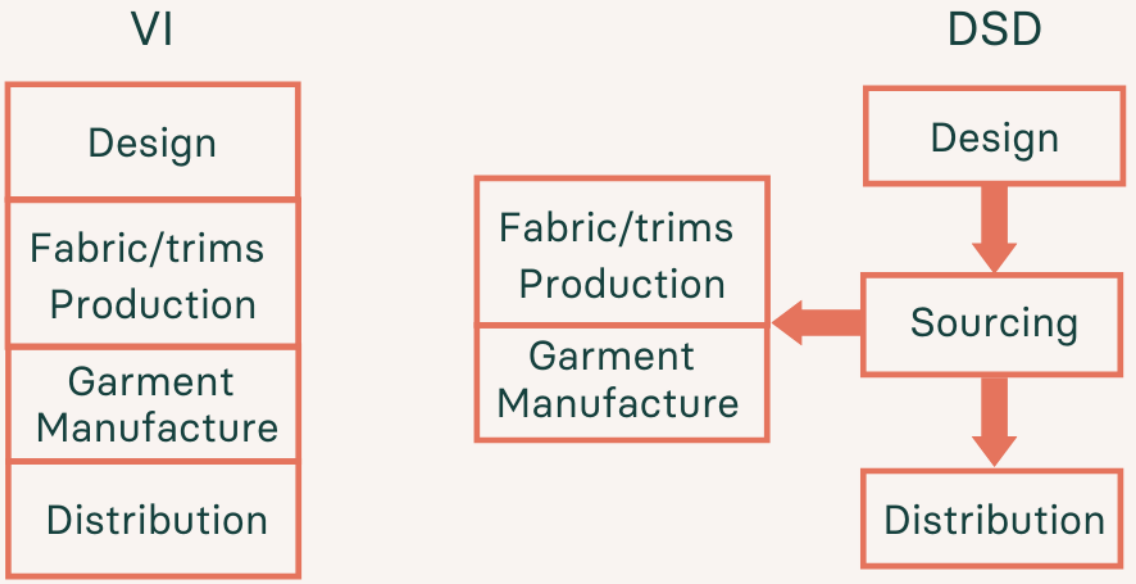
affects their reputation, foreign market share, and long term sustainability.

The Luxury Fashion Supply Chain

This singular direction chain enabled brands to protect artisan skills they used for personalised products,[20] as well as to control quality, exclusivity, and subsequently demand higher prices.[21]

The luxury fashion sector traditionally used vertically integrated supply chains. This is the most straightforward method, as products go directly from producers to market. This singular direction chain enabled brands to protect the artisan skills they used for personalised products,[20] as well as to control quality, exclusivity, and subsequently demand higher prices.[21] In recent years, though, some luxury brands have begun to outsource parts of their production to other countries with lower labour costs, adopting the Design, Source, and Distribution (DSD) model characteristic of fast fashion companies, figure 1.

Figure 1: Fashion Supply Chain Models



Source: [22]

The DSD model only helps to increase production cycles, but can significantly weaken manufacturer relationships and decrease transparency, as the supply chain becomes highly fragmented and decentralised. This removes many of the protections that artisans working for large luxury labels would have once had.

The DSD model enables brands to focus on design, branding, and retail activities, rather than production, and can open up access to networks of exclusive makers. This gives companies using a DSD model an edge, and has led to a sector trend of switching to vertical disintegration.[22] The Council of Fashion Designers America (CFDA) stresses the urgency of understanding and utilising customer and industry data to enhance relationships with manufacturers, match product cycles to changing customer preferences for newer products, and practice greater transparency and immediacy.[25] However, the DSD model only helps to increase production cycles, but can significantly weaken manufacturer relationships and decrease transparency, as the supply chain becomes highly fragmented and decentralised. This removes many of the protections that artisans working for large luxury labels would have once had.

Traditionally, luxury brands generally developed stronger, closer relationships with their suppliers than mass market and fast fashion companies, and played off a lack of transparency to drive up prices. The growing popularity of the DSD supply chain model has made it difficult for artisans working for large luxury companies, as they are less likely to have exclusivity, and therefore greater job security for artisan suppliers. The shift in supply chain brings about further challenges for the luxury market, as previously transparency was not valued, so when shifting from an exclusive model to a distributed one, there is often a lag in providing transparent production records.[2] [25] Getting products to market faster than competitors was also traditionally less important, because the lack of openness added to the mystery and attraction to the brand.[25] However, in recent years, clients have been more attracted by the high quality of luxury clothing, and although brand is still important.

Large luxury fashion companies also have the financial and physical resources to experiment with new, more flexible manufacturing systems, and can subsequently more easily incorporate more environmentally friendly practices in their supply chains.[25]

Due to the slow response of luxury brands to customer demands for greater transparency and faster reactions to trends, part of this customer base has been diverted to the other fashion sectors.[2] Startup fashion companies and mass producers have been much faster in reacting to demands of customers for rapidly changing and transparent fashion,[26] and have been more successful in the changing market than some luxury brands, then. Some luxury brands are catching up, though, such as the luxury conglomerate, Louis-Vuitton-Moet-Hennessy (LVMH), who has shortened production cycles and is transferring products to market more quickly. Large luxury fashion companies also have the financial and physical resources to experiment with new, more flexible manufacturing systems, and can subsequently more easily incorporate more environmentally friendly practices in their supply chains.[25]

The DSD model not only impacts all players in the fashion sector, from mass producers to luxury brands, it also has a serious impact on artisans. As luxury brands move away from a system with close relationships with certain artisans to supply a luxury brand with certain products, the safety and assurance of work for these artisans is endangered. Beyond removing long-lasting partnerships, the DSD model makes it much harder to track a product throughout the entire production cycle. This opens the supply chain up to counterfeit raw materials, which can be produced with unsafe, unregulated materials, such as lead paint, or with unsafe labour practices. Both consumers and manufacturers need a more secure and transparent manner to track production and ensure safety.[76] As the battle between fast-fashion and luxury brands continue, transparency is a prime area for improvement, especially with increased use of the DSD model, and can provide protections for consumers, brands, and the labourers whose skill make the products possible.

Decline of Artisans

In Italy, for example, there are less than 700,000 tailors in contrast to the 1950's when when there were 4 million

Changes in the supply chain have had a severe effect on the future of artisans, many are finding it hard to generate sufficient work and profit.[28] Made in Italy's artisan backbone has seen substantial declines, leading to difficulty in finding artisan labour as well. Overall, there are severe concerns about the future of artisanal culture. A 'part of Italy's distinctive heritage risks extinction';[29] in Italy, for example, there are less than 700,000 tailors in contrast to the 1950's when there were 4 million, and it has become difficult to find anyone to repair clothing or to make new items to measure.[29] The Gueli family tailoring business has more than a century's experience and describes the decline:

> 'Italy would lose enormous hands...mine are small but, in the end, they're enormous, too. Unfortunately, we're not valued. Actually, we are ignored'.[29]

The handmade shoe sector is experiencing similar issues due to disposable, cheap, plastic products that are not worth repairing. This has led to the disappearance of most of Italy's artisan shoe-makers and repairers.

Economic Interests

There are vested national economic interests in maintaining a unique Italian style, and have spurred several training programs, such as a law permitting eight post-secondary schools to offer a fashion related diplomas;[30] this initiative

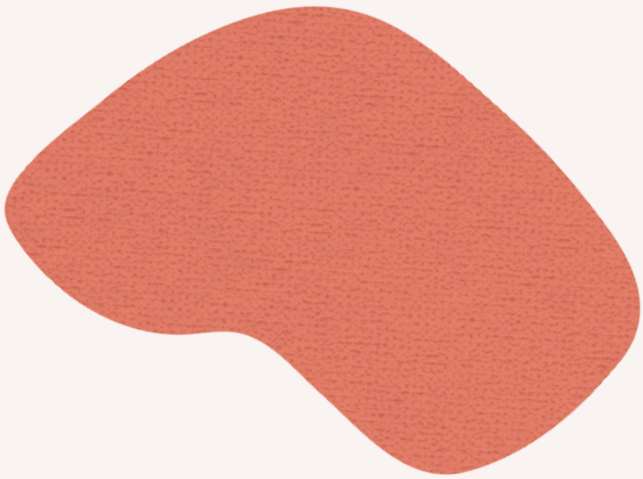
Altgamma, the Italian Luxury Goods Association, forecast extreme difficulty in replacing 50,000 artisans nearing retirement.[30]

appears to be inadequate, though, given the importance of Made in Italy to the economy. The Italian government has also introduced tax reductions on revenue from patented goods underpinned by design, know-how, and software in order to support innovation.[35] However, these efforts are further impacted by declining interest from younger generations in learning family craft and carrying on artisanal skills. Combined, this has led to an insufficient supply of artisans with tailoring skills to fulfill demand, even while other artisans struggle to find work. The longevity of traditional artisanal skills and knowledge faces severe challenges.[29]

As luxury goods purchasers express more interest in knowledge about the production of their goods, providing information about the artisans can increase sales.

