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Luxury Brands: Blockchain Seal of Authenticity in Internationalization

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Master's in International Management

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September, 2025

BUSINESS
SCHOOL

Department of Marketing, Strategy and Operations

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Acknowledgements

I want to begin by expressing my sincere gratitude to Professor Abel Camelo, whose valuable insights and numerous brainstorming sessions were instrumental in shaping the subject of this dissertation. I am equally indebted to Professor Renato Pereira, my supervisor, for his guidance, support, and understanding throughout the development of this work.

I am profoundly grateful to my mother, sister, stepfather, and maternal grandparents for their unwavering encouragement and steadfast belief in my abilities.

I would also like to acknowledge André, my boyfriend, whose motivation and constant support were vital in enabling me to persevere and complete this dissertation.

Finally, I would like to extend my appreciation to my friends, who have always believed in my ability to complete this master's degree and generously offered their advice whenever needed.

Resumo

O rápido crescimento da indústria global de luxo foi acompanhado por um aumento nos produtos falsificados, representando uma séria ameaça à reputação da marca, exclusividade e confiança do consumidor. Esta dissertação examina o potencial da tecnologia blockchain quando integrada na cadeia de abastecimento no mercado de luxo, de forma a prevenir a falsificação, servindo de selo de autenticidade para produtos de luxo. O estudo é motivado pela necessidade de explorar soluções inovadoras que melhorem a rastreabilidade dos produtos e garantam a autenticidade num setor onde a exclusividade e a tradição são essenciais para a criação de valor e o valor da marca.

Foi realizada uma revisão sistemática da literatura, analisando artigos publicados nas bases de dados Scopus e Web of Science. A revisão visa responder a três questões de investigação: (1) como a blockchain pode ser aplicada na gestão da cadeia de abastecimento para garantir a autenticidade e reduzir a contrafação, (2) oportunidades e desafios da sua adoção e (3) como será implementada.

Os resultados revelam os benefícios oferecidos pelos atributos da blockchain, como imutabilidade, descentralização e rastreabilidade, que fortalecem estratégias de antifalsificação, aumentam a transparência da cadeia de abastecimento e reforçam a confiança do consumidor. Contudo, desafios como elevados custos de implementação, falta de padronização, escalabilidade, interoperabilidade e resistência dos intervenientes dificultam a sua adoção.

O estudo conclui que a blockchain tem potencial para transformar a indústria do luxo, salvaguardando a autenticidade. No entanto, são necessários estudos empíricos e análises da perceção dos consumidores para validar a sua eficácia.

Palavras-chave: Tecnologia Blockchain, Contrafação; Anti-Contrafação; Indústria de Luxo; Cadeia de Abastecimento

Classificação: L81, L86

Abstract

The rapid growth of the global luxury industry has been accompanied by an increase in counterfeit products, posing a significant threat to brand reputation, exclusivity, and consumer confidence. This dissertation examines the ability of blockchain technology (BCT) when integrated into the luxury market's supply chain (SC) to prevent counterfeiting, serving as a seal of authenticity for luxury products. The study is motivated by the need to explore innovative solutions that improve product traceability and ensure authenticity in an industry where exclusivity and tradition are essential to value creation and brand value.

A systematic literature review (SLR) was performed, analyzing articles published in Scopus and Web of Science databases. The review aims to respond to three research questions: (1) how the use of BCT can be applied in supply chain management (SCM) to ensure authenticity and reduce counterfeiting, (2) the challenges and opportunities of their adoption, and (3) how it will be implemented.

The results reveal the benefits of blockchain features such as traceability, decentralization, and immutability that support anti-counterfeiting strategies, enhance SC transparency, and consumer trust. However, there are challenges such as high costs of implementation, lack of standardization, scalability, interoperability, and stakeholder resistance that hinder adoption.

The study concludes that blockchain has the potential to transform the luxury industry by safeguarding authenticity. However, empirical studies and consumer perception analyses are needed to validate its effectiveness.

Keywords: Blockchain Technology; Counterfeiting; Anti-Counterfeiting; Luxury Industry, Supply Chain

JEL classification: L81, L86

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Glossary

BCT - Blockchain Technology

BIM - Building Information Modeling

DLT - Distributed Ledger Technologies

EDI - Electronic Data Interchange

ERP - Enterprise Resource Planning

GPS - Global Positioning System

IoT - Internet of Things

NFC - Near Field Communication

NFT - Non-fungible token

OTP - One True Pairing

QR Codes - Quick Response Codes

RFID - Radio-frequency identification

SC - Supply Chain

SCM - Supply Chain Management

SLR - Systematic Literature Review

TMS - Transportation Management Systems

WMS - Warehouse Management System

1. Introduction

1.1. Context and relevance of the theme

The problem of counterfeit luxury brand goods has increased in the last few years, mainly due to the convenience of e-commerce and online shopping. The products compromise the authenticity and the integrity of brands.

The rise in luxury goods consumption can be attributed to the democratization of luxury, which has made high-end products accessible to a broader audience through the emergence of new markets, particularly in the Asian continent, with China and India leading the way (Kapferer, 2012; A. J. Kim & Ko, 2012). Despite the challenges posed by the pandemic, the luxury market has shown resilience and growth over recent decades. In 2023, the global luxury goods industry demonstrated remarkable resilience, achieving a robust growth of 8% to 10% and reaching €1.5 trillion (Bain & Company, 2023). However, in 2024, the market dropped marginally to a market value of €1.48 trillion (Bain & Company, 2025). The personal luxury goods segment, also referred to as the "core of the core" of luxury segments, remains robust, mainly due to increased demand for handbags, which are viewed as valuable investments. This sector reached €363 billion by 2024, driven by growth in emerging markets such as China, which remains the world's largest luxury market, and Japan, where purchasing intentions remain strong despite rising prices (Kapferer & Valette-Florence, 2016; Statista, 2025). The luxury market is expected to grow by 2.89% in 2025, with the central segment being luxury watches and jewelry (Statista, 2025).

The exclusivity, rarity, and high quality contribute to the authenticity of luxury products, as they are only produced in limited quantities, which makes them hard to find and thereby enhances their value and outstanding uniqueness (Vigneron & Johnson, 2004). To guarantee the authenticity of the products, they must have the traceability attribute, which allows the identification of the history and origin of the products (Bechini et al., 2008) and can prevent damage to a brand's reputation when counterfeit products or illegal commercialization occur (Castelli & Sianesi, 2015; O. Khan, 2015; Robinson & Hsieh, 2016).

Counterfeiting is one of the biggest challenges for luxury brands. It occurs when products are traded without authorization due to their design, trademark, logo, or company name, and can be confused with the original products (Staake et al., 2009). Counterfeits damage the brand's reputation and perceived value because they diminish the importance of the exclusivity factor that

is required to justify the value of luxury and make the products authentic (Groth & McDaniel, 1993; Wilke & Zaichkowsky, 1999).

To protect themselves, companies can utilize BCT. This decentralized and completely distributed system can store and record cryptographically signed data and transactions in a block-based structure, much like a distributed ledger has a correct database by being decentralized and transparent to everyone (Queiroz et al., 2019; Y. Lin & Yu, 2023). BCT adds a layer of transparency as it allows luxury brands to trace the source of their products, which in turn helps with counterfeiting prevention.

1.2. Research Problem and Objectives

The application of BCT has numerous advantages in various sectors, and the luxury industry is no exception. However, it remains a subject that has not been thoroughly researched. Due to the decentralization of functions and traceability that BCT enables, it is possible to utilize this technology as a method of guaranteeing the authenticity of luxury products. However, through the literature review, it was possible to verify that there are few studies evaluating the applicability of BCT in authenticating luxury products.

As Kapferer (2012) said, counterfeits "make the luxury dream and logos accessible to those who cannot afford them but want to be integrated" in a society where consumers increasingly aim to achieve luxury. Consequently, the issue of counterfeiting is increasing; by 2023, the counterfeit products market represents roughly 3.3% of global trade, with the luxury market being significantly the most impacted (Alpvision, 2023). The inability of luxury brands to ensure and prove the authenticity of their products is the cause of this phenomenon.

Therefore, this dissertation aims to address the main problem of counterfeiting in the luxury industry. Through a systematic review of the existing literature, the applicability of BCT in guaranteeing the authenticity of luxury brand products will be assessed.

1.3. Research Questions

The research questions presented aim to determine if BCT can be employed as an aid against counterfeiting and, therefore, enhance customer trust in the genuineness of their luxury products. This dissertation aims to answer the following questions:

RQ1: How can BCT be applied in Supply Chain Management (SCM) to guarantee authenticity and combat counterfeiting in the Luxury Industry?

BCT is a distributed and secure ledger that prevents modifications to previously added information because the database is shared across a network (Francisco & Swanson, 2018; Tang & Veelenturf, 2019). Each block has a unique hash code (a cryptographic algorithm that transforms a data input into a fixed-length irreversible output), which is connected to the one before and after it, added to a continuous and irreversible chain, and cannot be changed unilaterally, which adds a significant layer of safety (Y. Wang et al., 2019; Dutta et al., 2020). In conclusion, BCT adds value because it provides a layer of visibility and traceability to luxury brands and improves the authenticity and legitimacy of their products (Eisenstadt et al., 2020), which constitutes an important aspect of counterfeiting prevention, since all the information is available for all the SC participants to verify the records. Due to the immutability of the stored information on the blockchain, the data is secure, which is why it cannot be manipulated.

RQ2: What are the challenges and opportunities in implementing BCT in the Luxury Industry?

The main advantages of implementing BCT are the elimination of intermediaries due to smart contracts, fraud detection facilitated by the authenticity of each device and user that must be authorized and verified (Cui et al., 2020; Duan et al., 2020), and real-time auditing. The decentralized nature of BCT allows real-time auditing through timestamping (Cole et al., 2019).

BCT is an unknown technology, so the luxury industry will face some challenges. For example, the technology cannot ensure the actual condition of products in transit (Yadav & Singh, 2021) and is not suitable for every stakeholder due to the high cost of implementation, making collaboration between manufacturers and retailers essential to balance costs. Other challenges include concerns about the privacy and scalability of information, as well as low awareness and knowledge of the technology (Tokkozhina et al., 2022).

RQ3: How can BCT be implemented on counterfeiting in the Luxury Industry?

The implementation of BCT can be through immutable records, digital identifiers (such as Radio Frequency Identification (RFID), Near Field Communication (NFC), and Quick Response (QR) codes), and smart contracts to ensure traceability, transparency, and real-time authentication. Alternatively, it can be achieved through blockchain-based systems, such as those utilizing non-fungible tokens (NFTs), which create unique digital identities for each product, enabling verification at both purchase and resale, while reinforcing exclusivity and consumer trust.

1.4. Dissertation Methodology and Research Design

To obtain the most appropriate answers to the research questions defined in the previous section, the research design strategy employed is a descriptive method, conducted through a systematic literature review (SLR).

The descriptive research method enables the systematic description of existing facts about a given research subject, facilitating the identification of associations between various concepts within the same subject (Dulock, 1993). For McCombes (2023), the descriptive research method is often used to identify the characteristics and trends of a subject that is still little known.

This research method is qualitative. Studies that have proven BCT's applicability to the luxury industry will be used to analyze its effectiveness, particularly in addressing counterfeiting. This will help to understand the need to implement BCT in luxury SCM and the potential challenges of its application, considering the market characteristics.

Dissertation Structure

The present dissertation is divided into the following sections: definition of objectives and research problem, literature review, methodology and research design, data collection and respective analysis, data interpretation, and results.

Definition of objectives and research problem

The first section of the dissertation presents the context of the research, its relevance, the research problem and objectives, the research questions, the methodology and research design employed, and the structure of the dissertation.

Literature review

This section will explain various concepts, such as luxury and luxury brands, BCT, and its advantages and disadvantages. It will also discuss counterfeiting and the scale of this phenomenon, and finally, SC and SCM in the luxury industry.

Methodology and Research Design

The methodology used in this dissertation and the research design used will be presented in this section.

Structuring Data Collection

An SLR will be conducted to obtain results according to the research problem and respective research questions defined in the previous section.

Data Collection

The following section explains how the information gathered by the SLR was analyzed and will be used to present the conclusions in the final chapter.

Data analysis

This section presents an exhaustive analysis, examining the existing literature in terms of content, distribution by journal, and by year of publication.

Data interpretation and results

This final section presents the study's findings and theoretical insights, along with responses to the research questions, including limitations and recommendations for future research.

2. Literature Review

2.1. Luxury and Luxury Brands

Luxury encompasses three distinct domains: the definition of luxury, understanding luxury brands or economic sectors, and employing a specialized luxury strategy that distinguishes it from fashion, premium, or mass luxury strategies (Y. Wang, 2022).

The concept of luxury remains elusive with no universally accepted definition. Over the years, various definitions have emerged, describing luxury as encompassing excellence, creativity, exclusivity, and appreciation, while also emphasizing possession and perceived accessibility (Cristini et al., 2017; Ko et al., 2019). Y. Wang (2022) defines luxury as "expensive and exclusive products and brands differentiated by their exquisite design, craftsmanship, sensory appeal, and distinct socio-cultural narratives."

Due to Adam Smith's categorization of products, luxury goods were associated with scarce, exclusive, and expensive, and consequently became symbols of wealth (Y. Wang, 2022). Luxury has key attributes, namely elitism (denoting exclusivity and spending for a restricted number of people); exceptional quality (emphasizing durability and superiority); distinctiveness (linked with prestige and refinement); hedonism/sensory appeal (providing intense aesthetic pleasure); creativity (often infused with unique design elements and craftsmanship); and renown, associated with brands which have a rich history and heritage (Kapferer & Valette-Florence, 2022).

Consequently, luxury products must meet specified requirements: excellent quality to be considered a good long-term investment (Kapferer, 2012; Kapferer & Valette-Florence, 2019); high price, to enhance desirability (Vigneron & Johnson, 2004); rarity, introduced by brand strategies like limited editions or defining specific retail locations to create a sense of privilege (Kapferer, 2012); history and heritage, brands like to produce their products in their origin country due to the quality of the product and the history and culture that are reflected in the brand (Y. Wang, 2022); and aesthetics through an exquisite design and craft, often perceived as art, since they are a result of an elaborate creative process, and therefore are seen as original and authentic (Y. Wang, 2022).

Luxury encompasses high-end products, experiences, and services that are valued above their functional worth, incorporating privilege and exclusivity, and serve as symbols of accomplishment

and success, reflecting the social standing of individuals in society (Kapferer & Valette-Florence, 2022; Y. Wang, 2022).

Bernard Arnault (CEO of LVMH) highlighted a shift in luxury's focus from pure creativity to profitability, quoting the following statement from Cristini et al. (2022), “What interests me in luxury is not creativity but the idea of transforming creativity into profitability”. This shift suggests that modern luxury has evolved to include mass-produced brands aimed at broader consumer segments (Cristini et al., 2017). Although luxury consumption has shifted from being class-exclusive to mass-inclusive, wealth remains a significant factor in determining who can afford it. Individuals engaging with luxury cultivate "luxury skills" which include expertise in design and craftsmanship, refined aesthetic sensibilities, and an awareness of luxury's symbolism. These skills guide distinct consumption choices and experiences, differing from purely wealth-based consumption (Y. Wang, 2022).

According to the Cambridge Dictionary (2023), a luxury brand is "an expensive product or service provided by a particular company that has a reputation for being of high quality”. Luxury brands are recognized for superior quality and non-essential offerings (Tong et al., 2017), typically with premium prices, which makes them inaccessible to the average consumer and fosters a prestigious image in the market. Nevertheless, high prices and superior quality alone do not guarantee a brand's luxury status; the consumer perception is crucial (Ko et al., 2019). Luxury brands often prioritize effective marketing over artisanal craftsmanship; thus, accessibility to luxury has expanded, partly due to liberal democratic systems (Cristini et al., 2017).

The 10 most recognizable luxury brands, as measured by the Vogue Business Index, are Louis Vuitton, Dior, Gucci, Ralph Lauren, Saint Laurent, Hermès, Prada, Chanel, Burberry, and Fendi (Vogue Business, 2025).

2.2 Counterfeit

Counterfeiting is the unauthorized reproduction of legally registered trademarks, creating replicas of genuine brands to deceive consumers (Butt et al., 2023). These counterfeits often imitate the original's design, branding, and packaging to mislead buyers into believing they are purchasing authentic items (Kastowo & Christiani, 2024). The distinction between genuine branding and fake products forms the basis of counterfeiting, which is illegal and deceives consumers (Grossman & Shapiro, 1998b).

The counterfeiting landscape comprises two primary forms: deceptive and non-deceptive. Deceptive counterfeiting misleads consumers into believing they are buying genuine products, often involving items such as medications and car parts (Grossman & Shapiro, 1988a; S. Khan et al., 2020). Non-deceptive counterfeiting involves consumers who knowingly buy fake products, often due to the lower cost (Staake et al., 2009). Counterfeits are commonly referred to as "KW goods" in society, a euphemism for counterfeit items (Kastowo & Christiani, 2024), and are often associated with inferior safety and quality (Butt et al., 2023).

It is also possible to distinguish between four types of counterfeit products according to Berman (2008), low-cost products characterized by poor-quality imitations sold without traditional packaging, typically through unconventional distribution channels, where consumers are fully aware they are counterfeit; genuine products replicated using stolen or copied blueprints through reverse engineering, infringing on the exclusive rights of exclusive importers and additionally consumers are unaware of their counterfeit nature, these are traded on the gray markets due to the price gap between countries and retail networks; counterfeit products manufactured by current or former outsourcing suppliers without the authorization of the brand owner or the knowledge of the customers; and products produced by outsourcing suppliers that failed to meet the manufacturer's standards but were not properly destroyed (Berman, 2008).

The consumption of counterfeit goods often involves the deliberate purchase of fake brands to impress or deceive others. Buyers who cannot afford genuine products are often drawn to counterfeits due to the significant cost savings (S. Khan et al., 2020).

Consumers may also find that improving counterfeit quality reduces the perceived gap between originals and fakes (Marín-Palacios, 2024). Furthermore, counterfeits have seen substantial quality improvements due to the shared production technologies between genuine and fake items in emerging economies, further complicating price justifications for luxury brands (Wilcox et al., 2009; S. Khan et al., 2020).

Counterfeit goods fall under intellectual property violations, including piracy and imitation of branded products, which impact industries such as clothing, pharmaceuticals, and cosmetics (Marín-Palacios et al., 2024; Butt et al., 2023). Global counterfeiting poses a significant threat to international businesses, underscoring the importance of robust intellectual property protection. Reducing global demand for counterfeit products is crucial to minimizing business losses (Eisend et al., 2017). Consequently, intellectual property rights, including trademarks, have become a key

focus of international cooperation, requiring enhanced protective measures to safeguard brand owners from unauthorized imitation and potential harm to their business interests (Kastowo & Christiani, 2024; Butt et al., 2023).

The rise of globalization has complicated SCs, allowing counterfeiters to exploit apparel production across multiple countries (Butt et al., 2023). The expansion of e-commerce has also facilitated counterfeit trade, breaking down geographical barriers and providing counterfeiters access to a global audience (Paschina, 2023). Economic crises can drive consumers towards counterfeit products, as they seek to maintain their social image at a lower cost (S. Khan et al., 2020).

The counterfeit market is a global issue, particularly prevalent in developing countries with weaker legal infrastructures. These regions often show greater social acceptance of counterfeit purchases, partly due to a lack of strict law enforcement (Eisend et al., 2017). This contrasts with developed countries, where intellectual property rights enforcement is more robust, and counterfeit consumption is less socially accepted (Eisend et al., 2017). Moreover, cultural differences between Eastern and Western nations influence the acceptance of counterfeit goods, with lower-income Eastern countries often considering them a cost-effective alternative to luxury brands (Butt et al., 2023).

The consumption of counterfeit products can impact genuine buyers' behavior, leading them to abandon, support, or privately use the original brand, driven by fears of social sanctions (Commuri, 2009). Overall, counterfeiting undermines trust in brands, negatively impacting business revenues, consumer goodwill, and the image of luxury brands (S. Khan et al., 2020).

Anti-counterfeiting technologies rely on four key attributes: difficulty of duplication, ease of identification, visibility without special equipment, and complexity of reuse. Digital tools, such as RFID and barcodes, are widely used for tracking and tracing products. However, they are not foolproof against counterfeiting if copied or damaged (Boissieu et al., 2021). To combat counterfeiting, companies are adopting technologies such as QR codes, NFC tags, and blockchain-based systems for product authentication. Blockchain’s features of data integrity, traceability, and immutability make it a strong solution for counterfeit detection across industries (Mohite & Kale, 2023; Butt et al., 2023). Sensitizing consumers on how to identify counterfeit products and communicating anti-counterfeiting strategies are also crucial for building brand trust and loyalty (Paschina, 2023).

2.3. Blockchain Technology

BCT, introduced in 2008, emerged as a disruptive technology with applications across various sectors (Jevtic et al., 2023). According to Nakamoto (2008), blockchain operates as a distributed network of cryptographic blocks, forming a decentralized and secure system by validating only legitimate transactions. Its decentralized data storage relies on peer-to-peer interactions, making individual blocks difficult to alter and significantly enhancing security.

Dac et al. (2023) describe blockchain as a distributed network of nodes with specialized storage, communication, and consensus mechanisms that maintain synchronized ledger copies. All nodes are pre-authenticated and identify other nodes within the same network or consortium. Blockchain enables all parties to access a product's entire history and current location, promoting transparency and ensuring the authenticity and traceability of items (Dac et al., 2023). Due to its immutable record-keeping system, it can be adapted for various industries. Each block consists of multiple transactions, permanently updated across all participant records and cryptographically linked (Jevtic et al., 2023).

Cryptography, a cornerstone of blockchain, ensures trust and eliminates the need for intermediaries. Users generate private keys for signing data and public keys for verifying authenticity and enhancing data integrity. Once validated, transactions are sealed into blocks linked by hash values, forming the blockchain. Altering any block changes its hash, disrupting subsequent blocks and ensuring the incorruptibility of the blockchain. The first block, known as the Genesis Block, serves as the foundation of the ledger. Each new transaction requires validation by all nodes, facilitating tamper detection and rejection (Mohite & Kale, 2023).

A key feature of this technology is the use of Smart Contracts, which are programs stored on the blockchain that execute transactions automatically when predefined conditions are met. Through them, the intermediaries are removed, which reduces delays and streamlines processes. To update the database, a new transaction must be created and validated by all participants (Musale et al., 2023).

In addition to the features already mentioned, BCT is also characterized by the distributed ledger technology, where all participants share access to an immutable transaction record, and the inability to alter or delete transactions once recorded, which is why errors are rectified through new transactions, maintaining transparency (Musale et al., 2023). According to Prasad et al. (2023),

blockchain transactions are immutable, chronologically updated, globally distributed, and publicly accessible. The data is cryptographically sealed, enabling ownership tracking and product history verification, reducing risks, delays, human error and costs for all involved because the transactions are recorded in separate blocks, reducing tampering and enhancing information exchange verification, blockchain is an invaluable tool for secure and reliable transactions enhancing transparency, scalability, and security (Prasad et al., 2023; Boissieu et al., 2021). These factors revolutionize SCs by reducing counterfeit losses, administrative expenses, and inefficiencies (Mohite & Kale, 2023).

Blockchain networks are commonly classified as public or private (Dac et al., 2023; Mohite & Kale, 2023). Public networks are open, decentralized, and transparent, allowing anyone to join and transact. Private networks are partially decentralized, restricted to authorized users, and managed by a central authority, making them ideal for enterprises. Mohite & Kale (2023) also consider two additional types of blockchain: consortium blockchains, which strike a balance between efficiency and privacy, and hybrid blockchains, which combine features of public and private systems. Boissieu et al. (2021) also categorize blockchains into public, private, and consortium types, each tailored for specific applications like cryptocurrencies or private transactions.

Prasad et al. (2023) propose a decentralized SC model called the block-supply chain, which uses blockchain and NFC technologies to detect counterfeiting. Ethereum blockchain enables peer-to-peer networks and employs miners to validate and chronologically order transactions, ensuring integrity through its hash-linked structure (Ciatto et al., 2018). This system has been leveraged for counterfeit detection and authentication of luxury goods, as it links products to owner accounts, enabling proof of purchase and authenticity verification during resale (Jevtic et al., 2023).

Blockchain's development has evolved through four stages. Blockchain 1.0 focused on cryptocurrency and digital payments; blockchain 2.0 introduced privacy, smart contracts, and tokens, such as those used by Ethereum; blockchain 3.0 emphasizes decentralized applications, storage, and computing, and finally, blockchain 4.0 integrated artificial intelligence, offering solutions to mitigate fraud, improve efficiency, and reduce transaction costs (Boissieu et al., 2021).

In conclusion, BCT adheres to the principles of decentralization, transparency, traceability, data encryption, validity, anonymity, persistence, trustworthiness, and credibility (Boissieu et al., 2021), which collectively enhance its capacity to transform industries.

2.4. Supply Chain and Supply Chain Management

SCs play a vital role in assisting the entire lifecycle of extended manufacturing firms by enabling the tracking and tracing of items throughout supply networks. Tracking systems are essential for identifying the last known location of shipments, as without them, it becomes nearly impossible to locate delivered items, which are often considered lost or stolen (Helo & Shamsuzzoha, 2020; Mukhamedjanova, 2020). The SC can be defined as a network of three or more organizations/individuals, referred to as SC nodes, connected upstream and downstream in the flow paths of products, inventory, and information to and from customers, enabling them to meet their needs effectively (Mukhamedjanova, 2020). SCs encompass companies, individuals, and activities engaged in the production process, from the procurement of raw materials to the delivery of finished goods to end consumers, to help businesses stay competitive, reduce costs, and achieve a potential advantage over competitors. The primary function of an SC is to add value to raw materials by transforming and transporting them across different stages until they become finished products (Brugger, 2020).

The concept of SCM first appeared in literature in the mid-1980s, evolving from theories of inter-organizational operations management, system integration, and information sharing. Its development was driven by the growing importance of the customer, market globalization, and the informatization of society (Mukhamedjanova, 2020; Frazzon et al., 2019). SCM has numerous definitions, as there is no universal consensus on its scope. Some view SCM as a philosophy involving a systems approach to managing the entire SC as one cohesive entity, emphasizing the synchronization of internal operations and strategic capabilities to enhance customer satisfaction and value. It is centered on coordination, collaboration, and relationships between SC members, and operates across three dimensions: activity/process management, inter-functional coordination, and inter-organizational collaboration (Mukhamedjanova, 2020; Frazzon et al., 2019). The SCM process must be seen as a unified system encompassing all necessary activities to create, source, produce, and deliver goods. For competitiveness, all participants must work together, leveraging technology to gather market demand data and exchange information effectively. According to the Council of Supply Chain Management Professionals (CSCMP, 2017), SCM includes the management of supply, acquisition, logistics, and coordination with suppliers, intermediaries, third-party providers, and customers (Frazzon et al., 2019), that is, it consists of 5 steps starting with Planning (Developing strategies for sourcing, production, and delivery), Sourcing (Acquiring

raw materials and identifying optimal suppliers), Production (Creating, testing, packaging, and preparing products for delivery), Sales and Delivery (Distributing products to customers) and Returns (Managing inventory, handling product returns, and providing customer service)(Brugger, 2020).

The foundation of SCM architecture lies in ERP (Enterprise Resource Planning), WMS (Warehouse Management Systems), and TMS (Transportation Management Systems), with EDI (Electronic Data Interchange) enabling communication within the chain. Key innovations that improve communication and efficiency include barcodes for inventory tracking, EDI for faster and more accurate information flow, and systems such as ERP for data integration, WMS for optimizing warehouse utilization, and TMS for routing solutions linked to ERP and WMS (Frazzon et al., 2019). SCM helps businesses increase revenue, reduce costs, and gain market share, with the primary objectives being value creation, improved efficiency, and overall SC performance (Brugger, 2020). By focusing on efficient planning, coordination, and execution, SCM ensures that SC operates economically and effectively, ultimately meeting customer needs.

Recent studies suggest applying Industry 4.0 principles to global SC to enhance four key attributes: Connectivity, Visualization, Optimization, and Autonomy. Connectivity integrates production and SC networks, while visualization provides an overview of performance and status. Optimization enhances overall SC performance, and autonomy enables operations to self-manage, resulting in an adaptive and intelligent SC, which is particularly beneficial in competitive markets (Frazzon et al., 2019). Thus, the concept of Supply Chain 4.0 emerged and seems to offer competitive advantages by improving product availability, reducing costs, increasing market share, and, through interoperability, a critical factor for the success of this new method since it ensures that different systems can communicate and share functionalities (Frederico et al., 2019). According to Queiroz et al. (2021), Supply Chain 4.0 is "an integrated business system" that leverages novel technologies like the Internet of Things (IoT), innovative products, machines, and infrastructure, through which it enables real-time communication and intelligent processes across all SC stages.

At its core, Supply Chain Management 4.0 focuses on end-to-end integration and synchronization of the value chain across companies. Using advanced technologies, such as IoT, it creates an interconnected, transparent system capable of managing flows, optimizing itself, and

adapting autonomously. This results in a dynamic, intelligent, and customer-focused network (Frazzon et al., 2019).

2.5. SCM and BCT

BCT can improve SCM by addressing challenges related to procurement, transportation, tracking, customs, and trade finance. It facilitates product tracking through parcel codes, QR codes, and serial numbers, ensuring that every transaction is recorded. However, companies often lack detailed product information, and blockchain's distributed storage is not well-suited for handling large data volumes (Kawaguchi, 2019).

Blockchain enhances SC by reducing costs, optimizing operations, and improving security. It enables product authentication at every stage without relying solely on sellers, utilizing One True Pairing (OTP) verification for SC members and products. Blockchain helps minimize delays, costs, and human errors while increasing transparency, scalability, and cybersecurity. Its key features, such as decentralization, traceability, and immutability, help reduce counterfeiting, administrative costs, and paperwork, making transactions secure and efficient (Mohite & Kale, 2023).

Fragmented information limits SC transparency, leading to discrepancies. Distributed Ledger Technologies (DLT) provide solutions across various sectors, including Smart Agriculture, Healthcare, and Transportation. Smart contracts, which are self-executing codes with predefined conditions, ensure secure and transparent execution on the blockchain. RFID technology automates inventory management by utilizing electromagnetic fields to track objects without requiring a line of sight, reducing manual intervention (Bapatla et al., 2024).

BCT is highly suitable for SCM and can help achieve key objectives such as cost reduction, speed, reliability, risk mitigation, sustainability, and flexibility. Its applications include automating paperwork through smart contracts, counterfeit detection, origin tracking, and IoT integration. Blockchain ensures transparency by tracking key product attributes, including nature, quality, quantity, location, and ownership (Tezel et al., 2020).