Despite a decline in perceived need for artisans due to the rise of fast fashion, there is still market demand for talent, which is not being met. The market is expected to face greater understaffing in the future. In 2013, the Italian Artisan Association stated that 20% of all tailoring jobs remained vacant,[29] and more recently the annual rate of decline of artisan firms has been between 5% and 10%.[31] Altagamma, the Italian Luxury Goods Association, forecast extreme difficulty in replacing 50,000 artisans nearing retirement.[30]

While issues with declining interest need to be addressed, adjustments must be made to the supply chain to provide greater support and security to the artisans left. As luxury goods purchasers express more interest in knowledge about the production of their goods, providing information about the artisans can increase sales. Greater transparency in the supply chain can also aid the artisans directly, though, as it gives a clearer picture of need for their services, and can help provide predictions for the future.



Problems Caused by Counterfeiting

Problems Caused by Counterfeiting

Issues and Trends Associated with Counterfeiting

The impact of counterfeiting on the Made in Italy label, both inside and outside of Italy in 2016, was a loss of €12.4 billion, which is equal to 4% of genuine goods

Counterfeit goods are defined by their infringement on trademarks and copyright to create profit for organised crime groups, and result in revenue losses for companies, tax losses for governments,[41] and decreased employment.[42] The impact of counterfeiting on the Made in Italy label, both inside and outside of Italy in 2016, was a loss of €12.4 billion, which is equal to 4% of genuine goods; this impact negatively influences artisans' income, their future survival, and the economy.[42]

Counterfeit products are manufactured to closely resemble original brands, but do not match the quality and durability of the original to yield a higher profit margin.[43] The scope and extent of counterfeiting is increasing globally, due to increased access to a client base via online platforms that make it an increasingly lucrative income source for criminal organisations.[42] Counterfeiters target luxury goods for the high prices they draw, where as fast fashion generally yield low profits and counterfeiters cannot undercut their costs.[44]

Manufacturers of fake products are able to produce goods at a lower price, often using cheap, exploitative labour and unethically produced materials.[42]

To be effective, counterfeiters must meet the present fast production cycles and act quickly to obtain new product designs at the start of each season. The fakes must be produced as quickly as possible to capture the highest profits right after product launch. Manufacturers of fake products are able to produce goods at a lower price, often using cheap, exploitative labour and unethically produced materials.[42] Italian artisans subsequently lose revenues from their creative design and direct product sales. These losses are serious and difficult to recover from, as the creative labour is time consuming, and once stolen, cannot be recovered.[39]

The counterfeit market can generally be divided into two types: deceptive and non-deceptive.

Deceptive Market	Non-Deceptive Market
Exploits poor consumer knowledge to sell them a counterfeit product without their knowing it isn't genuine.[46]	Sells to individuals who know the item is not genuine, but choose the fake for the lower cost anyway.[46]

While those who inadvertently purchase fakes have been duped, and generally expect a much higher quality product, those who participate in non-deceptive counterfeiting are not victims of the deception, but can still be harmed by unsafe materials in the product.[46 48] Both types of counterfeiting lower the value of the actual brand.[49]

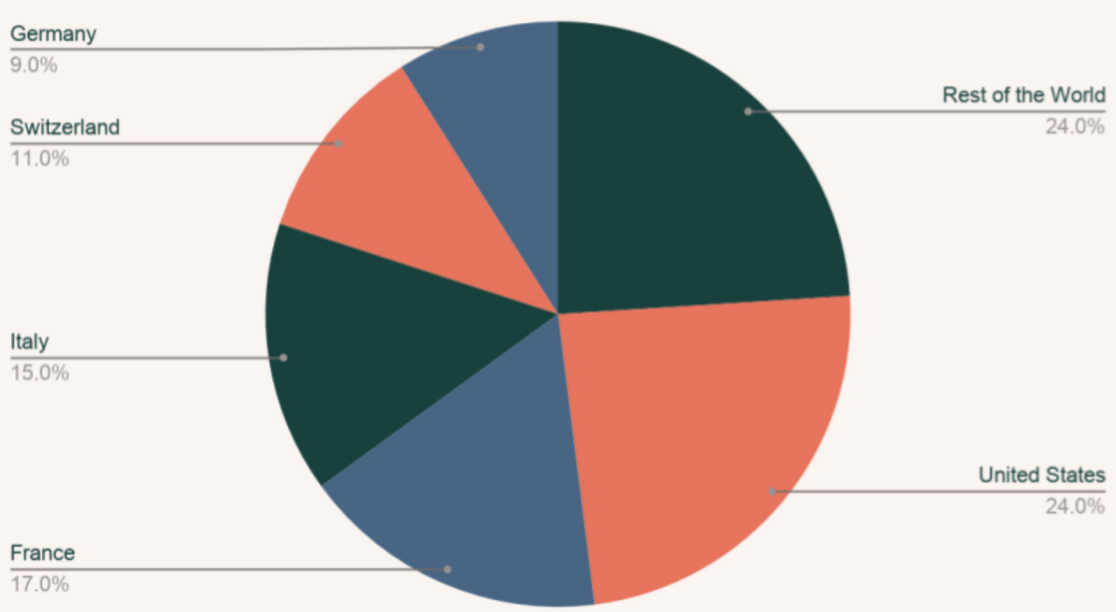
The other criminal activities that enable lucrative counterfeiting, such as low quality and/or potentially dangerous materials used by counterfeiters,[46] exploited labourers, and the impact on small artisans who produce goods for the large brands that are often the target of counterfeiting.

Non-deceptive counterfeiting makes products available to a much broader range of socio-economic groups, which accounts for most of its success. The World Intellectual Property Organization (WIPO) emphasises that the growth of counterfeiting is a result of customer demand, because many consumers do not believe the theft of a brands IP is as damaging as other crimes.[45] However, this fails to account for the other criminal activities that enable lucrative counterfeiting, such as the low quality and/or potentially dangerous materials used by counterfeiters,[46] exploited labourers, and the impact on small artisans who produce goods for the large brands that are often the target of counterfeiting.

The growing trade in counterfeit goods is estimated to represent 3.3% of total global trade.[41]

A recent joint report conducted by the Overseas Economic Cooperation and Development (OECD) and the European Union (EU) Intellectual Property Office analysed the growing trade in counterfeit goods, estimated to represent 3.3% of total global trade.[41] It found that counterfeiters exploited situations where poor governance exists, and highlighted the fashion industry as the most lucrative globally. Fashion products accounted for the highest proportion of all counterfeit goods seized by customs in 2016.[41 50] The brands or patents copied were mainly located in the US, France, Italy, Switzerland, and Germany, but fraudulent copies of Chinese and Brazilian brands are beginning to appear, figure 2.

Figure 2: Origin of Brands/Patents Copied by Counterfeiters



Source: [41]

The actual value of counterfeit goods is much higher than reported numbers because many are not seized by customs officials. Counterfeiters also increasingly use the post as a distribution channel. This is evident from the trends in seizure of small parcels by customs, which increased by 6% to 69% of the total goods intercepted between 2011 and 2016, 57% of these fakes were sent by post.

Barriers to reducing the counterfeit trade include the lack of small parcel screening, gaps in customs' procedures and practices in various countries, and inconsistent penalty levels for identified criminals. Counterfeiters can also benefit from free-trade zones, which are characterised by lower taxes and less stringent regulation, including fewer customs' controls.[41] In the meantime, Italian artisans and Made in Italy brands continue to see huge income losses and hits to their reputation.

Impact of Counterfeiting on Made in Italy Artisans

Leather goods - namely handbags - and clothing made up the largest proportion of counterfeit goods imported into Italy, 16% and 13.8% respectively.