The technology is poised to disrupt SCM by introducing new business models and roles, including registrars, certifiers, and standard organizations, to maintain trust. However, challenges include regulatory complexities, integration difficulties, and limitations in preventing real-world fraud (Tezel et al., 2020).

Blockchain can also support digital transformation in industries like construction by integrating with technologies such as BIM, IoT, and smart contracts. It enhances procurement processes through automation, transparency, and security while reducing the need for intermediaries. Despite its advantages, barriers include a lack of standardization and a shortage of skilled IT personnel. Overall, blockchain promotes transparency, security, and efficiency while enabling a peer-to-peer economy and fostering innovation across industries (Tezel et al., 2020).

BCT enhances information sharing and transaction security, thereby reducing the time and cost associated with tracking cross-border shipments. In SCs, it improves cost efficiency, quality, speed, reliability, risk management, sustainability, and flexibility. A key feature, smart contracts, automate processes by executing predefined conditions without human intervention, streamlining tasks such as notifications and payments (Qian & Papadonikolaki, 2020).

Blockchain improves product tracking and tracing by addressing security, standardization, and interoperability challenges in systems like RFID, Global Positioning System (GPS), and IoT. It enables goods management without intermediaries by using a unified, tamper-proof ledger for visibility across the SC. Smart contracts automate processes and enhance IoT security by verifying actions based on sensor data (Varriale et al., 2021).

In transportation and logistics, blockchain and smart contracts streamline payments and ensure quality control. BCT enables real-time information and accurate forecasting, reducing delays and stock shortages. It simplifies order processing, increases operational efficiency, and minimizes time lost due to human error or bureaucracy. Blockchain optimizes business processes, reduces costs, enhances transparency, and improves resource allocation, making SCs more efficient and responsive (Varriale et al., 2021).

Blockchain-based supply chains offer four key advantages: traceability, reliability with security, synchronized transaction processes, and cost efficiency. Blockchain enables real-time tracking of goods, enhances transparency, and helps prevent counterfeit products through decentralized record-keeping. Smart contracts automate document management, reducing unnecessary paperwork and improving inventory control while lowering costs. The use of distributed ledger technology provides a transparent, reliable, and efficient system for recording transactions across the SC, ultimately enhancing overall SCM (Park & Li, 2021).

3. Methodology

For the research to produce results that others can verify, it is essential to conduct a critical analysis of the existing literature to identify gaps that require further study. For this reason, the methodology adopted in this dissertation is the Systematic Literature Review (SLR). This research methodology has a qualitative character, as it involves collecting, identifying, and critically analyzing existing literature through a structured approach that follows a sequence of steps to organize the review methodically. This approach yields valuable results by providing a summary of the existing evidence on a particular theme (Carrera-Rivera et al., 2022).

The first phase of the process is the definition of the theme/idea to be studied, followed by Planning (second phase), in which the activities to be developed are outlined, including the creation of the research questions, the selection of the databases to be used, the definition of inclusion and exclusion criteria, determining whether an article falls within the scope of the study, and defining the extraction method. Once these activities have been established, the third phase begins, Conducting the review, where the keywords to be used in the search are defined, articles are collected, an initial analysis is carried out to eliminate duplicates, and articles are reassessed to determine, according to the previously described criteria, whether they should be included or excluded from the scope of the study.

The articles selected after the screening phase will then be analyzed to conclude, first regarding the leading authors, journals, countries, and number of publications per year, and later to answer the research questions previously defined (Carrera-Rivera et al., 2022).

3.1. Planning the review

In recent years, the counterfeiting of luxury items has increased, with the primary drawback being the erosion of consumer confidence in luxury brands, which consequently damages their reputation. This concern gave rise to the subject of the present dissertation. Accordingly, the primary focus of this work is to examine the existing literature on the application of BCT in the luxury industry to combat counterfeiting, in conjunction with the research questions outlined in Chapter 1.3.

Given the diversity and scientific quality of the available studies, the databases selected to conduct this investigation were Scopus and Web of Science, thereby ensuring methodological rigor. To ensure efficiency and alignment with the subject under study, the following selection criteria were applied:

1. studies published in peer-reviewed scientific journals,
2. studies published from 2015 onward (inclusive), and
3. Studies classified under the subject areas of Business, Management, and Accounting, as well as Social Sciences, in Scopus, and under Business Economics and Social Sciences in Web of Science.

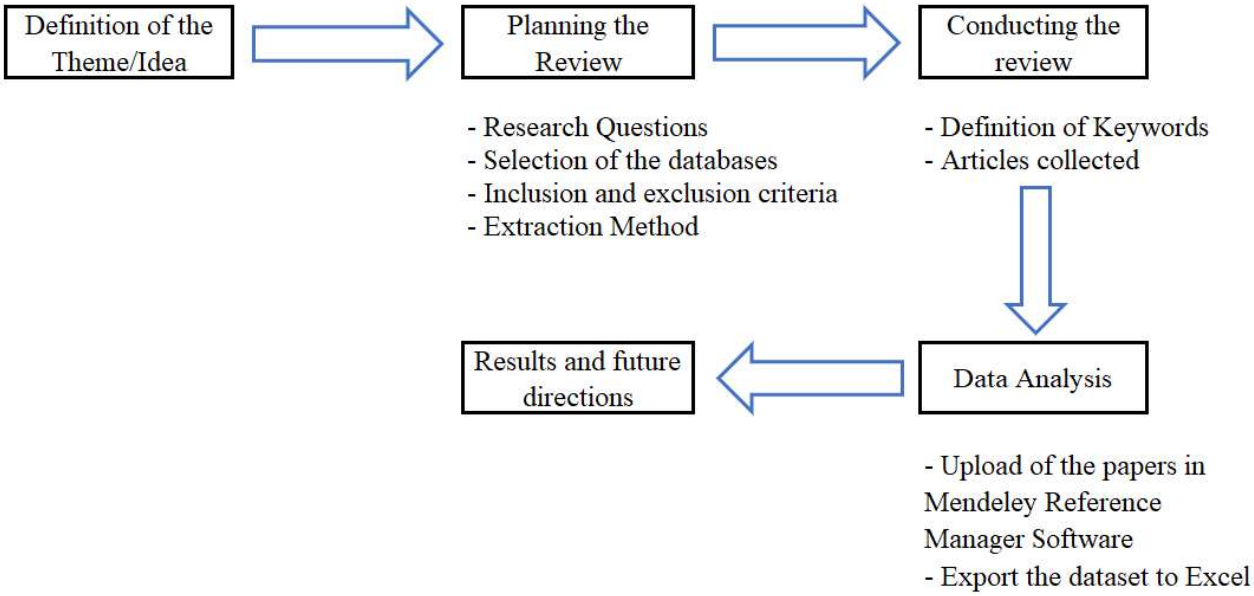


Figure 1: SLR steps. Note: Own elaboration

3.2. Conducting the review

After setting the inclusion and exclusion criteria, the keywords employed in the database searches were: *BCT and Luxury Industry*, *Counterfeit in Luxury Industry*, *BCT Combat Counterfeit*, and *BCT in Luxury Industry SC.*

The initial search yielded a total of 420 articles. During the first screening stage, 152 duplicates were removed. Subsequently, the abstracts and introductions of the remaining 268 articles were reviewed to assess their relevance to the study's scope. As a result of this screening process, 174 articles were excluded, leaving a final sample of 94 articles (see Fig.2 and Appendix 1) for in-depth analysis.

A structured template was used to extract relevant information from each article, including the bibliographic reference, study objective, methodology applied, primary findings, and suggestions for future research (see Appendix 1). All articles were subsequently uploaded into the Mendeley

Reference Manager Software, which facilitated the generation of a consolidated file containing the bibliographic references of the entire dataset.

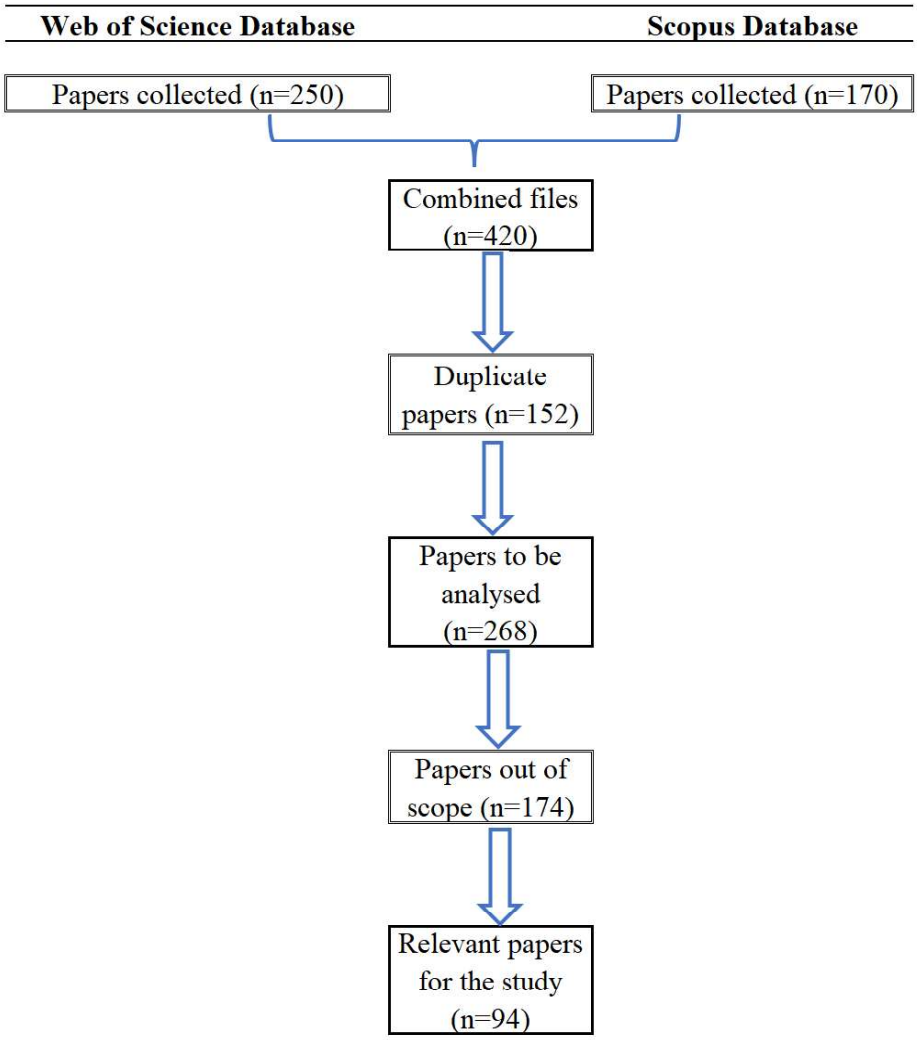


Figure 2: Steps for selecting articles for SLR. Note: Own elaboration

3.3. Data Analysis

The dataset exported from the Mendeley Reference Manager software provided the information required for the analytical assessments conducted in Excel.

The results indicate that 59% of the analyzed articles were published between 2023 and 2025 (Fig. 3). Furthermore, a notable upward trend in the number of publications is observed from 2020 onwards, reflecting the increasing scholarly interest and growing relevance of BCT applications.

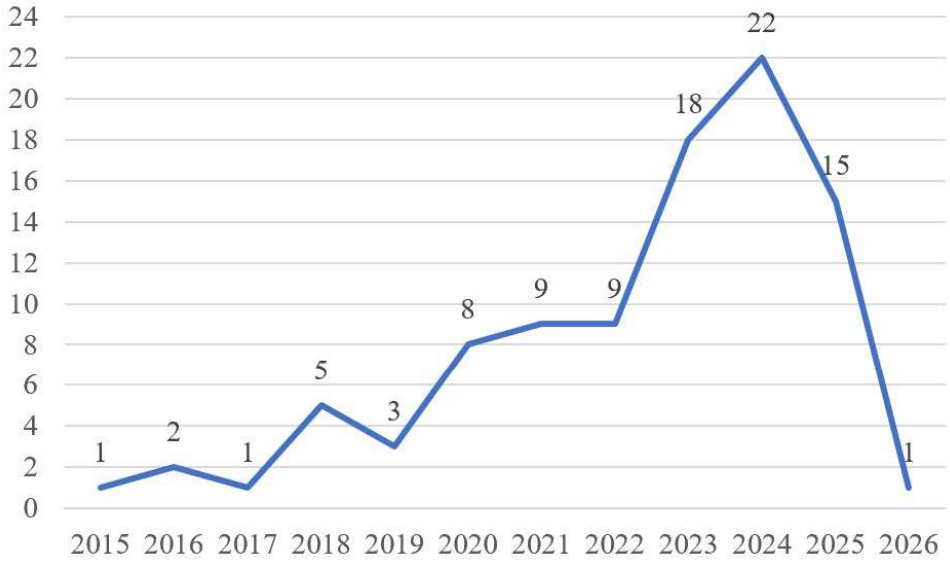


Figure 3: Number of articles published per year. Note: Own elaboration

The selected studies were published in 49 different journals, with the nine most frequently represented journals accounting for 55% of the total number of studies. (Fig. 4).

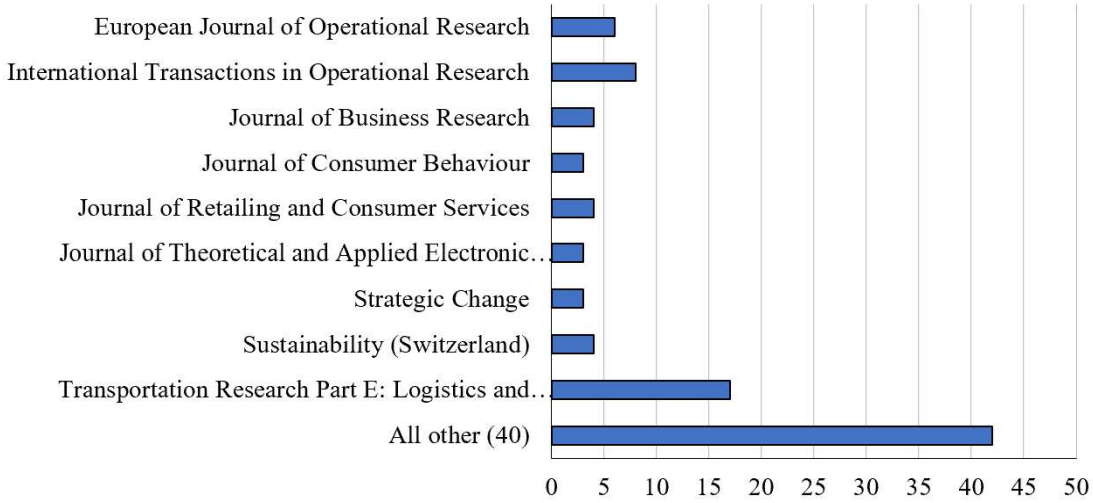


Figure 4: Number of articles published per journal. Note: Own elaboration

4. Results and Discussion

4.1. Summarization of the Extracted Data

An analysis of the selected articles highlights the relevance of BCT through the development of several frameworks that demonstrate its positive impact in combating counterfeiting in the luxury market. BCT fosters transparency, cooperation, and trust across the SC, enabling product traceability through tamper-proof records and thereby mitigating the risk of counterfeiting. Furthermore, it reduces manual intervention, ensures real-time updates, verifies the authenticity of transactions, and minimizes errors through the use of smart contracts.

The integration of blockchain with other technological innovations—such as QR codes, the IoT, RFID, and NFTs—further strengthens consumer confidence in both products and brands, as it securely links the physical object to blockchain entries, ensuring reliable product identification.