Leather goods - namely handbags - and clothing made up the largest proportion of counterfeit goods imported into Italy, 16% and 13.8% of the total respectively. These were mostly purchased by consumers who knew that the goods were counterfeit, an estimated average of 61% of purchasers, but the percentage of known fake purchases varies considerably across fashion products.[42] Global trade in fake Italian items

The associated job losses number 88,000, or 2.1% of the full time equivalent employees.

amounted to €32 billion in 2016, equivalent to 3.6% of Italian manufactured sales. Consumers paid €8.3billion for the counterfeits in 2016. Italian retailers and wholesalers lost sales amounting to €7.9billion in 2016, owing to the presence of imported fake goods in the market. The associated job losses numbered 88,000, or 2.1% of full time equivalent employees. Although 2.1% is a relatively low number, as these jobs are mostly located in an endangered sector already, it has serious implications.

The GTRIP p-index rates the attractiveness of a product for counterfeiting. A high score indicates that the associated product category contains high values of Italian trademarks or patents or that a large proportion of goods associated with them are counterfeit, table 1.[42]

Table 1: GTRIC Average Scores for Italian Products 2014 to 2016

Category	GTRIC-p
Perfumes and cosmetics (33)	1.000
Articles made from leather, handbags (42)	1.000
Optical, photographic and medical apparatus (90)	1.000
Watches (91)	1.000
Clothing, knitted or crocheted (61)	1.000
Toys and games (95)	0.994
Jewellery (71)	0.830
Footwear (64)	0.754
Plastic and articles made from plastic (39)	0.375
Knitted or crocheted fabrics (60)	0.353
Electrical machinery and electronics (85)	0.147
Beverages (22)	0.125

Source: [42]

This data set shows different counterfeit trends from the global set, footwear is less susceptible than other fashion products. Instead, Italian made handbags, leather goods, clothing, watches, and jewellery are the fashion items most attractive to counterfeiters.[42]

Despite perception that large fashion brands are the only group affected by counterfeiting, small, prestigious brands,

Small, prestigious brands, such as many Italian artisans, experience both lost revenue and the theft of valuable intellectual property.[42]

such as many Italian artisans, experience both lost revenue and the theft of valuable intellectual property.[42] These impacts have further repercussions as well, as fear of copyright infringement deters many small firms from exploring international sales and expanding online platforms - a critical success factor. Non-deceptive counterfeiting also particularly negatively impacts small artisans in the countries in which the fakes are sold. In Italy, where counterfeit sales target tourists, the brand value and worth of goods are driven down due to the negative image a counterfeit item brings. In this way, counterfeiting not only directly impacts revenue, but also deters innovation and growth in small businesses, and generally lends to the decline of artisans.[49]

The Special Problems of Online Counterfeiting for Made in Italy

Online sales and platforms make selling counterfeit items easier, especially deceptive sales. As customers can't physically inspect the product, they can be enhanced with photo editors that make them more passable as the genuine product.[43] [52] A survey by MarkMonitor, a company working to reduce fraud and copyright infringement, revealed that 31% of 2600 people located in five European countries had mistakenly purchased counterfeit clothing items. Furthermore, when participants discovered their mistake, more than 25% of them ceased purchasing branded goods and deterred family and friends from buying branded goods online.[53] The loss of reputation has serious consequences for the brand, as even though they had no part in manufacturing the faulty item, it still impacted their sales.[54] At present, there are also very inconsistent laws on the books, leaving nobody 'responsible for [the] fake', according to Hugo Garcia-Cotte of anti-counterfeiting tech company Cypheme. This is of particular issue with items imported to the US, as only 5% or less items were found to be scrutinized by customs. These items can then be sold on platforms like Amazon under the name of the Italian brands they are impersonating.[50] Though other countries have stronger screening practices, due to Amazon and other multi-brand platforms' scale, they have international impact on the reputation of companies located around the world.

The loss of reputation has serious consequences for the brand, as even though they had no part in manufacturing the faulty item, it still impacted their sales.[54]

Counterfeiters have been very quick to master online marketing and sales to reach a broader client base without being easily traced. Meanwhile Italian artisans remain unaware of how or unable to effectively identify and combat these efforts and the larger luxury brands who employ artisans cannot operate at scale to eradicate counterfeits.[31] [36] For instance, to evade detection, counterfeiters often build

websites in one country, locate the server in another, and sell goods to consumers in specific countries outside of those two locations. The goods sold are subsequently distributed from other countries, making it very difficult to trace the entire operation. In some cases, counterfeit manufacturers/retailers copy real brand websites and paste several copies on the internet, tricking consumers into believing that they are on the genuine site.[53] Luxury brand websites, then, unintentionally help manufacturers of counterfeit items because the recognisability of the logos make them easy to closely copy, as well as other marketing techniques that counterfeiters appropriate to improve the appearance of authenticity of the fake product. When a potential consumer checks the fashion item against the brand's website, they often think it is the same product.[55]

Amazon Marketplace currently has more than 5 million retailers, making it difficult to regulate.

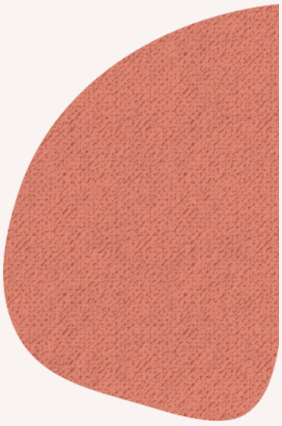
Large online platforms, such as Amazon and Alibaba, see similar mimicry issues. Although they were designed to connect small businesses to a broad customer base, they contributed to counterfeiting growth. For instance, Amazon Marketplace currently has more than 5 million retailers, making it difficult to regulate. Counterfeiters not only create fake, unregulated accounts, but also post fake reviews of their products and services on their websites according to research conducted by Fakespot, a consumer watchdog. This report found that reviews or products advertised on Amazon are unreliable. As third parties can create accounts, often with very little oversight, these platforms often play host to a proliferation of counterfeiting operations.[53] One study found that 15% of all products on eBay marketplace are fake, and 13% on Amazon.

One study found that 15% of all products on eBay marketplace are fake, and 13% on Amazon.

Such online platforms, then, while created with the goal of connecting small businesses to a large retail market, often cause more problems than good for small businesses. The huge counterfeiting potential of these marketplaces, leaves small businesses vulnerable, but they also lead to less in-store shopping, making it more difficult for stores to operate without an online presence.[56] [57] [58] Therefore, these online platforms often harm SME's far more than they help, but place businesses in the difficult position of having to lose customers up front or risk endangering their company in the long run, due to the theft of designs and negative reputation.

Blockchain Solutions

Blockchain Solutions



Blockchain technology has several characteristics that position it to not only help reduce counterfeiting, but generally increase the efficiency of the supply chain and services for customers.

There are four opportunities we've identified:

- inventory and omnichannel management
- provenance tracking
- ethical practices
- post-purchase services.

Most of these opportunities are related to the advantages of Distributed Ledger Technology (DLT). A distributed ledger is publicly available, cutting out intermediaries and saving both time and cost and provides an immutable record, meaning that it cannot be retroactively changed. This increases the security, eliminates retroactive forgery concerns, and even enables multiple companies to operate on the same system, as trust is established at a network level, not inter-company.[81]

Inventory and Omnichannel Management

When multiple suppliers or companies are involved in production and transportation, there is often not enough trust to enable one, streamlined database of products as they move through the supply chain.

The DSD supply chain model means that different products for one company, or even different materials for one product, may not be produced by the same people. However, this decentralisation also opens up supply chains to infiltration by counterfeiters throughout production.[86] There is room for counterfeit raw materials to enter the production cycle, or even for counterfeit products to seamlessly integrate into the production chain and be shipped out to retailers or customers.[86] All of this endangers efforts to comply with labour and material safety laws.

In order to combat this, many companies have turned to highly centralised supply chains.[77] They rely on one company to direct the logistics of the supply chain and verify the raw materials and finished products. This is exceptionally inefficient, places a tremendous processing burden on the server, and forces reliance on one single point while leaving multiple points open to infiltration.[77] However, when multiple suppliers or companies are involved in production and transportation, there is often not enough trust to enable one, streamlined database of products as they move through the supply chain.

Whether outsourced or not, relying on such centralised systems to coordinate movements and keep records slows the movement of goods through the supply chain. Moving all of the raw materials and products through one or a few warehouses to be processed and authenticated is time consuming, inefficient, and subject to lost records.[87] Storing documentation on a decentralised ledger can mitigate some of this strain. Decentralised ledger technology means the information is stored on every connected node simultaneously, giving all members of the supply chain access to information as a product moves through manufacturing.

Both public and private blockchains are a potential option for SCM, although for individual company use, a private blockchain is likely simpler to integrate. Private blockchains restrict access to only those with the key, but can increase efficiency as the ledger is still stored on every connected node, and therefore simultaneously updated. So, as materials and products are verified in the system, every participant in the supply chain would be able to access the information.[87] The need to wait for this information to be processed and relayed by a third party is removed. Additionally, the decentralised manner of the ledger also means that records can't be lost or altered, further securing this system.

One report by fintech specialist Monica Eaton-Cardone predicts that about 78% of retailers will be using blockchain by 2023

If operated properly, this is useful for omnichannel management. Providing customers and various service providers with consistent and fast service and products across a range of platforms, from online to in store, is difficult. However, the peer-to-peer manner of blockchain allows all distributors and retailers of a product to instantaneously update each other as to the location of goods, radically improving delivery and access services for customers.[78] One report by fintech specialist, Monica Eaton-Cardone, predicts that about 78% of retailers will be using blockchain by 2023, simply due to the massive improvements that it can provide in the supply chain.[78] While these numbers may be difficult to achieve, they point to the high potential that many in the retail industry see in blockchain technology to improve services.

Automation

Automation further increases the efficiency and security of the supply chain. Radio-Frequency Identification (RFID) tags are one good way to do this. RFID tags are unique and used to identify the one particular item attached to the tag. They can automatically identify the product and update the information stored in the tag. For instance, these tags can be linked to a blockchain platform, and automatically track and update the

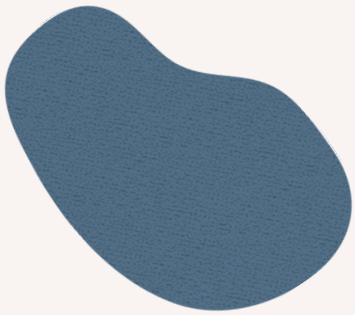
manufacture and movement of the product. Radio-frequency allows them to be read by any reader that is within range, making them particularly useful as they do not have to be in the line of sight of a scanner. While these tags can be battery powered to increase the range at which they can be read, they are still viable when not running on an external power source.

RFID tags can also solve some issues with verification of information added to the blockchain. They act as "oracles", supplying outside data to the blockchain.

RFID tags can also solve some issues with verification of information added to the blockchain. According to Adam Friberg, the CEO of company AVAVAV, 'blockchain in combination with RFID will be the solution [necessary to provide] total transparency to production'. They act as "oracles", supplying outside data to the blockchain. As blockchain can only store data, information from the world needs to be added to the system under a high verification standard to maintain the integrity. Oracles act as means of communicating events from outside the blockchain into the blockchain, and therefore need to be highly secure.[89] RFID tags would be considered "hardware oracles", and as long as they function properly, a reliable source. If trustworthy hardware is not available, another system utilizing a trusted third party is necessary to secure any blockchains that serve more than one company, partially mitigating the decentralisation of the system.[89]

Automation of DLT updates standardizes this, and allows all supply chain partners - from suppliers to distributors and vendors - to check the passage of products through every aspect of the supply chain.[53]

Automation of DLT updates standardizes this, and allows all supply chain partners - from suppliers to distributors and vendors - to check the passage of the products through every aspect of the supply chain.[53] RFID tags are already being used extensively in fashion supply chains and by logistics companies to provide a link to information on the product. However, by placing this data on a blockchain, there are several benefits. First, is the security, as this data cannot be retroactively tampered with, meaning that the veracity of the uploaded information is more secure from both internal attempts to adjust audits and malicious external attacks, as each record across the DLT would have to be adjusted simultaneously.



Secondly, the increased efficiency of a decentralised ledger is even further assured by automatic updates. As the tag is read, it would automatically update the ledger of the items location in the supply chain, and in turn, the data the tag carries could be automatically updated to reflect any adjustments to the product that would happen at that stage.

Finally, the extreme security of blockchain paired with smart contracts - computer protocols which digitally facilitate, verify, and enforce a decision - enables machine to machine (M2M) interactions.[80] This means that as data from the RFID tags are

read and updated, this could also automate other actions in the process. For instance, payments for services from one producer could then be verified as the product moved out of their work space, removing the necessity for someone to manually verify and approve payments. Blockchain is essential to this system, though, as the security and smart contracts - which act as binding protocols - enabled by blockchain are essential to run secure M2M transactions.

Non-Fungible Tokens

Non-Fungible Tokens, or NFTs, are an important initiative being used to eliminate counterfeiting in the luxury fashion industry; they are a cryptographic token standard enabled on the Ethereum blockchain.[64] They act as a digital twin, holding all the pertinent information about an object, and can be linked via an RFID tag or QR code. Satoshi Studio, a French company, created a blockchain certified luxury fashion trainer[65] using the ERC-721 token standard. A fungible good is easily replicable, but a non-fungible product is not reproducible, so that the non-fungible token is characterised by unique fraud proof data. The ERC-721 token cannot be divided into smaller parts, unlike some non-fungible tokens, meaning that this token type is uniquely associated with one item.[62] Therefore these tokens are promoted as a valuable means to prevent counterfeiting in the fashion industry. Satoshi Studio CEO, Nicolas Romero, says:

> 'By combining physical products with digital certificates, the issue of large-scale counterfeiting could become a thing of the past'.

'By combining physical products with digital certificates, the issue of large-scale counterfeiting could become a thing of the past'.

Linking the NFT with a connected device, like an RFID tag enables the information to be updated using smart contracts as they move through the supply chain or change ownership.[81] Using smart contracts to update them allows for them to track changes to the product or in ownership, without endangering the integrity of the token, as it is not replicated; rather it is added to, and therefore remains non-fungible, even as the product it refers to can change.

Multi-Company Ledgers

Increasingly diversified supply chains also means there are often multiple companies and manufacturers involved in the production and transport of a single item. Blockchain enables multiple members to interact on the DLT through the network that runs the ledger and update products as they're modified, not merely tracking the finished product, as is presently the

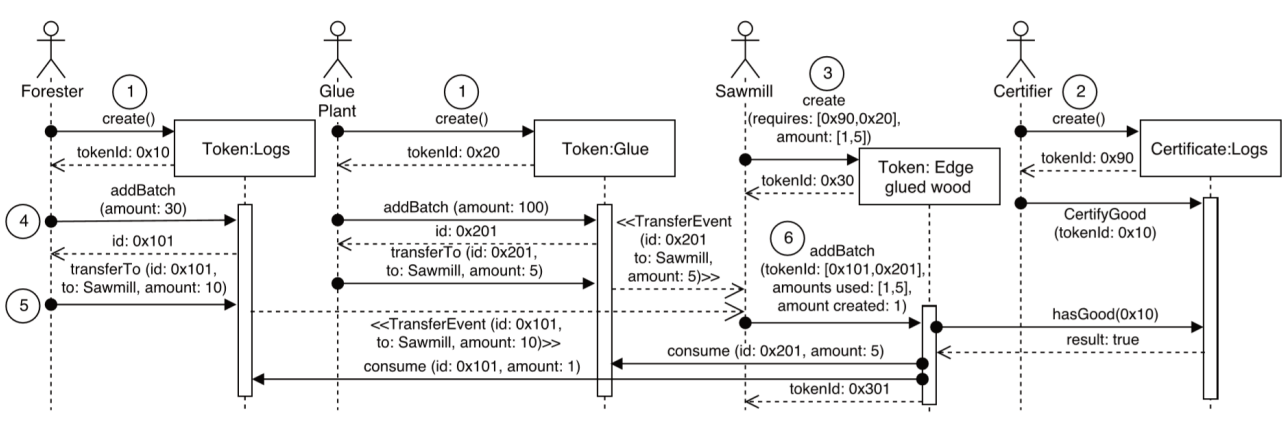
'Making more data public[...] on the percentage of fakes on the market' is one of the main steps to reducing counter-feiting.

norm.[81] The trustless communication of public blockchains allows for this. "Trustless" refers to the fact the decentralised system uses the network and immutability of the system to verify transactions, not a trusted third party.[88] This allows participants who normally would not have direct communication to store verified information on the same ledger.[88] Even competing companies can interact on the same ledger, as many of these are run in a pseudonymous manner, protecting the identity of the company. According to Hugo Garcia-Cotte, CEO and Co-Founder of anti-counterfeiting tech company, Cypheme, claims that 'making more data public[...] on the percentage of fakes on the market',is one of the main steps to reduce counterfeiting.