Despite these advantages, several authors underscore the challenges associated with BCT adoption, including high implementation costs, the shortage of skilled personnel with technological expertise, limited stakeholder receptiveness (retailers, manufacturers, and consumers), and the absence of comprehensive government regulation. Nevertheless, risk-averse manufacturers appear more inclined to adopt blockchain as a means of reducing uncertainty within the SC.

Figure 5 illustrates the various features of BCT and their role in addressing counterfeiting, along with the associated barriers.

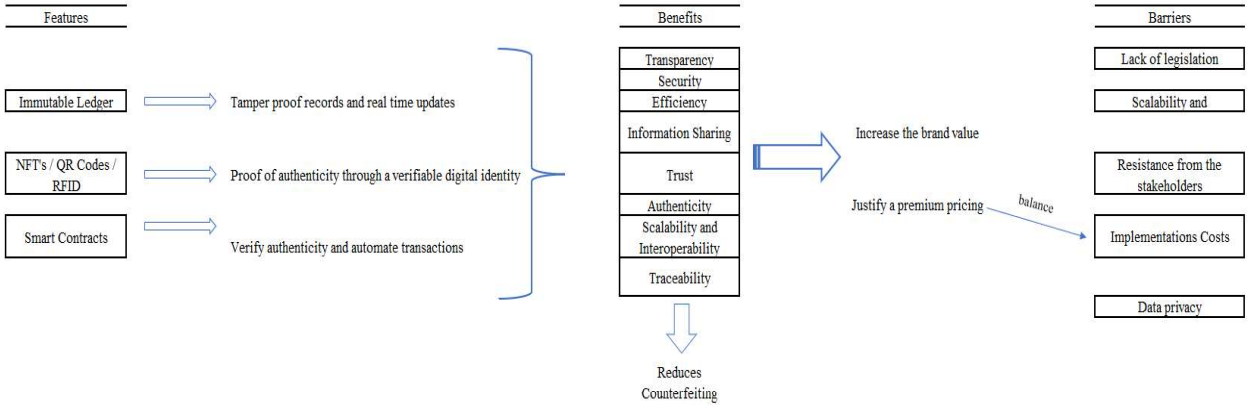


Figure 5: Features, Benefits and Barriers of BCT. Note: Own elaboration

This is further complemented by Table 1, which summarizes how BCT features address core issues in the luxury industry by linking them to the advantages they enable, and by Table 2, which enumerates the barriers to adopting BCT.

Luxury Industry Issue	Blockchain Feature	Benefit	References
Product history / Real-time monitoring	Immutable Ledger	Traceability, Security and Authenticity since it's recorded the full lifecycle of a product	(Alexander & Bellandi, 2022), (Awasthy et al., 2025), (Berneis & Winkler, 2021), (Chang et al, 2023), (C. L. Chen et al., 2022), (T. Chen et al., 2024), (Davies et al., 2024), (Egwuonwu et al., 2022), (Fang et al., 2024), (Guan et al., 2024), (Guo, 2025), (He et al., 2023), (P. Hou et al., 2024), (R. Hou et al., 2025), (Iyengar et al., 2020), (Iyengar et al., 2024), (Jang & Kang, 2025), (J. Jiang & Chen, 2021), (L. Jiang & Shan, 2018), (Kang et al., 2024), (H. M. Kim & Laskowski, 2018), (Klöckner et al., 2023), (G. Li et al., 2023), (H. Li et al., 2025), (Z. Li et al., 2021), (X. Lin et al., 2025), (X. Liu et al., 2024), (X. Liu et al., 2024), (Ma et al., 2024), (Meidute-Kavaliauskiene et al., 2021), (Mhatre et al., 2023), (Morkunas et al., 2019), (Naoum-Sawaya et al., 2023), (Pun et al., 2025), (Pun et al., 2021), (Quttainah & Singh, 2024), (Shen et al., 2020), (Shih et al., 2021), (Swazan & Youn, 2025), (Valami & Ahmadifar, 2025), (Wilke & Zaichkowsky, 1999), (Xiao et al., 2024), (X. Xu et al., 2023), (Yadav & Singh, 2021), (Youn et al., 2025), (Yu et al., 2025), (H. Zhang et al., 2024), (J. Zhang & R. Q. Zhang, 2015), (Q. Zhang et al., 2023), (T. Zhang et al., 2023), (X. Zhang et al., 2023), (Zhou et al., 2022).
Information Assymetry	Immutable Ledger	Information Sharing and Efficiency since all participants have access to the blockchain	
Product Authenticity and Ownership	NFT's / QR Codes / RFID	Authenticity due to a unique digital identity	(Alexander & Bellandi, 2022), (C. L. Chen et al., 2022), (Cho & Cho, 2025), (Davies et al., 2024), (Jang & Kang, 2025), (Joy et al., 2022), (J. Kim et al., 2025), (S. E. Kim et al., 2024), (Klöckner et al., 2023), (Lee et al., 2024), (G.. Li et al., 2023), (Z. Liu & Z. Li, 2020), (Mhatre et al., 2023), (Morkunas et al., 2019), (Pun et al., 2025), (Pun et al., 2021), (Sung et al., 2023), (Valami & Ahmadifar, 2025).
Consumer trust and brand value	Immutable Ledger / Smart Contracts	Transparency since the authenticity of each transaction is verified	(Alexander & Bellandi, 2022), (Awasthy et al., 2025), (Chang et al., 2023), (C. L. Chen et al., 2022), (T. Chen et al., 2024), (Cho & Cho, 2025), (Cui et al., 2020), (Davies et al., 2024), (Egwuonwu et al., 2022), (Fang et al., 2024), (Guan et al., 2024), (Guo, 2025), (He et al., 2023), (P. Hou et al., 2024), (R. Hou et al., 2025), (Y. Huang et al., 2026), (Iyengar et al., 2024), (Jang & Kang, 2025), (J. Jiang & J. Chen, 2021), (Kang et al., 2024), (H. M. Kim & Laskowski, 2018), (J. Kim et al., 2025), (Klöckner et al., 2023), (G. Li et al., 2023), (H. Li et al., 2025), (J. Li et al., 2024), (S. S. Liu et al., 2025), (X. Liu et al., 2024), (X. Liu et al. 2024), (Z. Liu & Z. Li, 2020), (Meidute-Kavaliauskiene et al., 2021), (Mhatre et al., 2023), (Morkunas et al., 2019), (Pun et al., 2025), (Pun et al., 2021), (Quttainah & Singh, 2024), (Shen et al., 2020), (Shih et al., 2021), (Swazan & Youn, 2025), (Valami & Ahmadifar, 2025), (J. Wang et al., 2024), (Wilke & Zaichkowsky, 1999), (Xiao et al., 2024), (X. Xu et al., 2023), (Yadav & Singh, 2021), (Yang et al., 2022), (Youn et al., 2025), (H. Zhang et al., 2024), (J. Zhang & R. Q. Zhang, 2015), (T. Zhang et al., 2023), (X. Zhang et al., 2023), (Q. Zhang et al., 2023), (Zhou et al., 2022).
Integration and Collaboration among Stakeholders	Immutable Ledger / Smart Contracts	Scalability and Interoperability	
Number of intermediaries	Smart Contracts	Transaprency due to the automation of transactions	

Table 1: Blockchain features and respective benefits in addressing the luxury industry issues. Note: Own elaboration

Barrier	Description	References
Implementation Costs	High initial adoption cost and need for universal participation	(Berneis & Winkler, 2021), (Chang et al., 2023), (C. L. Chen et al., 2022), (T. Chen et al., 2024), (Egwuonwu et al., 2022), (P. Hou et al., 2024), (Y. Huang et al., 2026), (Iyengar et al., 2024), (Joy et al., 2022), (Klöckner et al., 2023), (G. Li et al., 2023), (J. Li et al., 2024), (Ma et al., 2024), (Naoum-Sawaya et al., 2023), (Pun et al., 2025), (Pun et al., 2021), (Wilke & Zaichkowsky, 1999), (H. Zhang et al., 2024), (J. Zhang & R. Q. Zhang, 2015), (Y. Zhou et al., 2022).
Lack of Legislation	Missing standardized protocols and legal frameworks	(Berneis & Winkler, 2021), (Cui et al., 2020), (Egwuonwu et al., 2022), (C. He et al., 2023), (Jang & Kang, 2025), (Z. Liu & Z. Li, 2020), (Meidute-Kavaliauskiene et al., 2021), (Quttainah & Singh, 2024), (Xiao et al., 2024).
Data Privacy	Sharing sensitive information	(R. Hou et al., 2025), (Meidute-Kavaliauskiene et al., 2021), (Pun et al., 2025), (H. Zhang et al., 2024).
Resistance from the stakeholders	Retailer and manufacturer knowledge about BCT and consumer awareness and willingness to use verification tools	(Berneis & Winkler, 2021), (C. L. Chen et al., 2022), (Iyengar et al., 2024), (Jang & Kang, 2025), (S. E. Kim et al., 2024), (Klöckner et al., 2023), (J. Li et al., 2024), (Naoum-Sawaya et al., 2023), (Pun et al., 2021), (Quttainah & Singh, 2024), (Xiao et al., 2024).
Interoperability	Need for coordination and standardization between stakeholders	(Iyengar et al., 2020), (H. M. Kim & Laskowski, 2018), (Z. Liu & Z. Li, 2020), (Ma et al., 2024), (Meidute-Kavaliauskiene et al., 2021), (Naoum-Sawaya et al., 2023), (Pun et al., 2025), (Pun et al., 2021), (Valami & Ahmadifar, 2025), (X. Zhang et al., 2023).
Scalability	Integration of a growing numbers of users, transactions, and transport infrastructures	(Berneis & Winkler, 2021), (S. S. Liu et al., 2025), (Z. Liu & Z. Li, 2020), (Meidute-Kavaliauskiene et al., 2021), (X. Xu et al., 2023).

Table 2: Barriers to the adoption of BCT in the luxury industry. Note: Own elaboration

The literature review indicates that the introduction of BCT into the SC of the luxury market facilitates both scalability and interoperability. Nonetheless, these two benefits may also be regarded as barriers to the adoption of this technology within SCM.

The application of BCT enables the integration of multiple users, transactions, and transport infrastructures within the SC, thereby enhancing scalability. However, this scalability may pose

challenges, as the expansion of the chain can lead to slower transaction processing and increased operational costs associated with BCT.

Furthermore, the use of smart contracts guarantees that all users have direct access to information, eliminating the need for intermediaries and promoting interoperability. Nevertheless, this also requires users to standardize their platforms to mitigate risks related to potential data manipulation or inconsistency.

4.2. Results of the Research Questions

4.2.1. RQ1: How can BCT be applied in Supply Chain Management (SCM) to guarantee authenticity and combat counterfeiting in the Luxury Industry?

Luxury firms must balance exclusivity, efficiency, sustainability, and digital innovation, as they face complexity, counterfeiting, and digital disruption, which demand flexible and innovative strategies (Shen et al., 2020). The introduction of BCT into SCs in the luxury industry should consider brand positioning, country of origin, target markets, product segments, and consumer needs, to improve service levels between demand and supply, reduce costs through scale, and eliminate intermediaries (Brun et al., 2017).

Consumer campaigns against counterfeiting are also essential and should take cultural factors into account (Ryu et al., 2023; Zameer et al., 2018). Marketing strategies must adapt to both conspicuous and inconspicuous consumers, leveraging digital tools such as blockchain and NFTs to enhance trust, authenticity, and personalization (Pangarkar & Shukla, 2023). The transparency and security provided by blockchain increase trust in the SC; however, for manufacturers and retailers to adopt this technology, platforms must be reliable and user-friendly (Jain et al., 2022).

Valami & Ahmadifar (2025) propose a low-cost blockchain-based model to detect counterfeit containers in transport systems, as existing solutions are expensive and centralized, leaving them vulnerable. Within this framework, each container is equipped with an RFID tag that stores all necessary information, enabling real-time tracking. Smart contracts automatically validate the RFID tag, while only authorized stakeholders can access the data, ensuring authenticity and security. Since blockchain improves product traceability and authenticity, it consequently increases SC transparency. Effective coordination between manufacturers and retailers is crucial, while

consumer trust and a willingness to pay more for verified products further enhance the value of blockchain (T. Zhang et al., 2023).

Blockchain transparency reduces uncertainty and increases trust, thereby strengthening purchase intention, including in second-hand luxury markets. Price-conscious consumers, being more risk-averse, are particularly influenced by transparency, making blockchain adoption in the resale market especially effective (Youn et al., 2025). Similarly, Lee & Yeon (2021) introduce a blockchain-based traceability system to authenticate products, track their movement, and prevent counterfeit infiltration in cross-border e-commerce. By recording tamper-proof data across stakeholders, buyers and sellers can verify authenticity. This system enhances trust, transparency, and efficiency in international e-commerce while reducing fraud. However, challenges include high implementation costs, scalability issues, regulatory concerns, and stakeholder resistance.

NFTs are playing an increasingly significant role in the luxury sector. J. Kim et al. (2025) find that a strong, premium visual presentation of NFTs enhances the perception of authenticity and consumer trust, leading to greater engagement and a willingness to pay. Luxury brands must strike a balance between heritage and innovation, ensuring that digital strategies, such as the metaverse, digital fashion, and NFTs, align with authenticity and consumer trust. While these strategies provide growth opportunities, they face hurdles such as blockchain's high energy costs and regulatory uncertainty (Joy et al., 2022).

Ownership of NFTs enhances brand trust, perceived exclusivity, and authenticity, driving purchase intention and resilience to negative information. NFTs serve as digital extensions of luxury identity, reinforcing symbolic and emotional value (Cho & Cho, 2025). Bundling NFTs with physical products enhances perceived value, exclusivity, and innovation, particularly among younger consumers, who view NFTs as indicators of scarcity and uniqueness. This makes them powerful marketing tools to strengthen brand equity and consumer excitement (S. E. Kim et al., 2024). NFTs provide digital scarcity, authenticity, and ownership, extending luxury beyond physical goods and enabling new revenue streams. They also foster exclusivity, personalization, and community engagement, while linking physical and digital assets for traceability and anti-counterfeiting (Alexander & Bellandi, 2022).

Blockchain-certified NFTs enhance authenticity and exclusivity by securely tying digital assets to physical products. They serve as status symbols, engagement tools, and future-proof marketing devices that bridge physical and digital value (Sung et al., 2023). NFTs also create unique digital

identities for products, enabling traceability and lifecycle tracking across supply chains (Davies et al., 2024). Virtual NFT wearables serve as digital status symbols in gaming, the metaverse, and social media, allowing luxury brands to connect with Gen Z and Millennials by offering exclusive and scarce digital items (Lee et al., 2024).

For physical luxury goods, blockchain ensures traceability and authenticity only when securely tied to physical products. Digital twins (e.g., QR codes, NFC chips, certificates) link physical assets to blockchain entries, combating counterfeits and reinforcing trust in the watch industry, where this technology is already in use. However, challenges include costs, technical integration, consumer adoption, and risks of tampering with identifiers (Klöckner et al., 2023).

Returns represent another area of complexity, fraud risk, and loss of trust. X. Liu et al. (2024) demonstrate that blockchain can enhance transparency in returns by immutably recording transactions, verifying authenticity, ownership, and condition, thereby improving accountability and customer satisfaction. This transform returns into value-adding processes and prevents fraudulent practices. Similarly, Shih et al. (2021) highlight that smart contracts can record product lifecycle data, ensuring authenticity and condition verification during returns, thereby reducing costs and protecting brand reputation.