This traceable process records information about all of the raw materials that is shared to every participating supplier, and can be used to verify the final product.

Blockchains can provide a secure manner to track and share this information, especially when integrated into a distributed supply chain. Smart contracts can change the protocol, so that once the digital representation for an item has been created, it can be updated to reflect the changes indicated by the smart contract, so that all materials used in production can be traced.[81] Using blockchain to do this eliminates the need for an intermediary, but also means that companies do not have to communicate directly, as the information on the ledger is updated, verified, and made available to everyone, or everyone with the proper key in the case of a private blockchain.[81] Information input by one company cannot be changed by another, only added to as they alter or add to the product, figure 3.

Figure 3: Use Case, Non-Fungible Tokens



Source: [81]

Figure 3 describes the process of tracking a product from initial raw material through all of the modifications in production to

Utilising blockchain exposes any anomalies in the sourcing or production process

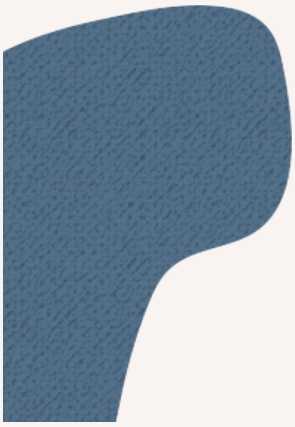
the creation of a certification at the end. This system relies on Non-Fungible Tokens to track batches, which in the luxury supply chain, could reference a supply of fabric or the thread that is later turned into a jacket. As each product or service is added, the Token is updated using a smart contract, until the final product is certified.[81] This traceable process records information about all of the raw materials that is shared to every participating supplier, and can be used to verify the final product. However, a similar system could be integrated within larger business networks, such as online retailers, to secure them against counterfeit goods.

International Sales

Using blockchain ledgers, only items that have been verified at every stage in production, could then be authenticated, and therefore deployed.[87]

Internal company product tracking on blockchain could increase efficiency when clearing customs. The origins of the product can be authenticated digitally by the relevant authorities.[53] Utilising blockchain exposes any anomalies in the sourcing or production process; this improves border security, and can enable more seamless decentralised sourcing for companies. As omnichannel and global services become more important for clients, the increased communication that blockchain enables is even more useful.[79]

Additionally, beyond an individual company level, a blockchain for large retailers, such as Amazon, could provide some of the much needed transparency and vetting to dismantle many of the counterfeit operations that use them. This is an important step that could help protect SMEs, as well as purchasers. Using blockchain ledgers, only items that have been verified at every stage in production, could then be authenticated, and therefore deployed.[87] A system where these two initiatives are implemented side-by-side is necessary to prevent counterfeiting. While integration, as well as verification standard, need to be hammered out, blockchain presents one of the most promising methods for increasing communications, efficiency, and security - enabling better omnichannel options, both domestic and international, for customers.



Cost Reduction

While implementation of blockchain tracking systems will come with costs, the use of a decentralised system has the potential to reduce costs down the line. The elimination of a centralised intermediary to plan, process, and track the supply chain, will obviously have an impact. However, these improved records can also be used to track costs throughout the supply chain in order to make better choices in the future.[2] [25] A blockchain system eliminates the costs associated with traditional

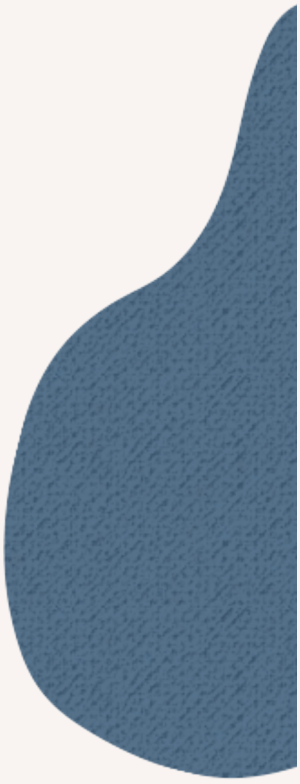
administration, while increasing the security of information, including data that can be used for counterfeiting purposes. Financial transactions can also be made via the platform if the stakeholders use cryptocurrency instead of bank transfer.

Provenance

Certificate methods are exceptionally outdated, subject to forgery - either of luxury items themselves or the authentication documents, - limited to the value of the items, and expensive.

For users, blockchain provenance tracking provides more streamlined options than have previously been available. As one report outlined the issues with paper certificates:

> 'Luxury and high value items whose provenance might otherwise be reliant on paper certificates and receipts can easily be lost or altered. In fact, lack of transparency in the supply value of any item prevents supply chain entities and customers from verifying and validating the true value of that item. The cost involved in handling intermediaries, their reliability, and transparency further complicate managing this traceability in the supply chain. Strategic and reputational competitive issues arise from these risks and lack of transparency'.[87]



Particularly in the case of luxury items, provenance matters, affecting the ability to sell high-end products secondhand. Presently, certificate methods are exceptionally outdated, subject to forgery - either of luxury items themselves or the authentication documents, - limited to the value of items, and expensive, making them available only to the extreme upper echelon of products. However, by digitising the provenance process on a blockchain, tracking items becomes far more secure. Additionally, if blockchain solutions are used to streamline many companies' supply chains, it opens up provenance to a much wider selection of goods, for which the production materials and methods can be traced, as well as the value. Several companies are already working on a platform that is available to multiple companies, such as Arianee, discussed in the Case Studies.

Intellectual Property Rights

Intellectual Property Rights (IPR) are a prime concern in counterfeiting, and difficult to protect. Large brands are entitled to protect works with a logo, which can often be useful in identifying counterfeits, as the prestige the logo confers is just as desirable to steal as the design. However, this presents difficulties when protecting smaller artisan designs, which may not come with an internationally recognizable logo. To address this, Italy implemented various EU regulations, such as the Agreement on Trade-Related Aspects of Intellectual Property,

Trademark Directive (2015/2436), and the Trade Secrets Directive (2016/943/EC) as well as participating in the Agreement on the Unified Patent Court.

There are still issues with the amount of paperwork and processing, so though the Patent Office and Customs Agency attempt to stay in constant communication, there is a lag in the transference of information.

These directives support the brands that make up the Made in Italy label by backing a highly effective Customs Agency with reaching agreements to several countries, including some of the countries which produce high levels of counterfeit Made in Italy products - particularly China. The Italian Customs Agency also has ongoing communication with patent/trademark holders seeking protection from fakes. Goods labelled as produced in Italy are carefully scrutinised - to a level that is much more stringent than EU law. The capacity of the Customs Agency to gather evidence for prosecuting counterfeiters has been further enhanced by the implementation of a digital Anti-Counterfeiting Information System. The system also receives information from IP holders about possible infringement of their rights, which facilitates identification and comparison of authentic and counterfeit products. There are still issues with the amount of paperwork and processing, so though the Patent Office and Customs Agency attempt to stay in constant communication, there is lag in the transference of information.

Lawmakers need to 'help by collaborating on open standards for blockchain traceability, and using these systems for analysis'.

However, updating this system to use blockchain stored provenance records could make tracking patents and products much faster. As blockchain is both time stamped and immutable, it is a much better system for holding patents and trademarks. The decentralised nature of the information adds to this utility, as it becomes readily accessible to both those trying to add their patented material and those enforcing this simultaneously. In order to do this, lawmakers need to 'help [by] collaborating on open standards for blockchain traceability, and using these systems for analysis', according to Provenance Founder and CEO, Jessi Baker.

Wearable fashion will change the way that data is collected, and in turn, should change the way that it is processed and stored in order to protect personal privacy.

Additionally, due to the very fast turn around that fashion often sees, unregistered rights are more often the ones that need protecting. Once again, the time stamped and immutable nature of blockchain can be useful in determining ownership of IP. There are still issues that this cannot address, for instance, if someone fails to add their design to the blockchain ledger before someone else does. However, this is still a superior system to the current extremely slow patent and trademark process, and could add greatly to the rights of artists with unregistered designs.

Post-Purchase Services and Data Protection

As fashion tech becomes more normalised, wearable fashion will change the way that data is collected, and in turn, should change the way that it is processed and stored in order to protect personal privacy. In a fully automated system, the Internet of Things (IoT) acts as the sensor, Artificial Intelligence (AI) as the logic, and blockchain as the memory.[82] By storing collected data on a blockchain, it is encrypted and secure from retroactive tampering. This is exceptionally important, as wearables take data collection into people's homes, and potentially to all parts of their day.

'Digital certificates to valuable products[...] allow for the full potential of the downstream supply chain to be exploited connecting with customers, managing circulating products, sharing information on production, etc., and for a customer, it is a new type of relationship'

Wearable tech is appealing as it enables fashion companies to explore the end-user services. RFID tags, for instance, are not only useful for the company identifying the item throughout the supply chain, but can be embedded into products to provide data throughout the lifespan of the garment. This can improve services, as companies will better understand the desired use of the product, such as why a customer might decide to get rid of a garment, allowing the design of garments that better match the needs of customers.[83] Satoshi Studio, the innovative luxury fashion company, is already doing this, using blockchain-based ERC-721 standards to do more than just prevent counterfeiting. Nicolas Romero, the CEO, says:

> 'digital certificates to valuable products[...] allows for the full potential of the downstream supply chain to be exploited connecting with customers, managing circulating products, sharing information on production, etc., and for a customer, it is a new type of relationship with [their] favorite brands and valuable products'.

Decentralised blockchain IoT data storage and management gives users the choice over whether or not to share or sell their data, without having to rely on an intermediary to hold the data.

As Romero pointed out, these tags can be used by customers to continue receiving services post-purchase, varying from placing a service request and getting care information to verification of authenticity. Embedding this data in the product greatly reduces the risk of counterfeits entering the market as secondhand items, as blockchain provenance records are immutable; when this information is attached directly to the physical item, will make it more difficult to forge.

The collection of data from wearable items, though, can provide privacy concerns for individuals. Decentralised blockchain IoT data storage and management gives users the choice over whether or not to share or sell their data, without having to rely on an intermediary to hold the data. This is an important distinction, as these intermediaries are often less secure or trustworthy than assumed.[84] To do this, "modular

consortium" architecture appears to be the most scalable. If using only one blockchain, every entry has to be approved, either by 51% of nodes, an authority, or some other proof. However, "modular consortium" architecture allows this network to be broken down into multiple, smaller private blockchains, called "sidechains".[84] The connection of all of these sidechains creates an overarching decentralised, peer-to-peer consortium network.[84] Owners of data sensors control the data on their own chains, without always adding it to the main network, as the different sidechains can be added to entirely separately from each other. However, the owner of the sidechain can grant access to other users via the consortium blockchain, which logs all of the requests, both successful and unsuccessful, to be granted access to the various sidechains.[84] Therefore, while issues between data collection for greater services and personal privacy concerns mount, using a "modular consortium" blockchain enables individuals to maintain ownership of data, and retain the ability to securely share that data as they choose. This grants individuals access to services, while enabling them to retain ownership of their own data.

Sustainable and Ethical Practices

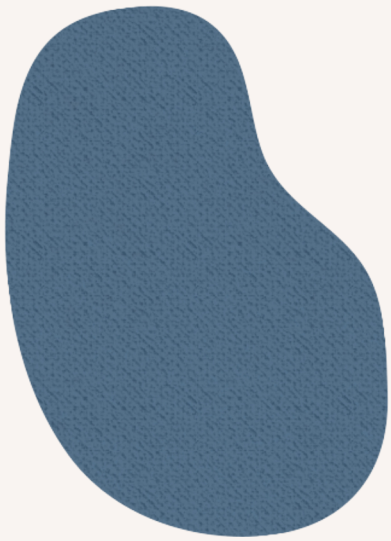
'Blockchain has a role to play in enabling products to come with authentic information'.

Luxury fashion companies can enhance their reputation with consumers and other stakeholders by making all of their supply chain management practices transparent.[2] Some companies are incorporating an environmental Profit and Loss account as part of the financial report to relay the environmental impact of operations. However, these financial reports may not be widely available, and although important for building a client-base, are generally still faced with skepticism and mistrust in reporting. Reporting all costs, from raw materials to transport, import/export costs, and profit margins, though, to promote an image of transparency, has become very important to consumers. Brands that use blockchain technology can optimise transparency by granting access to the network and information about the supply chain transaction history.[2] According to Jessi Baker, Founder and CEO of Provenance, one organisation providing such services, 'blockchain has a role to play in enabling products to come with authentic information'. As traceability of raw materials is increasingly a trust issue, blockchain can help provide authenticated information. This is particularly important as fashion supply chains are highly fragmented, and the number of suppliers and sub suppliers could be up to 50,000.[2] Blockchain can increase this trust and improve the tracking. This information can be made available to clients at the time of purchase or post

The company profited directly from [providing information about artisan suppliers], with a sales increase of 31% within six months, and customer engagement increased by 45%.[55]

purchase through QR codes or RFID tags that provide viewing access to the DLT.

The luxury fashion designer Martine Jarlgaard is trialing blockchain for this purpose, as is the shoe company Fuchsia.[2] These initiatives stimulate stakeholder support for artisan workers. Fuchsia shares information about the workers, who handcraft its shoes, using a blockchain platform called Provenance. The company profited directly from this initiative, with a sales increase of 31% within six months, and customer engagement increased by 45%.[55]



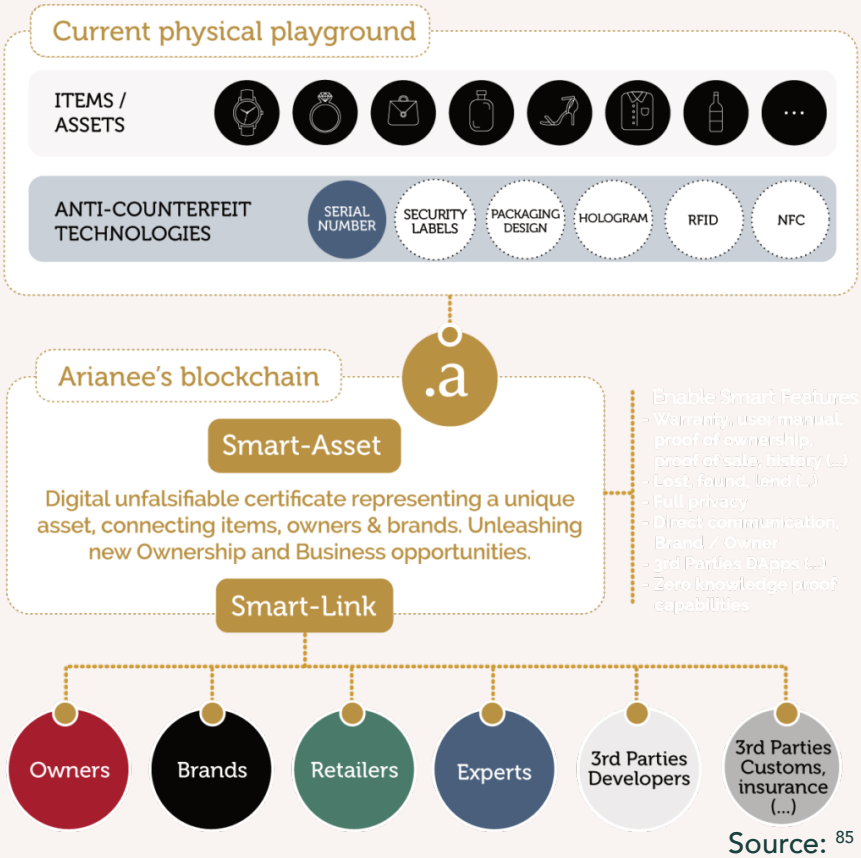
Case Studies

Arianee

Arianee gestures toward the future of luxury products, as the digital twin links a product to a wealth of information and network of service providers, all while maintaining the privacy and security that has come to be synonymous with blockchain technologies.