Blockchain adoption by manufacturers enhances authenticity verification and reduces counterfeit sales, especially on online channels. Coordinated adoption increases retailer credibility and consumer trust, ultimately improving profitability (X. Lin et al., 2025). Hybrid approaches, combining blockchain with physical identifiers, are the most effective for luxury e-commerce, particularly for high-value or high-risk categories. Success depends on the selective implementation, effective consumer education, and strategic brand collaboration (G. Li et al., 2023).

Finally, Quttainah & Singh (2024) identify key enablers for blockchain adoption in luxury SCs: traceability and transparency (to strengthen authenticity and reduce counterfeiting), collaboration among stakeholders (shared adoption is essential), technological knowledge (infrastructure, standards, integration), regulatory support (for compliance and legitimacy), and consumer demand for authenticity (driving brand incentives). Blockchain adoption is most effective when technical, regulatory, collaborative, and consumer factors align.

4.2.2. RQ2: What are the challenges and opportunities in implementing BCT in the Luxury Industry?

Blockchain significantly enhances SC traceability, transparency, and authenticity. It provides real-time tracking of product origin, safety, and quality, improving responsiveness to disruptions such as contamination or recalls. It also fosters trust and data sharing among stakeholders, making SCs safer, more transparent, and responsive, particularly in industries where collaboration and cost-sharing are critical (Ma et al., 2024).

BCT reduces counterfeit risks by creating immutable and transparent records, which mitigate information asymmetry and deception. This enhances consumer trust and strengthens the brand's reputation, especially in markets dominated by counterfeit products (L. Wang et al., 2024; Guan et al., 2024). Blockchain is particularly valuable in secondhand and resale markets, where it addresses transparency gaps and fraud risks, increasing consumer confidence (Shen et al., 2020).

Immutable ledgers, digital certificates, and smart contracts further strengthen authenticity by recording the full product lifecycle and automating ownership transfers (Pun et al., 2025). Smart contracts also streamline SC processes, reduce fraud, and boost resilience by automating transactions without intermediaries (Guo, 2025).

Blockchain adoption reshapes consumer trust and purchasing behavior. It allows retailers to charge premium prices, as authenticity and transparency increase consumer confidence (Z. Zhang et al., 2022; Awasthy et al., 2025). Moreover, blockchain reduces post-purchase regret associated with counterfeits, highlighting the importance of psychological factors in pricing under blockchain-enabled markets (T. Yu et al., 2024).

Consumer willingness to pay for transparency is a crucial driver of adoption. When buyers accept premium prices in exchange for verified authenticity, manufacturers and retailers can coordinate cost-sharing to maximize benefits (Iyengar et al., 2023). However, privacy risks may deter engagement, since handling consumer data on blockchain can raise concerns that reduce willingness to participate (Jain et al., 2022; R. Hou et al., 2025).

Blockchain not only combats counterfeits but also influences SC channel dynamics. By increasing trust in online sales, blockchain strengthens direct and e-commerce channels while putting pressure on traditional retailers (H. Li et al., 2025; Kang et al., 2024). Adoption in multichannel supply chains is especially effective when firms pursue online expansion, as blockchain increases the credibility of digital channels (T. Zhang et al., 2023). Choosing the right

channel is important: direct blockchain-enabled e-commerce maximizes traceability and consumer trust, whereas retail channels face greater integration challenges due to the presence of multiple intermediaries (Z. Li et al., 2021; P. Hou et al., 2024). Furthermore, adoption may shift the balance of power among channels. Manufacturers may benefit more from blockchain-enabled direct channels, potentially at the expense of retailer profits. Excessive transparency, however, may reduce retailer flexibility and intensify competition (T. Zhang et al., 2023).

Blockchain also reshapes competitive dynamics through traceability strategies. Firms may adopt either partial or full traceability, with the latter offering stronger consumer trust but at a higher cost. In competitive markets, full traceability may become unavoidable if rivals adopt it first, despite the risks of overexposing sensitive information (T. Chen et al., 2024).

Despite its benefits, blockchain adoption faces several barriers. High implementation costs, technical integration, interoperability, and scalability remain key challenges (S. S. Liu et al., 2025; Pun et al., 2021). The absence of harmonized legal frameworks and unresolved data privacy concerns further hinder adoption (Meidute-Kavaliauskiene et al., 2021; Jain et al., 2022).

Blockchain ensures immutability, transparency, and decentralization, however, it cannot guarantee input data accuracy. Governance, regulation, and trust in institutions remain necessary, as blockchain does not fully solve scalability and privacy challenges (Xu & Zou, 2021).

Risk-averse sellers are less likely to adopt blockchain when costs and uncertainties are high. However, adoption likelihood increases when the impact of consumer trust is substantial, implementation costs are low, and perceived risks are reduced (H. Zhang et al., 2024). Early adoption can provide a competitive advantage, but coordination failures and over-adoption risks must be managed carefully (Wu et al., 2022).

Blockchain is more than a technology; it is an institutional innovation that reorganizes trust, transactions, and value creation (Morkunas et al., 2019). It enables transparency, immutability, smart contract automation, and distributed data storage, which strengthens trust and efficiency across stakeholders (Z. Liu & Z. Li, 2020). BCT creates value not only by reducing counterfeiting and improving efficiency but also by enabling new business models such as tokenization (NFTs). It is particularly strategic in industries with high information asymmetry, counterfeit risks, or consumer trust deficits, including remanufacturing (X. Xu et al., 2023).

Pricing models also affect adoption incentives. In wholesale pricing structures, manufacturers benefit more due to enhanced brand reputation and product authenticity. In retail pricing models,

retailers capture greater gains since they interact directly with consumers. Dual adoption maximizes efficiency, but it risks duplicative costs unless effective sharing mechanisms are in place. Optimal investment thus depends on who captures the most excellent trust-based benefits (Fang et al., 2024).

Overall, blockchain adoption enhances traceability, transparency, authenticity, and consumer trust while mitigating counterfeits and information asymmetry. Its success, however, depends on balancing benefits with costs, addressing privacy and scalability concerns, and ensuring collaboration across stakeholders. Adoption is most strategic in markets where counterfeit risks, consumer trust demand, and competitive pressures are high. Firms must align their blockchain strategies with channel design, pricing models, and consumer expectations to fully leverage the transformative potential of blockchain in supply chains (Berneis & Winkler, 2021).

4.2.3. RQ3: How can BCT be implemented on counterfeiting in the Luxury Industry?

Counterfeiting poses a significant threat to luxury firms, eroding their prestige and damaging long-term brand equity. Prestige-focused strategies, which prioritize brand value over short-term profits, strengthen resistance to counterfeit dilution and safeguard brand identity (Varshney et al., 2024). At the same time, counterfeit awareness may paradoxically enhance preference for genuine brands by highlighting authenticity, scarcity, and exclusivity (Baghi et al., 2015). However, counterfeiting also reduces profitability and increases risk in disrupted SCs, making anti-counterfeiting investment crucial—though its effectiveness depends on balancing costs and disruption risks (Y. Huang et al., 2026).

BCT offers robust anti-counterfeiting mechanisms through immutable product records, spanning from manufacturing to sale, as well as digital identifiers (RFID, NFC chips, QR codes, and NFTs), and smart contracts that automate authenticity verification and compliance checks (Pun et al., 2021; Z. Liu & Z. Li, 2020). These features ensure traceability, transparency, and security, allowing consumers to verify provenance and ownership in real-time.

C. L. Chen et al. (2022) proposed a blockchain-based anti-counterfeiting system in which each product carries a unique digital identity on the blockchain, ensuring secure and tamper-proof verification across the SC. Similarly, Mhatre et al. (2022) developed the Blockchain-based Counterfeit Product Identification System (BCPIS), which records transaction history on blockchain ledgers, uses QR codes and RFID tags to create product identities, and employs smart

contracts to automatically flag suspicious activity. Consumers confirm authenticity by scanning the product's digital identity. This system provides transparency, efficiency, and security, thereby increasing consumer trust. However, consumers need to be aware of this technology and how they can verify the identity of the product.

In e-commerce, blockchain further enhances trust and confidence. J. Jiang & Chen (2021) propose a blockchain-supported platform where smart contracts automate verification, enabling consumers to gain real-time assurance of authenticity and reducing fraud. Blockchain also strengthens direct-to-consumer and trusted retailer channels by minimizing counterfeit risks, which otherwise make consumers hesitant and weaken demand (T. Yu et al., 2025).

NFTs extend blockchain's anti-counterfeiting role by certifying ownership of digital or physical luxury assets, offering decentralization and uniqueness (Xiao et al., 2024). Tokenization through RFID, NFC, QR codes, and NFTs enables product tracking and transaction validation without the need for intermediaries (Z. Liu & Z. Li, 2020). NFTs help luxury brands combat counterfeiting and strengthen consumer trust by verifying provenance, ownership, and scarcity. They enhance traceability, exclusivity, and authenticity, reinforcing brand value and consumer engagement. Nevertheless, regulatory uncertainty and consumer education remain significant adoption challenges (Jang & Kang, 2025).

In second-hand luxury markets, where traceability is often limited, blockchain and NFTs are particularly valuable. Immutable ledgers and digital certificates record the full product lifecycle, while smart contracts automate ownership transfers and verify authenticity, providing buyers with transparency and confidence (Pun et al., 2025).

Counterfeiting challenges not only brand equity but also SC dynamics. Anti-counterfeiting strategies are most effective when manufacturers and retailers collaborate, as this enhances trust, efficiency, and overall performance (Yang et al., 2022).

Blockchain enhances SC coordination by reducing information asymmetry and fostering trust among stakeholders. It supports brand-dominated SCs by reinforcing direct-to-consumer channels and improving authenticity, though adoption may reduce retailer bargaining power. Profitability depends on carefully balancing adoption costs against the benefits of demand and trust (Zhu et al., 2023).

The integration of blockchain with IoT further improves anti-counterfeiting and risk management by enabling real-time data capture, shipment tracking, and inventory visibility.

However, adoption requires standardization, interoperability, and governance, while risks include cybersecurity threats, high costs, and uneven adoption across markets (Egwuonwu et al., 2022).

Blockchain adoption offers competitive advantages when only some platforms or firms adopt it, as authenticity verification allows adopters to charge higher prices. If all adopt, differentiation decreases and competition shifts to pricing and service (J. Li et al., 2024; Chang et al., 2023). Adoption is most beneficial for firms with strong online channels, where consumer trust deficits are highest.

BCT is therefore both a technological and strategic tool. It not only reduces counterfeiting but also redefines channel design, pricing power, and consumer trust management. Policymakers and firms should incentivize adoption to improve market-wide authenticity while addressing challenges of costs, interoperability, and consumer education (Zameer et al., 2018; J. Li et al., 2024).

5. Conclusions, Limitations, and Suggestions for Future Research

5.1. Conclusions

The present dissertation aimed to investigate how BCT can be applied as a seal of authenticity in the internationalization of luxury brands, with a particular focus on its capacity to address the persistent challenge of counterfeiting. By conducting an SLR, the dissertation explored both the opportunities and respective benefits and challenges associated with the adoption of BCT in luxury SCs, thereby contributing to the academic debate.

The findings highlight that counterfeiting remains one of the most critical threats to luxury brands worldwide. The literature consistently highlights that counterfeit products erode consumer trust, undermine brand equity, and dilute the exclusivity that characterizes luxury products and brands. In this context, BCT emerges as a promising solution. Its defining features, immutability, decentralization, traceability, transparency, and smart contracts, make it particularly suited to combating counterfeiting. By recording every transaction in a secure, tamper-proof ledger, blockchain enables luxury brands to create a verifiable digital history for each product, from the sourcing of raw materials to the delivery of the product to the final customer. This not only enhances SC visibility but also provides consumers with a reliable guarantee of authenticity, reinforcing trust in luxury purchases.

Beyond counterfeit prevention, blockchain's benefits extend to broader aspects of luxury brand management and internationalization. The technology facilitates real-time auditing, reduces dependency on intermediaries, and can support compliance with international regulatory frameworks. In doing so, it enhances SC efficiency and transparency across borders, which is particularly relevant in the globalized luxury market, where production, distribution, and consumption often span multiple countries.

The adoption of BCT also enables premium pricing due to the security and authenticity it guarantees for products, ensuring profitability for brands and offsetting the initial costs of implementing this technology. Furthermore, blockchain can enhance consumer engagement by offering digital storytelling opportunities, where customers can trace the heritage and craftsmanship of their luxury items, thereby reinforcing perceptions of authenticity and exclusivity.

However, the study also found that blockchain adoption is a path with many challenges. Implementation costs are high, scalability remains limited, and a general lack of awareness and

technical knowledge exists among manufacturers, retailers, and consumers. Moreover, blockchain itself cannot guarantee the physical condition of products in transit or prevent fraudulent behavior occurring outside the digital record; it is essential to establish the link between the physical product and its digital certificate.

Despite the challenges, it can be concluded that blockchain represents a strategic tool for the luxury industry, one that could reshape anti-counterfeiting strategies and serve as a competitive advantage in international markets if implemented effectively.

This dissertation has demonstrated that BCT holds significant promise as a tool to combat counterfeiting and reinforce authenticity in luxury SCs. While challenges remain, the potential for blockchain to transform the luxury industry is considerable. By enabling greater transparency, security, and consumer trust, blockchain may redefine the relationship between luxury brands and their customers in the digital age. Continued academic and managerial research will be crucial to unlocking this potential, particularly in understanding the role and applicability of NFTs, and ensuring that blockchain evolves from a promising concept into a widely adopted and value-generating practice in the global luxury market.

5.2. Limitations

While this research has yielded valuable insights, it is essential to acknowledge several limitations that restrict the generalizability and practical applicability of its findings. The methodology adopted in this dissertation is an SLR. Although this approach provides a rigorous and structured synthesis of existing literature, it is inherently limited to secondary data.

First, the review considered only articles published in scientific journals that were accessible through the two selected databases. Second, the search strategy treated several keywords as interchangeable, which raises the possibility that relevant studies employing alternative terminology may have been excluded. Third, the manual screening process, based on predefined inclusion and exclusion criteria, carries the risk of not considering pertinent studies. Fourth, most studies that examine the role of BCT in combating counterfeiting focus predominantly on deceptive counterfeit products, while research addressing its implications for non-deceptive counterfeit products remains scarce. Finally, the interpretation of the extensive literature inevitably involves a degree of subjectivity. This is particularly salient given that data extraction was conducted by a single reviewer, which increases the potential for bias in the analysis.

Future reviews may address these limitations by broadening the search to include additional databases and a wider set of keywords, as well as by involving multiple reviewers to mitigate subjectivity and enhance reliability.

A further limitation concerns the nature of the existing literature on blockchain in the luxury sector. The majority of contributions remain conceptual rather than empirical, meaning that the evidence base essentially comprises theoretical frameworks or pilot projects. This constrains the possibility of deriving managerial recommendations. Moreover, blockchain represents a rapidly evolving domain. Consequently, the literature analyzed offers only a temporal snapshot; emerging developments, such as NFTs, smart contracts, and integration with the IoT, may soon surpass and reframe the conclusions drawn in this dissertation.

5.3. Suggestion for Future Research

To address the limitations and advance the understanding of blockchain's role within luxury SCs, several directions for future research can be identified.

First, subsequent studies must move beyond conceptual analyses and SLRs by incorporating empirical evidence. Case studies involving luxury brands that have already adopted blockchain solutions, as well as surveys of SC participants, could provide valuable insights into whether blockchain enhances trust, increases consumers' willingness to pay, or strengthens brand loyalty. Such approaches would also illuminate adoption processes, organizational challenges, and measurable outcomes. Furthermore, interviews and surveys could offer a more nuanced perspective on consumer responses to blockchain-based authentication features, particularly in terms of awareness, perceived value, and willingness to engage with such technologies.

Second, given the global nature of the luxury market, comparative studies across regions are essential. Consumer acceptance of blockchain may vary considerably between Western markets, where emphasis is traditionally placed on heritage and craftsmanship, and Asian markets, where rapid technology adoption and the importance of social validation are more pronounced.

Ultimately, future research should investigate the interplay between blockchain and complementary technologies such as the IoT, RFID, NFC, the metaverse, and, notably, NFTs. The latter may serve as digital certificates of ownership in the luxury sector, thereby reshaping both primary and secondary (resale) markets. Investigating these intersections would deepen the understanding of blockchain's broader impact on luxury ecosystems and consumer practices.

5.4. Final Thoughts

Through an SLR, the potential of BCT as a seal of authenticity and a tool to combat counterfeiting was analyzed, since it remains a profound and persistent threat to luxury brands, undermining consumer trust and eroding the exclusivity central to the luxury value proposition. In this regard, blockchain demonstrates considerable promise, offering immutability, traceability, transparency, and security as mechanisms to authenticate products and enhance supply chain visibility. Beyond its role in anti-counterfeiting, blockchain also holds potential to strengthen consumer engagement, streamline international operations, and reinforce brand equity in an increasingly globalized and digitalized marketplace.

The research has also highlighted the challenges that must be overcome before blockchain can achieve widespread adoption in the luxury sector. High implementation costs, technical complexity, scalability issues, and limited stakeholder awareness continue to be significant obstacles. Furthermore, blockchain's digital assurances cannot, on their own, address vulnerabilities related to the physical handling of products or fraudulent practices beyond the ledger. Thus, the success of blockchain as a strategic tool will depend on effective integration with other technologies, as well as industry-wide collaboration to bridge the gap between physical and digital authentication.

In this way, it is possible to verify that the three research questions proposed were answered during the dissertation, reinforcing the idea that BCT has the potential to transform the way authenticity, trust, and exclusivity are managed in the luxury industry. By enabling verifiable transparency and digital trust, blockchain may redefine the relationship between brands and consumers, offering a competitive advantage that requires sustained academic inquiry and managerial experimentation.

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Appendix 1 - Content Analysis of the SLR

#	Source Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
1	Journal Article	Anti-Counterfeiting in a retail Platform: A Game-Theoretic approach	2022	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	165	Yu	Zhou	https://doi.org/10.1016/j.tre.2022.102839	The article uses a game-theoretic approach to analyze anti-counterfeiting strategies in online retail platforms, focusing on the interactions between the platform operator and third-party sellers.	Game-theoretic model is developed	Optimal inspection strategy depends on the cost of inspections, counterfeit prevalence, and penalty effectiveness. Higher penalties and inspection rates reduce counterfeit sales but increase platform costs. There is a trade-off between deterrence and operational cost — over-enforcement can be inefficient if counterfeit incentives are low. Coordinated measures such as public disclosure of penalties and consumer awareness campaigns further deter counterfeit activity.	The study relies on a game-theoretic dual-channel model, without empirical or case-based validation and simplifies some assumptions: Assumes the manufacturer never sells fakes and that counterfeiters operate only through resellers, which may not reflect all market realities. Counterfeits are modeled as deceptive (same price as genuine), excluding non-deceptive counterfeits where consumers knowingly buy fakes. Government regulation, law enforcement, and consumer awareness are not fully incorporated, though these strongly influence counterfeiting outcomes. The finding that anti-counterfeiting may reduce consumer surplus and social welfare in some conditions is based on model assumptions, not observed behavior. Focuses on short-term equilibria, without considering dynamic interactions over time, such as long-term brand damage, technology evolution, or repeated competition.	Apply the model to real-world retail platforms (e.g., Amazon, JD.com, Taobao, Pinduoduo) to test revenue, consumer welfare, and strategic predictions. Extend analysis to non-deceptive counterfeiting and industries where consumers knowingly buy fakes (fashion, entertainment, digital goods). Incorporate the role of governments, regulators, and IP laws in shaping incentives for platforms and manufacturers. Explore long-term dynamics of anti-counterfeiting, including repeated games, evolving technology (e.g., blockchain, AI), and shifting consumer perceptions. Examine behavioral factors such as trust, brand loyalty, and willingness to pay in the presence of counterfeit risks. Compare effects across sectors (luxury goods, pharmaceuticals, electronics, FMCG) where the costs and risks of counterfeiting differ significantly.
2	Journal Article	Application of blockchain in the secondary market with counterfeiting	2025	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	197	Hubert	Pun	https://doi.org/10.1016/j.tre.2025.104078	The article explores using blockchain technology to combat counterfeiting in the secondary market, where resale of goods often suffers from authenticity and trust issues.	Game-theoretic model is developed	Introducing blockchain in the secondary market helps combat deceptive counterfeit products, increasing transparency and trust. Blockchain implementation affects the interactions among manufacturers, resellers, and counterfeiters, shifting consumer demand toward legitimate products. By preventing counterfeit infiltration, blockchain protects the brand reputation of manufacturers and helps resellers maintain credibility. While blockchain adds extra operational costs, the long-term benefits (e.g., higher trust, reduced fake products, stronger resale market) outweigh the expenses.	The study only models deceptive counterfeits (where consumers unknowingly buy fakes), ignoring non-deceptive counterfeits (where consumers intentionally purchase fakes).The study also simplifies assumptions, assumes rational decision-making and uniform behavior among market participants, which may oversimplify real consumer and counterfeiter actions. Results are based on theoretical modeling, not tested with real-world case data or pilot projects. It remains unclear whether all sellers should be required to use blockchain or if participation can be voluntary, creating adoption uncertainty.	Extend the model to include non-deceptive counterfeit consumption, as it represents a large share of luxury and fashion counterfeiting. Explore how customer review systems may complement blockchain in detecting and discouraging deceptive counterfeit sales. Examine whether blockchain adoption should be mandatory or voluntary for sellers on secondary platforms. Test the model with real marketplace data (e.g., Amazon, eBay, StockX, luxury resale platforms) to validate theoretical results. Investigate blockchain + other mechanisms (AI detection, RFID, digital twins) for more robust counterfeit prevention.
3	Journal Article	Cross-market selling channel strategies in an international luxury brand's supply chain with gray markets	2020	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	144	Hongfu	Huang	https://doi.org/10.1016/j.tre.2020.102157 R	Topic: How luxury brands manage supply chains and selling channels when gray markets (unauthorized but legal parallel imports) exist. Problem: Price gaps across regions fuel gray market activity, harming brand control and authorized retailers.	Game-theoretic developing	Brands can strategically choose selling channels (direct, authorized retailer, or dual-channel) depending on gray market presence. Gray markets reduce profits but can be mitigated by careful channel design and pricing policies. Dual-channel strategies (direct + retailer) may help balance control and coverage, but risks gray diversion. Exclusive direct selling can suppress gray markets but may sacrifice reach.	The study focuses on a two-channel structure (authorized and gray markets), which may not capture the complexity of real-world luxury supply chains involving multiple intermediaries and regions. Consumer preferences and purchase decisions are modelled in a rational, utility-maximizing framework, overlooking psychological, cultural, and social drivers of luxury consumption. The game-theoretic model assumes static interactions, without considering dynamic adjustments over time as gray market conditions evolve. The model does not explicitly integrate the impact of brand enforcement actions, anti-gray market regulations, or government policies. Results are theoretical; the study lacks real-world data testing or case validation.	Extend to multi-period models that capture evolving brand–gray market interactions and long-term effects of channel strategies. Integrate behavioral, cultural, and psychological factors influencing gray market purchases (e.g., stigma, trust, value perceptions). Expand the model to multi-tier international supply chains with multiple regions, intermediaries, and logistics complexities. Analyze the role of legal enforcement, anti-diversion policies, and international trade laws on gray market strategies. Validate findings with industry data, consumer surveys, or case studies from luxury sectors like fashion, jewelry, or watches.
4	Journal Article	Combating counterfeits with the Blockchain-technology-supported platform under government enforcement	2023	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	175	Chao	He	https://doi.org/10.1016/j.tre.2023.103151	Problem: Counterfeiting remains a serious threat to supply chains, harming brands, consumers, and economies. Proposal: A blockchain-supported platform to improve anti-counterfeiting, studied under varying levels of government enforcement.	Game-theoretic developing	Blockchain increases traceability, transparency, and trust, reducing counterfeit risks. Government enforcement strengthens blockchain's effectiveness by ensuring compliance and discouraging fraud. The combination of technology + regulation is more effective than either alone.	The model assumes only one type of counterfeit product with low quality but high resemblance, not reflecting real markets where multiple counterfeit types (e.g., low-quality vs. high-quality) coexist. Government combating level is treated as exogenously fixed, ignoring how enforcement may be influenced by welfare policies, budget constraints, or adaptive responses. Based on game-theoretic models (signaling and Stackelberg), which simplify market complexities and consumer behaviors. Assumes consumers rely primarily on price and blockchain traceability, without considering psychological, social, or brand-related factors that influence real-world purchase decisions.	Extend the model to markets where different qualities of counterfeits coexist, analyzing how firms adopt blockchain platforms under such conditions. Explore models where the government's combating level is determined endogenously, e.g., based on welfare optimization or adaptive enforcement strategies. Incorporate consumer psychology and perception factors (trust, brand loyalty, digital literacy) to better reflect real purchasing decisions. Test the game-theoretic predictions using case studies or real-world data from industries (luxury goods, pharmaceuticals, electronics).
5	Journal Article	Competition versus cooperation? Which is better in a remanufacturing supply chain considering blockchain	2022	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	165	Lipan	Feng	https://doi.org/10.1016/j.tre.2022.102858	Problem: Remanufacturing supply chains face counterfeiting, inefficiency, and trust issues. Approach: Uses game-theoretic modeling to compare competition vs. cooperation strategies when blockchain is applied.	Game-theoretic modeling	Blockchain improves traceability and consumer trust in remanufactured products. Cooperation (manufacturer and retailer aligning) generally yields higher profits, efficiency, and anti-counterfeiting effectiveness than competition. Blockchain adoption costs and market demand influence which strategy is optimal.	The study considers a relatively basic manufacturer–remanufacturer structure, without extending to multi-tier or globalized supply chains. Assumes fixed blockchain usage fees and externally determined patent license fees in some scenarios, which may not reflect dynamic market realities. Based on static game-theoretic modeling, without capturing long-term interactions or dynamic decision-making over time. Consumer acceptance of remanufactured products is modeled primarily via quality recognition, without accounting for social perception, sustainability awareness, or brand loyalty. Results are purely theoretical; the framework has not been validated in real-world remanufacturing or blockchain adoption cases.	Apply the model to complex and global supply networks with multiple intermediaries, logistics providers, and retailers. Develop multi-period or dynamic models to account for evolving blockchain costs, patent policies, and consumer adoption trends. Explore how fluctuating blockchain usage fees and different consensus mechanisms affect cooperation vs. competition. Incorporate consumer attitudes, trust, and willingness-to-pay for blockchain-enabled remanufactured products. Test theoretical insights with case studies, industry pilots, or survey-based empirical research in sectors like electronics, automotive, or fashion. Investigate the role of government incentives, circular economy policies, and intellectual property enforcement in shaping blockchain adoption.
6	Journal Article	Exploring the physical–digital interface in blockchain applications: Insights from the luxury watch industry	2023	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	179	Maximilian	Kilroken	https://doi.org/10.1016/j.tre.2023.103303	How blockchain links the physical–digital interface in luxury watch authentication and supply chains.	Case study through interviews	Blockchain ensures traceability and authenticity but only works if the physical product is securely tied to its digital record. Effective systems use digital twins (e.g., QR codes, NFC chips, digital certificates) to bind physical watches with blockchain entries. Benefits: combats counterfeiting, strengthens trust, enhances resale value, and supports circular economy practices. Challenges: cost, technical integration, consumer adoption, and risk of tampering with physical identifiers. Implications: Success requires robust physical–digital integration, industry collaboration, and consumer trust in both the tech and the identifiers.	The qualitative data is largely cross-sectional, preventing analysis of the long-term dynamics of blockchain projects in the luxury watch sector. Many blockchain projects and physical–digital linking approaches studied were either planned or in very early stages, so practical experience and insights were limited. The study focuses on the Swiss luxury watch industry. Although the findings are argued to be generalizable, challenges of the physical–digital link may differ across industries.	Conduct long-term studies to capture the dynamics of blockchain project development and adoption in the luxury sector and beyond. Collect more practical data on the real-world implementation and utilization of different physical–digital linking approaches (invasive and non-invasive). Examine how the physical–digital link challenges manifest in other industries (e.g., fashion, jewelry, pharmaceuticals) to test generalizability. Explore how industry-wide standards for describing and linking physical goods to digital records can enhance scalability and reduce costs. Evaluate the operational and financial performance impacts of blockchain adoption once linking solutions mature.
7	Journal Article	Eliminating information asymmetry in supply chains: Blockchain-driven or not	2025	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	201	Chi To	Ng	https://doi.org/10.1016/j.tre.2025.104201	How to reduce information asymmetry in supply chains, with or without blockchain.	Game-theoretic modeling	Blockchain can effectively reduce information asymmetry by ensuring traceability, transparency, and tamper-proof records across supply chain partners. Adoption is more likely when information asymmetry is high and the benefits (trust, reduced monitoring costs) outweigh implementation costs. Blockchain adoption often benefits manufacturers more than suppliers, leading to unequal welfare outcomes in the supply chain. While blockchain improves transparency, non-blockchain governance mechanisms (contracts, trust-based relationships, third-party audits) can still play critical roles in reducing asymmetry. Blockchain adoption becomes particularly appealing when supply chain partners are risk-averse, as the technology reduces uncertainties around product quality and authenticity.	The study is based on economic/game-theoretic modeling, which abstracts from real-world complexities such as multi-tier supply chains and cultural factors. Findings are not supported by case studies or survey evidence, making external validity uncertain. The model does not capture dynamic aspects or blockchain adoption, such as technological evolution or changing regulations. Focus is mainly on manufacturers and suppliers, with limited consideration of retailers, regulators, or consumers.	Test theoretical findings with field studies, surveys, or real-world blockchain adoption cases. Develop models that account for technology diffusion, learning curves, and adoption over time. Incorporate perspectives of consumers, regulators, and logistics providers to fully understand blockchain's impact. Compare blockchain adoption with alternative governance mechanisms to assess when blockchain is truly superior. Apply and test the framework in diverse industries (luxury, pharmaceuticals, food supply chains, electronics) where asymmetry levels differ. Examine how government policies, subsidies, and standardization can encourage or discourage blockchain adoption.
8	Journal Article	Logistics and supply chain management in the luxury industry	2020	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	143	Bin	Shen	https://doi.org/10.1016/j.tre.2020.102018	Explores logistics and supply chain management (LSCM) challenges and innovations in luxury.	Conceptual framework	Luxury goods production involves globally dispersed suppliers, creating significant challenges in coordination, transparency, and resilience. Volatility in consumer tastes, shortened product life cycles, sustainability demands, and the disruption caused by COVID-19 are major supply chain stressors. Sustainability: Increasing demand for eco-friendly and transparent practices. Digitalization: Blockchain and data-driven tools to improve traceability and authenticity. Consumer Behavior: Social influences, omnichannel shopping, and rental/sharing models are reshaping operations. Channel Strategies: Firms must balance store-only vs. omnichannel and direct-to-consumer vs. third-party channels. "See Now, Buy Now" (SNBN) operations, luxury rental platforms, and blockchain-based traceability are emerging as important innovations.	Many studies reviewed are based on Italian or European luxury companies, which may limit generalizability globally. Research on logistics and supply chain management (LSCM) in luxury is relatively new and still fragmented across disciplines. Much of the evidence comes from case studies, small samples, or stylized models, reducing external validity. Many innovative practices (blockchain, SNBN, luxury sharing platforms) are nascent and not widely adopted yet.	Extend research beyond Europe to examine luxury supply chains in Asia, Americas, and emerging markets. Investigate the long-term impacts of disruptions like COVID-19, as well as sustainability transitions in luxury LSCM. Explore how consumer attitudes toward sustainability, authenticity, and omnichannel shopping influence supply chain design. Examine how blockchain, AI, and IoT jointly transform luxury supply chains, particularly in areas like traceability and counterfeit prevention. Assess the financial and operational impacts of innovative supply chain models (SNBN, rental platforms, blockchain adoption).
9	Journal Article	Impacts of blockchain-based digital transition on cold supply chains with a third-party logistics service provider	2023	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	170	Guo	Li	https://doi.org/10.1016/j.tre.2023.103081	Focus: Explores how blockchain adoption affects cold supply chains (CSCs) when integrated with third-party logistics providers (3PLs). Problem: CSCs face challenges with traceability, temperature monitoring, trust, and compliance. Solution: Blockchain enables secure, transparent, and immutable tracking of goods, combined with IoT sensors for temperature and condition data.	game-theoretic modeling	Improves food safety, accountability, and regulatory compliance. Builds trust among stakeholders (producers, logistics, retailers, consumers). Enhances efficiency by reducing disputes, fraud, and waste. Implications: Blockchain-driven digital transition strengthens 3PLs' role as trusted intermediaries. Adoption requires investment, collaboration, and regulatory alignment.	The model assumes simplified market conditions (e.g., homogenous products, ideal logistics performance), which may not fully capture the complexities of real cold supply chains. The analysis is centered mainly on blockchain-based digital transition, without considering integration with other technologies such as IoT sensors, AI, or big data analytics. The study is theoretical/model-driven, meaning results are not yet validated through real-world case studies or large-scale empirical data. The work specifically analyzes third-party logistics (3PL) providers in cold chains, which narrows generalizability to other logistics sectors or supply chains.	Apply the model to real-world cold supply chains to validate its practical feasibility and effectiveness. Extend analysis beyond cold chains (e.g., pharmaceuticals, luxury goods, automotive) to evaluate blockchain's broader logistics impact. Explore how blockchain interacts with IoT, AI, and predictive analytics to enhance cold chain traceability and efficiency. Investigate how end-consumers perceive blockchain-enabled cold chain transparency, especially regarding trust and willingness to pay. Assess the long-term effects of blockchain adoption on supply chain resilience, costs, and sustainability over time. Compare the outcomes of blockchain adoption across different logistics providers (3PL vs. 4PL) and different regional or regulatory environments.