Arianee is an organisation which has further developed the idea of tags for post-sale services, including provenance, by designing a protocol for creating and transferring digital identities for objects. In many ways, Arianee gestures towards the future of luxury products, as the digital twin links a product to a wealth of information and network of service providers, all while maintaining the privacy and security that has come to be synonymous with blockchain technologies. This is useful for the elimination of fake fashion products and does not require the brand owner to discard its current physical systems and anti-counterfeiting techniques. However, while the digital identity can be linked to a ready-made product, this platform does not have provisions for the supply chain or materials beyond providing access to certification in the digital identity. Though this is not an overarching solution to counterfeiting, it is a useful tool for adding to current anti-counterfeiting measures, as authentication and certification can be linked in the digital identity, and can be used to improve access to these documents and further services figure 4.[57]

Figure 4: Arianee Blockchain Solution



Source: [85]

The Arianee protocol defines the rules of access to the blockchain for three user groups: brands, product owners/ consumers and third parties, which are able to interact on the platform.

Each asset is linked to the digital identity, often through exclusive serial numbers embedded in the product; the digital identity is a smart asset registered in the blockchain and linked to smart contacts. The smart contracts enable the product's stakeholders to communicate or adjust the information; for instance brand owners, retailers, experts, third party developers, customers, and Customs' personnel can use the smart contracts to communicate. Using the platform, these parties can request access and be given permission to read the details about the digital identity.[57] This system can reduce or eliminate counterfeiting, because the counterfeiter can make a fake product, but cannot copy the digital certificate. As Pierre Nicolas Hurstel, CEO and Co-Founder says, 'it is easier to fake a product than a non-fungible token', proving the utility of a service that creates digital identities for products.

'Once the resale transaction has been completed, the item's digital identity certificate will be transferred to the new owner who will have the guarantee that [they] purchased an authentic item and who will be able to [...contact] the brand anonymously'.[90]

The ecosystem developed by this concept also means that brand owners enjoy a two way link to their customers, to gain feedback on the products and new ideas, so that potential for co-creation of future products is enabled.[58] A recent collaboration between Arianee, accessible luxury fashion brand, ba&sh, and tech company Reflaunt, is evident of the innovation that such technologies and built-in authentication can provide. The collaboration allows customers to resell items, creating a secondhand market that brands have a hand in, and therefore with greater protections for customer's seeking to buy genuine productions. The process is facilitated by Reflaunt's tech, which generates 'an Arianee digital identity certificate[...] that will support the resale process',[90] according to a press release. The statement continues:

> 'Once the resale transaction has been completed, the item's digital identity certificate will be transferred to the new owner who will have the guarantee that [they] purchased an authentic item and who will be able to [...contact] the brand anonymously'.[90]

Generally, this process supports sustainability and improved customer services, all while fostering a marketplace in which counterfeit items are unable to enter. However, this service is only provided for market ready items, and therefore only impacts the secondhand market and services that brands can provide. However, although not developed solely for product authentication, Arianee 'creates a new universe of services to

clients' according to Hurstel, which allows for innovation with authentication precautions already built in.

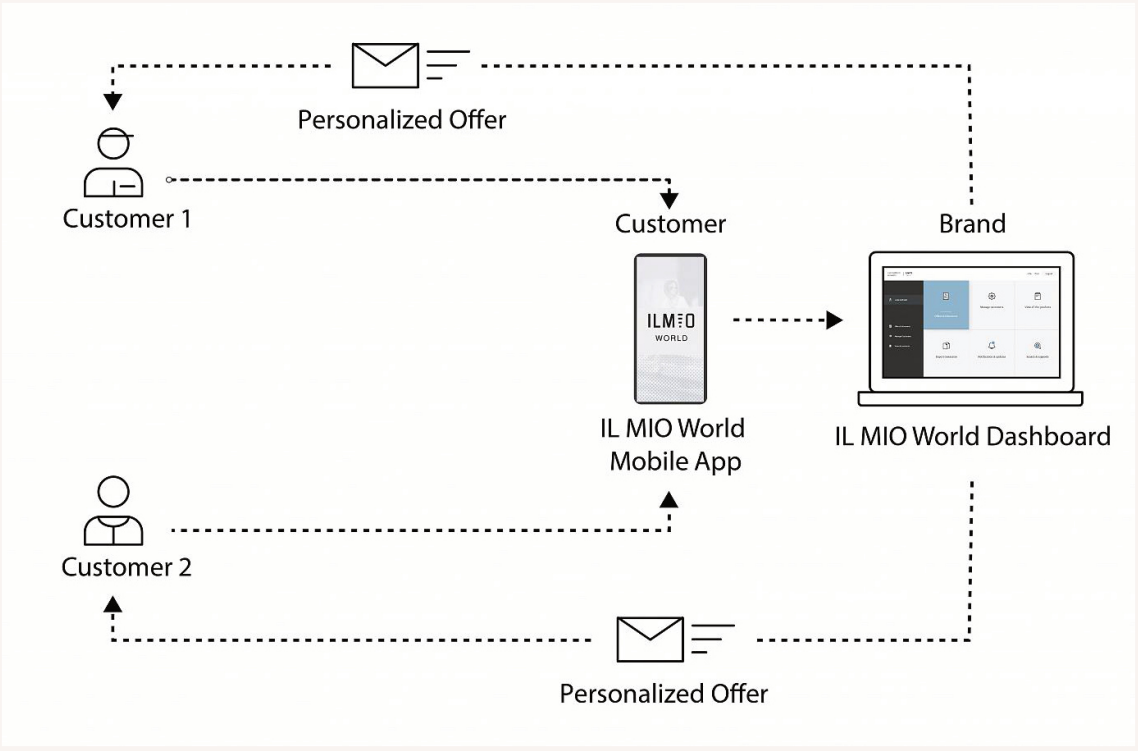
Il MIO World

IL MIO's main goal is to protect the 'high quality, creativity and innovation' associated with the Made in Italy brand, merging traditional business practices with technology in new ways to eliminate counterfeiting,[74] and simultaneously protect consumers.

IL MIO World is an Italian start-up developed by collaboration between Mark Noorlander and Armin Zadakbar. These two combined their expertise to develop an anti-counterfeiting device, which could also act as a highly effective, GDRP compliant marketing tool. The company implemented blockchain as a means of luxury brand authentication using Near-Field Communication (NFC) chips to provide individual items with a unique digital identification. IL MIO's main goal is to protect the 'high quality, creativity and innovation' associated with the Made in Italy brand, merging traditional business practices with technology in new ways to eliminate counterfeiting,[74] and simultaneously protect consumers.

The chip can be detected by the Il MIO World mobile app, allowing the purchaser to claim ownership from the manufacturer/retailer and to set its status, which is invaluable if it is lost or stolen. The lifetime ownership of the product is traceable if the product is sold by the original purchaser, figure 5.[74] [58]

Figure 5: Blockchain Tracing Successive Ownership

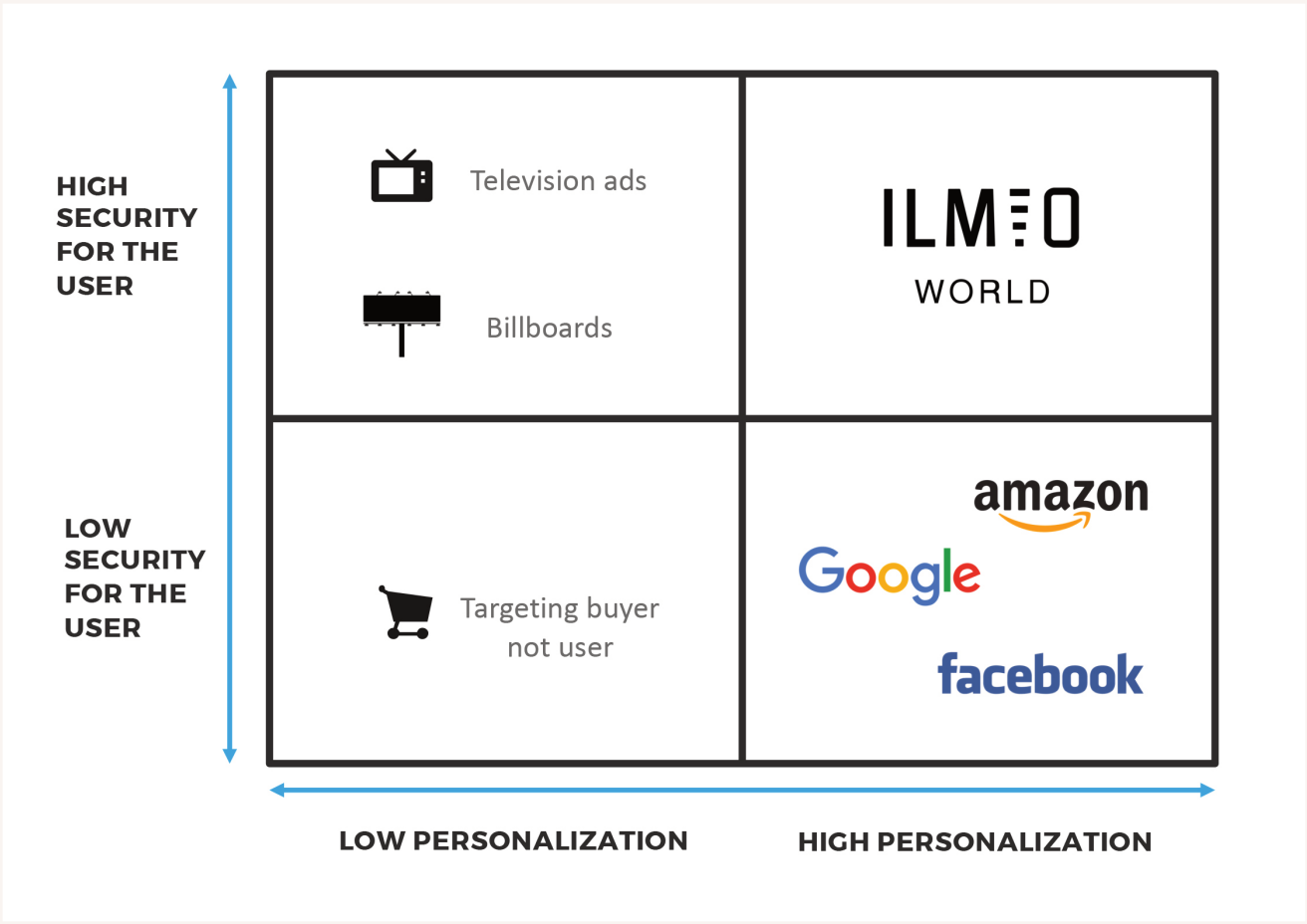


Source: [73]

Blockchain facilitates a two-way communication process by means of a customised dashboard from which brands can identify and communicate with anonymous purchasers

The additional value of blockchain to Made in Italy is stressed by IL MIO World as expanding its future marketing power. When a consumer buys a Made in Italy luxury product on an online platform, the manufacturer has no information about the purchaser and no opportunity to interact with them to build customer loyalty and feedback on the product. In contrast the blockchain facilitates a two-way communication process by means of a customised dashboard from which brands can identify and communicate with anonymous purchasers and customise special offers and discounts directly. The business model attached to this innovation is promoted as providing optimum security to brand and user, figure 6.

Figure 6: High Security and Personalisation



Source: [58]

How Effective are Blockchain Solutions?

Doubts remain about how effective blockchain will be in reducing counterfeiting, because false information can be entered onto the ledger, especially at the beginning. Blockchain only allows consumers and other stakeholders to check that the information has not been altered, so that the quality of data at time of validation to the blockchain is not 100% guaranteed. To do this, ensuring that secure oracles are available to verify information that is added to the blockchain is necessary.

Another limitation of blockchain is that it cannot directly link the physical product to its record on the distributed ledger. RFID tags, or other IoT devices have to be connected to the item to link to information on the blockchain.

Artificial Intelligence provides a potential solution, as relying on automated systems can reduce concern over ulterior motives. Additionally, the inability for blockchains to store anything but digital information is where services such as Arianee enter the mix; they create a digital twin of every product, which is then matched against the blockchain information. This model can be used to phase in digitisation, still relying on already trusted authenticators to certify products before that information is logged to the blockchain. While there are still issues with ensuring the validity of initial information, blockchain technology can still improve tracking systems, and be a useful tool when moving towards more secure, digitised supply chains.

Conclusion

Conclusion

While counterfeiting is not the only issue facing artisans, it brings into relief the biggest issues in the supply chain, and many of the issues that most endanger this part of Italy's heritage. Securing the supply chain against counterfeit goods and materials resolves several other issues, as well, and can even promote other critical success factors.

Blockchain presents a potential solution for fractured supply chain management, as the immutability and decentralised nature of blockchain ledgers improve security, transparency, and efficiency. Importantly, these factors provide allowances for protections of small producers, as well as the largest brands, and can bring about mutually beneficial digitisation solutions.

The primary potential for blockchain technology to improve services are in providing more efficient and secure:

- inventory and omnichannel management
- provenance
- post-purchase services and data protection
- proof of sustainable and ethical practices.

With the future of fashion tech and post-purchase services on the horizon, blockchain technology can aid in developing innovations to revive luxury brands.

With increasingly digitised shopping, the supply chain needs to keep up in order to match delivery and transparency needs. Much of this merely means cleaning up the supply chain, and utilising smarter methods of tracking and relaying information - areas in which blockchain can be useful. However, with the future of fashion tech and post-purchase services on the horizon, blockchain technology can aid in developing innovations to revive luxury brands.

Anti-counterfeiting initiatives must be taken with the artisans who built the label in mind to protect the traditions and legacy of Italy in the future.

Already, the Italian government has identified this as a potential solution. Due to the tremendous economic value of the Made in Italy label, the government recently invested €15 million. This money is intended to support rapid implementation of digital technologies including blockchain, and to finance a joint project with IBM Italy and the artisan community. Some Italian brands are already using blockchain to protect their IP and supplier artisans, while Italian academics are collaborating with blockchain experts to develop blockchain solutions for the global protection of Made in Italy brands. While the industry definitely has incentives to improve their systems and reduce counterfeiting, these initiatives must be taken with the artisans who built the label in mind to protect the traditions and legacy of Italy in the future.

About dGen

BEYOND

After Gen X, characterised by big societal shifts, Gen Y, better known as millennials, and the digital native Gen Z, the ***decentralised generation*** will grow up in a future shaped by different dynamics and technological developments. AI, blockchain technology, and IoT will individually bring disruption to many industries, but it's at the crossroads where we expect our whole socio-economic fabric to change.

dGen is a not-for-profit think tank based in Berlin, Germany. We focus on how blockchain technology can contribute to a decentralized future in Europe and what this might mean for people, society, private entities, and the public sector over the coming decades.

Emerging technology focused on decentralising society will shape the next part of the twenty-first century; The dGen will grow up with opportunities for borders to fade and traditional networks to dissipate. Meanwhile, most blockchain developments are still in the early stages; focusing on building solid products and exploring regulatory requirements to create a fertile yet safe environment for companies and investors. The industry is focused on solving the big topics right now, while we encounter a lot of great ideas in the blockchain community about adoption. It's time for those ideas to find a purpose and for the real decision-makers in the world to learn what decentralisation will mean for them.

We're working with a team of researchers exploring how decentralisation will shape our future. Our insight reports focus on specific topics and industries to drive ideas for adoption in Europe. If you're researching how decentralisation is shaping our future, and would like to get involved, please get in touch at dGen.org.

dGen is part of Beyond, a venture studio exploring a new world. For more information, go to beyond.ventures.

Contributors

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Before founding dGen, Jake was originally a partner at Signal Ventures, investing in blockchain tech. In late 2017 he founded hype partners to help build and nurture ecosystems for blockchain projects and has worked with many top 100 projects. Jake is one of the founding partners of Beyond, a venture studio exploring a new world.

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One of the founders of dGen and with a rich background in tech, Nick is a former Product Manager and Director of Customer Success. He shipped software to a user base over 15% of the US population and has organised 200+ events in Berlin. At hype partners he is currently helping top-tier blockchain firms strategise their market approach and is one of the founding partners of Beyond.

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Interested in Partnering on Our Next Report?

We're looking for partners operating in blockchain ecosystems, corporates, universities, the public sector, and other stakeholders to engage in conversations about how blockchain and emerging tech is shaping the decentralised generation.

We're open for any collaboration on this topic and the broader study of decentralisation in Europe.

You can reach us at partners@dgen.org for more information.

Research Agenda

DeFi – Usecases and Risks for Mass Adoption	Scheduled Q2 2020

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