#	Source Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
10	Journal Article	Non-fungible tokens: The missing ingredient for sustainable supply chains in the metaverse age?	2024	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	182	Jennifer	Davies	https://doi.org/10.1016/j.tre.2024.103417	Explores how NFTs can enhance sustainable supply chains in the era of the metaverse.	Conceptual and framework-driven, grounded in the TOE model, supported by literature synthesis and case-based illustrations	Key Insights: NFTs provide unique digital identities for products, enabling traceability, authenticity, and lifecycle tracking. Help enforce circular economy principles by tracking reuse, recycling, and resale. Bridge physical and digital supply chains, creating transparency across the product journey. Findings: NFTs strengthen trust, sustainability reporting, and consumer engagement. In the metaverse, they also create new opportunities for immersive supply chain interaction. Implications: Integrating NFTs into supply chains supports both sustainability goals and digital transformation. Brands can use NFTs for accountability, eco-conscious marketing, and combating counterfeiting.	Research on NFTs in sustainable supply chain management (SSCM) is still very nascent. Most insights are conceptual or derived from case studies, with limited quantitative or empirical validation. Many case studies cited involve early-stage pilots or niche sectors (luxury, art, spirits, fashion). The long-term viability and scalability of these use cases remain uncertain. The study highlights failures like the Bic et Nunc NFT platform shutdown, showing that reliance on external providers introduces risk to NFT adoption in supply chains. NFTs inherit some of the well-known blockchain limitations (e.g., scalability, energy use, interoperability). These technological uncertainties make it difficult to forecast large-scale SSCM adoption. Current applications are heavily concentrated in luxury and high-value goods sectors. Findings may not directly transfer to low-cost, mass-market supply chains.	Conduct quantitative studies, experiments, and pilot projects to evaluate the real-world impact of NFTs on supply chain sustainability. Extend NFT adoption studies to diverse industries (e.g., food, pharmaceuticals, automotive, consumer goods) beyond luxury markets. Examine in detail how NFTs can address barriers such as cost, interoperability, and consumer trust, building on the TOE (Technology–Organization–Environment) framework used in the paper. Further investigate "phygital products" (NFTs linked to physical goods) to assess how they enable circular supply chains, reduce waste, and enhance traceability. Explore the role of government regulation, industry standards, and certification in fostering trustworthy NFT-based SSCM systems. Study how gamified NFT incentives (badges, avatars, rewards) influence consumer sustainable purchasing behavior. Track NFT adoption in SSCM over time to see whether early pilots translate into durable, scalable practices.
11	Journal Article	Online operations in a multichannel supply chain under service cost difference: The adoption of blockchain technology	2025	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	199	Qi	Xu	https://doi.org/10.1016/j.tre.2025.104111	Examines how blockchain adoption affects multichannel supply chains when service costs differ between channels (e.g., online vs. offline).	Game-theoretic modeling	Key Insights: Blockchain provides authenticity, transparency, and trust, reducing counterfeit risk. Service cost differences influence whether online or offline channels dominate. Blockchain shifts competitive balance by making online channels more credible and attractive Findings: When service cost gaps are large, blockchain adoption helps equalize competition. Encourages coordination and reduces channel conflict. Implications: Blockchain is both an anti-counterfeiting tool and a strategic lever for channel management. Firms should adopt blockchain when pursuing strong online expansion in multichannel supply chains.	The study relies on a game-theoretic and analytical modeling approach, which simplifies real-world complexities of multichannel supply chains. Service costs and blockchain adoption costs are assumed to be stable and deterministic, while in reality they may fluctuate. The model focuses on a manufacturer–retailer dyad, without incorporating broader supply chain networks or competing platforms. Consumer behavior is simplified; it does not fully capture heterogeneous preferences, behavioral biases, or trust dynamics in adopting blockchain–enabled platforms. The paper considers short-term equilibrium outcomes but does not explore long-term adoption patterns, technological evolution, or competitive dynamics.	Extend the analysis to empirical validation using data from industries where blockchain is already applied to multichannel operations (e.g., luxury, pharmaceuticals, agri-food). Consider heterogeneous consumers with varying preferences for blockchain transparency, service quality, and pricing. Incorporate dynamic models to analyze long-term effects of blockchain adoption, technology upgrades, and learning curves. Expand the framework to multi-retailer or multi-manufacturer settings, reflecting realistic supply chain competition. Explore the policy and regulatory impacts of blockchain adoption in multichannel systems, especially under anti-counterfeiting and traceability regulations. Examine how blockchain adoption interacts with other emerging technologies (e.g., AI, IoT, metaverse commerce) to enhance multichannel strategies.
12	Journal Article	Profit or prestige? Strategies for luxury brands to navigate the second-hand market using blockchain technology	2024	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	191	Umang	Varshney	https://doi.org/10.1016/j.tre.2024.103774	Examines the tension between profit motives and prestige preservation in luxury brands' strategies against counterfeiting.	Game-theoretic modeling	Key Insights: Luxury brands balance short-term profit opportunities (wider reach, accessibility) with long-term prestige maintenance (exclusivity, authenticity). Counterfeiting threatens prestige and brand equity, but stricter enforcement can conflict with profit expansion goals. Findings: Overemphasis on profit (e.g., mass distribution) increases counterfeit vulnerability. Prestige-focused strategies (heritage, authenticity, scarcity) strengthen resistance to counterfeit dilution. Implications: Luxury firms must strategically prioritize prestige over profit to sustain long-term brand value. Anti-counterfeiting should align with exclusivity-driven brand positioning.	Simplified assumptions – The study builds its analysis using stylized assumptions about consumer preferences, prestige value, and profit maximization, which may not fully capture real-world complexities. Context-specific focus – The results are derived within a specific market and product category; findings may not generalize across industries or cultural settings. Static analysis – The model considers equilibrium outcomes at a single point in time and does not address dynamic aspects such as shifting consumer tastes, technological adoption, or long-term brand strategies. Exclusion of behavioral nuances – Consumer psychology, brand loyalty, and emotional motivations for prestige consumption are not deeply incorporated. Lack of empirical validation – The findings are theoretical in nature, with no case studies, experiments, or real-world data testing.	Empirical testing – Use surveys, experiments, or case studies to validate how consumers balance profit and prestige motives in different luxury markets. Cross-cultural analysis – Examine how cultural values shape consumer trade-offs between profit-oriented and prestige-oriented consumption. Dynamic models – Extend the framework to study longitudinal effects, such as how prestige evolves over time or how firms adapt strategies in response to consumer shifts. Integration of behavioral theories – Incorporate insights from psychology and behavioral economics (e.g., status signaling, social identity theory) to enrich the model. Technology-driven contexts – Explore how blockchain, NFTs, and digital platforms influence prestige vs. profit trade-offs in luxury and non-luxury markets. Policy implications – Investigate how government regulations, sustainability pressures, or anti-counterfeiting laws affect firms' choices between profit maximization and prestige building
13	Journal Article	Omnichannel supply chain operations for luxury products with conspicuous consumers	2020	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	137	Feng	Li	https://doi.org/10.1016/j.tre.2020.101918	Studies how omnichannel strategies affect luxury supply chains, considering conspicuous consumers (who buy luxury mainly to display status).	Game-theoretic modeling	Key Insights: Luxury omnichannel operations (offline + online) must balance exclusivity, service, and visibility. Conspicuous consumers prefer channels that enhance status signaling (flagship stores, premium online experiences). Inventory, pricing, and channel coordination decisions are shaped by the need to maintain scarcity and prestige. Findings: Omnichannel presence increases reach but risks diluting exclusivity. Careful design (selective online access, premium differentiation) helps manage conspicuous demand while keeping brand value intact. Implications: Luxury brands must align omnichannel operations with conspicuous consumption motives. Digital channels should complement rather than replace exclusivity-driven offline experiences.	The study is theoretical and model-based, relying on mathematical modeling rather than real-world empirical data, which may limit its practical generalizability. It focuses only on one type of consumer group—conspicuous consumers—without considering other behavioral variations such as inconspicuous or ethical consumers. The model assumes simplified market conditions, such as demand, cost, and consumer behavior, which may not fully reflect the complexities of actual luxury omnichannel operations. Government policy, technology adoption barriers, and cultural differences in luxury consumption were not incorporated into the analysis.	Extend the model by including heterogeneous consumer groups (e.g., conspicuous vs. inconspicuous, environmentally conscious consumers) to capture broader market dynamics. Conduct empirical or case study validation with real luxury brands to test and refine the proposed theoretical results. Explore the role of digital technologies (e.g., blockchain, AI-driven personalization, metaverse commerce) in omnichannel strategies for luxury. Investigate policy and regulatory impacts (such as anti-counterfeit regulations or sustainability policies) on omnichannel supply chain decisions. Expand the study to consider global cultural contexts, since luxury perception and conspicuous consumption vary across regions.
14	Journal Article	Shipment policy and its impact on coordination of a fashion supply chain under production uncertainty	2024	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	192	Sadiul	Alom	https://doi.org/10.1016/j.tre.2024.103774	Investigates how shipment policies affect coordination in fashion supply chains facing production uncertainty.	Game-theoretic modeling	Key Insights: Fashion supply chains suffer from demand variability and uncertain production outcomes. Shipment policies (timing, frequency, batch size) strongly influence inventory, costs, and coordination efficiency. Findings: Proper shipment policy design improves coordination and responsiveness under uncertainty. Poorly aligned policies increase mismatches, inefficiency, and cost burdens. Implications: Firms must integrate shipment strategies with production realities to maintain efficiency. Strategic shipment planning is key to resilience in volatile fashion markets.	Simplified modeling assumptions – The analysis is based on stylized mathematical models (linear demand, risk-neutral players, symmetric cost structures), which may not fully reflect real-world supply chain dynamics. Narrow focus on shipment policies – Only shipment timing and batch-related policies are considered, while other supply chain strategies (e.g., pricing, contract types, financing) are excluded. Static perspective – The study focuses on equilibrium under uncertainty but does not explore dynamic or long-term effects of repeated interactions. Lack of empirical validation – The findings are entirely theoretical and not tested with real-world case studies, experiments, or industry data. Limited scope of uncertainty – Only production uncertainty is considered; demand uncertainty, transportation risk, and global disruptions are not addressed.	Incorporate additional uncertainties – Extend the models to include demand uncertainty, logistics risks, and global disruptions (e.g., pandemics, geopolitical events). Dynamic and multi-period analysis – Explore how shipment policies evolve over time and repeated interactions between manufacturers and retailers. Broader coordination mechanisms – Investigate how contracts, financing, and digital technologies (like blockchain) interact with shipment policies to improve coordination. Empirical validation – Test theoretical predictions with real-world fashion supply chain data, case studies, or experiments. Multi-echelon and global supply chains – Extend the framework beyond a single dyadic relationship to analyze multi-tier, globalized supply chains. Sustainability and environmental impacts – Explore how shipment policies under uncertainty interact with sustainability goals (carbon emissions, waste reduction, circular fashion).
15	Journal Article	Selling secondhand products through an online platform with blockchain	2020	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	142	Quan	Yuan	https://doi.org/10.1016/j.tre.2020.102067	Examines how blockchain enhances online platforms for secondhand product sales.	Game-theoretic modeling	Key Insights: Blockchain ensures authenticity, traceability, and trust in resale markets. Addresses risks of counterfeits, fraud, and lack of transparency in secondhand transactions. Encourages sustainable consumption by validating product lifecycle histories. Findings: Blockchain-based resale platforms increase consumer confidence and support circular economy goals. Implications: Retailers and platforms can use blockchain to professionalize secondhand markets. Strengthens brand reputation while reducing counterfeit risks.	Simplified model assumptions – The study is based on a stylized mathematical model (e.g., consumer behavior, costs, and supply chain structure) that may not fully reflect real-world dynamics. Static perspective – The analysis examines outcomes in equilibrium without accounting for the long-term or dynamic effects of blockchain adoption. Lack of empirical validation – The results are theoretical; no surveys, case studies, or experiments were conducted to confirm findings. Scope of supply chain – Focuses only on secondhand products in a single platform context, which limits generalizability to other product categories or multi-platform settings. Consumer behavior limitations – Assumes homogeneous consumer preferences and rational decision-making, ignoring psychological, cultural, or trust-related aspects.	Empirical testing – Conduct case studies, experiments, or surveys with secondhand platforms (e.g., luxury resale, electronics) to validate the theoretical insights. Dynamic modeling – Extend the framework to account for blockchain adoption over time, consumer learning, and technological evolution. Cross-industry comparison – Explore how blockchain affects different industries (luxury goods, fast fashion, electronics, automotive parts) in resale markets. Consumer heterogeneity – Incorporate differences in consumer trust, risk aversion, environmental concern, and willingness to pay for blockchain-enabled authentication. Multi-platform competition – Investigate competition between multiple resale platforms using blockchain, rather than a single platform scenario. Integration with sustainability – Study how blockchain in secondhand markets contributes to circular economy goals and influences firms' sustainability strategies. Policy and regulation – Examine the role of government policies and international standards in promoting blockchain adoption for secondhand market authentication.
16	Journal Article	The interplay between blockchain adoption and channel selection in combating counterfeits	2021	Elsevier Ltd	Transportation Research Part E: Logistics and Transportation Review	155	Zhiwen	Li	https://doi.org/10.1016/j.tre.2021.102447	How blockchain adoption interacts with channel selection (direct vs. retail) in fighting counterfeits.	Game-theoretic modeling	Deceptive counterfeits in both online and offline markets reduce the profits of genuine manufacturers and retailers. Non-deceptive counterfeiters may also suffer when deceptive counterfeits rise, due to intensified competition. Manufacturers should only adopt blockchain technology (BCT) when the proportion of deceptive counterfeits in their channel is high. Adoption is only profitable if both marginal and fixed deployment costs of BCT are sufficiently low. Below blockchain, dual-channel sales (retailer + direct) can be optimal. After adopting blockchain, firms should often shift from dual-channel to single-channel models (either direct or retailer), depending on counterfeit prevalence. Risk-averse consumers and the proportion of "expert" consumers (who can identify counterfeits) significantly affect optimal channel and adoption decisions. Blockchain adoption can increase consumer trust and social welfare when channels are less reliable. Large-scale application of blockchain against counterfeits depends on [illegible]	The study uses a vertical differentiation model and assumes deceptive and non-deceptive counterfeits have equal quality, which may not reflect reality. The proportion of deceptive counterfeiters on platforms is treated as exogenous (fixed), though in practice platforms may adjust their anti-counterfeit efforts. While blockchain boosts transparency, the paper acknowledges it may create consumer privacy concerns, but this was not integrated into the models. Costs of blockchain adoption are modeled only as fixed and marginal fees, ignoring other factors such as scalability, interoperability, or regulatory differences.	Use other demand and consumer behavior models beyond vertical differentiation to capture different dynamics. Consider cases where deceptive counterfeits are of higher quality than non-deceptive ones (since deceiving consumers often requires better imitation). Investigate how blockchain adoption interacts with data privacy risks and consumer trust. Analyze how online platforms' strategic anti-counterfeiting efforts affect manufacturers' channel and blockchain adoption decisions
17	Journal Article	Blockchain-technology-supported platforms for diamond authentication and certification in luxury supply chains	2019		Transportation Research Part E: Logistics and Transportation Review		Tsan-Ming	Choi	https://doi.org/10.1016/j.tre.2019.05.011	Problem: The diamond industry faces counterfeiting, fraud, and ethical sourcing concerns. Proposal: Use blockchain-based platforms to authenticate and certify diamonds across the supply chain. Challenges: Implementation barriers include cost, interoperability, scalability, and adoption resistance.	Game-theoretic modeling	Blockchain enables tamper-proof recording of diamond grading, certification, and provenance. Provides end-to-end visibility across the luxury diamond supply chain, reducing information asymmetry. Increases consumer confidence in authenticity while helping brands protect reputation. Framework can be extended to other luxury goods (jewelry, watches, art) prone to counterfeiting.	The study demonstrates feasibility but lacks large-scale real-world deployment. Blockchain performance (throughput, latency, energy use) may not meet global luxury supply chain demands. Existing enterprise systems and legacy certification processes are not fully addressed. Does not deeply explore legal enforceability of blockchain–based certificates across jurisdictions. Focused on technical and supply chain benefits, without testing consumer willingness-to-use in practice.	Deploy in actual diamond and luxury brand supply chains to evaluate adoption challenges and benefits. Investigate Layer-2 protocols, sidechains, and consensus improvements to overcome blockchain efficiency limits. Extend framework to art, watches, fashion, and pharmaceuticals. Explore consumer acceptance, trust factors, and willingness-to-pay for blockchain-certified luxury goods. Study how governments and international trade bodies can standardize blockchain-based certification. Combine blockchain with AI (fraud detection), IoT (sensor-based tracking), and digital twins for stronger anti-counterfeiting.
18	Journal Article	The Enablers and Interdependencies of Blockchain Technology in Supply Chain Management: Evidence From Luxury Products	2024	John Wiley and Sons Inc	Thunderbird International Business Review	66	Majdi Anwar	Qattaisah	https://doi.org/10.1002/tie.22408	Identifies enablers and interdependencies for adopting blockchain in luxury supply chains.	ISM–MICMAC analysis, supported by literature review and expert input, to identify, structure, and classify blockchain adoption enablers in luxury supply chains.	Key enablers: Traceability & transparency → strengthen authenticity and reduce counterfeiting. Collaboration among stakeholders → shared adoption is crucial. Technological readiness → infrastructure, standards, and integration with existing systems. Regulatory support → provides legitimacy and compliance. Consumer demand for authenticity → drives brand incentives to adopt. Interdependencies: These enablers reinforce each other—e.g., regulatory frameworks boost collaboration, which enhances technological deployment. Implications: Blockchain adoption in luxury supply chains is most effective when technical, regulatory, collaborative, and consumer factors align.	Narrow focus – The study mainly identifies enablers of blockchain adoption while overlooking barriers and challenges that may hinder implementation. Static analysis – The ISM-MICMAC approach provides a static snapshot of relationships among enablers, without considering temporal changes or how relationships evolve over time. Oversimplification risk – The hierarchical structure from ISM may oversimplify reality by assuming linear and clear-cut hierarchies among enablers. Subjectivity and bias – Heavy reliance on expert opinions introduces potential personal biases, even if experts are carefully selected. Sector-specific findings – Results are based on the luxury product sector, which limits generalizability to other industries with different supply chain dynamics. Technology evolution – Blockchain is rapidly evolving; new developments may outdate findings quickly, limiting long-term relevance. Complexity not fully captured – ISM-MICMAC may not adequately reflect the dynamic and complex interactions of enablers in real-world supply chains. Expert sample limitations – Small or	Employ alternative methods – Use additional multi-criteria decision-making (MCDM) methods to validate the ISM-MICMAC findings. Empirical validation – Conduct survey-based empirical studies with practitioners to strengthen the robustness and generalizability of findings. Consider barriers alongside enablers – Future work should integrate both enablers and barriers of blockchain adoption for a more balanced view. Dynamic modeling – Extend the analysis to consider temporal changes and the evolution of enabler interdependencies over time. Cross-sectoral studies – Apply the framework to different industries beyond luxury products to test its applicability across diverse supply chains. Address privacy and security – Further research on data privacy, cybersecurity, and trust mechanisms in blockchain-enabled SCM. Standardization & policy – Explore the role of blockchain standardization, policies, and regulatory frameworks to support wider adoption. Practical applications – Develop and test use cases of blockchain-enabled supply chains to validate theoretical enabler frameworks in practice.

#	Source/Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
19	Journal Article	Interplay between manufacturers' blockchain adoption strategy and retailers' online channel introduction strategy in the presence of counterfeits	2025	Elsevier Inc.	Technological Forecasting and Social Change	218	Xiong	Zhang	https://doi.org/10.1016/j.techfore.2025.1	Focus: Analyzes how manufacturers' blockchain adoption and retailers' online channel strategies interact when counterfeits are present. Key Insights: Blockchain adoption by manufacturers → enhances product authenticity verification, reducing counterfeit circulation. Online channels → expand market reach but also increase counterfeit risks. Strategic tension: Manufacturers adopting blockchain may reduce counterfeit sales, boosting retailer credibility. Retailers introducing online channels need manufacturer blockchain support to protect against fakes.	Game-theoretic modeling	Optimal outcomes arise when both sales coordinate: blockchain adoption + online channels → higher consumer trust and profitability. Misalignment (online sales without blockchain, or blockchain without retailer alignment) weakens effectiveness. Implications: Collaboration between manufacturers and retailers is crucial. Blockchain is most effective when integrated with channel strategies.	The game-theoretic framework assumes homogeneous consumers, fixed blockchain costs, and simplified counterfeit dynamics, which may not reflect real-world complexity. The study is entirely theoretical; no case studies, experiments, or empirical data are used to validate the results. The model centers on one manufacturer–retailer supply chain, limiting generalizability across multiple or more complex networks. The analysis isolates blockchain adoption, without considering its integration with other technologies (e.g., IoT, AI, big data) that often complement it in practice. The framework is static, not capturing long-term dynamics of counterfeit evolution, blockchain scalability, or changes in consumer trust.	Validate the theoretical insights through field studies, surveys, or experimental data from industries heavily affected by counterfeiting. Extend models to include multiple manufacturers and retailers, especially in global supply chains with cross-border counterfeit issues. Incorporate longitudinal models to examine how blockchain adoption and counterfeit strategies evolve over time. Explore the combined impact of blockchain with IoT sensors, AI-driven monitoring, and digital authentication tools for counterfeit prevention. Study how consumer trust, willingness to pay, and perception of authenticity influence blockchain adoption strategies. Investigate how government policies, enforcement intensity, and legal frameworks shape blockchain adoption and online channel strategies.
20	Journal Article	Blockchain-Based Anti-Counterfeiting Management System for Traceable Luxury Products	2022	MDPI	Sustainability (Switzerland)	14	Chin Ling	Chen	https://doi.org/10.3390/su141912814	Problem: Luxury products are highly vulnerable to counterfeiting, which damages brands and reduces consumer trust. Proposal: A blockchain-based anti-counterfeiting system to ensure traceability and authenticity verification of luxury goods.	Conceptual framework	The proposed system (BCACMS) effectively ensures end-to-end product traceability across the luxury supply chain, preventing tampering and fraud. By combining blockchain, IoT, RFID, and QR codes, the system achieves secure product identification, making counterfeiting significantly harder. Automated recording and verification using smart contracts reduces manual intervention, ensuring real-time updates and minimizing errors. The developed prototype successfully validated authenticity verification, ownership transfer, and product tracking in test scenarios. Immutable blockchain records help brands protect reputation and build consumer trust, which is critical in luxury retail. While focused on luxury goods, the model shows potential for pharmaceuticals, electronics, and food supply chains, where authenticity is equally crucial.	The system was tested in simulated environments, not fully implemented in real-world luxury supply chains. Large-scale application may face network latency, high storage requirements, and energy costs. Compatibility with existing enterprise systems and global logistics networks is not fully addressed. The study focuses on technical feasibility but does not test consumer perceptions, trust, or adoption willingness. The legal acceptance of blockchain-based records as anti-counterfeiting evidence is not fully examined.	Test the system in actual luxury brand supply chains to validate feasibility and adoption barriers. Explore lightweight blockchain solutions (e.g., Layer-2, sharding, sidechains) to reduce costs and latency. Extend the model beyond luxury goods to pharmaceuticals, electronics, and food safety. Study consumer trust, willingness-to-pay, and user experience with blockchain-enabled authentication systems. Investigate how legal frameworks and industry standards can support blockchain-based anti-counterfeiting. Integrate blockchain with AI (fraud detection), IoT (real-time monitoring), and digital twins for enhanced performance.
21	Journal Article	Blockchain-based traceability for anti-counterfeit in cross-border e-commerce transactions	2021	MDPI	Sustainability (Switzerland)	13	Changhak	Yeon	https://doi.org/10.3390/su131911057	Problem: Cross-border e-commerce faces severe counterfeiting and trust issues due to complex, opaque supply chains. Proposal: A blockchain-based traceability system to authenticate products, track their movement, and prevent counterfeit infiltration. Challenges: Issues include high implementation cost, scalability, regulatory hurdles, and stakeholder adoption resistance.	Developed a blockchain-based traceability system through data tests	The pilot confirmed blockchain's ability to securely share end-to-end product information and prevent counterfeit proliferation in cross-border e-commerce. Consumers gained direct access to product authenticity data, reducing information asymmetry and enabling them to report counterfeits before purchase. The prototype validated secure data sharing between different blockchain systems, proving feasibility in heterogeneous cross-border environments. By preventing counterfeits, the system supports sustainability efforts and protects brands that invest in ecological and ethical supply chains.	Tests were performed on a limited number of products and nodes, restricting scalability insights. Achieved ~300 TPS, much lower than legacy systems (credit cards ~5000 TPS), highlighting scalability limits. Cross-blockchain integration relied on API servers, which increase complexity and expose vulnerabilities to cyberattacks. Different countries and firms use varied data standards, laws, and blockchain protocols, complicating ledger-level integration. Adoption requires balancing blockchain implementation costs with actual benefits for firms and consumers.	Expand to large-scale pilots with diverse products, sellers, and real-world cross-border platforms. Explore Layer-2 solutions, sharding, and other optimizations to improve throughput and efficiency. Develop standardized data protocols to enable direct ledger-to-ledger communication, reducing reliance on APIs. Study how customs, legal frameworks, and international regulations affect blockchain traceability adoption. Examine consumer adoption, trust, and willingness-to-pay for blockchain-enabled authenticity systems. Combine blockchain with AI (fraud detection), IoT (real-time monitoring), and digital twins for stronger anti-counterfeiting.
22	Journal Article	Managing the product-counterfeiting problem with a blockchain-supported e-commerce platform	2021	MDPI AG	Sustainability (Switzerland)	13	Ji	Jiang	https://doi.org/ 10.3390/su13116016	Focus: Proposes blockchain-supported e-commerce as a solution to counterfeiting. Problem: Traditional e-commerce platforms struggle with counterfeit detection, undermining trust. Solution: -Blockchain provides immutable, transparent records of product origin and transactions. -Smart contracts automate verification, reducing fraud. -Consumers gain real-time assurance of authenticity.	Game-theoretic modeling	Enhances trust, security, and consumer confidence in e-commerce. Benefits both brands (protection of reputation) and platforms (credibility, loyalty). Implications: Blockchain can transform e-commerce into a trust-based ecosystem. Requires cooperation across supply chains and platform operators.	The study only considered the situation where retailers and consumers cannot distinguish between genuine and counterfeit products. In reality, some consumers knowingly purchase counterfeit products because they are unwilling or unable to pay for genuine items. This situation was not included in the model The model assumes that the operating fees charged by blockchain-supported platforms are fixed. This creates a potential conflict between the platforms and firms because higher operating costs increase the burden on manufacturers and retailers. The analysis is primarily theoretical and model-based (using Stackelberg equilibrium and game theory), without empirical testing in real-world markets.	Expand the model to include both consumer behaviors: Those who unknowingly purchase counterfeit products AND Those who knowingly buy counterfeits due to price sensitivity. Investigate the relationship between platform operating fees and firm income. Future research could model how different fee structures affect manufacturers, retailers, and overall supply chain sustainability Empirical validation of the models in different industries (e.g., pharmaceuticals, luxury goods, automotive components) to confirm theoretical findings. Explore policy implications and how government intervention (e.g., subsidies, regulations, or incentives) could support adoption of blockchain-supported platforms for anti-counterfeiting.
23	Journal Article	The Impact of Online Anti-Counterfeiting on Channel Structure and Pricing Decisions	2023	MDPI	Sustainability (Switzerland)	15	Weiting	Wang	https://doi.org/ 10.3390/su15108253	How online anti-counterfeiting measures affect channel structures and pricing in supply chains.	Game-theoretic modeling	Anti-counterfeiting technologies (e.g., blockchain, monitoring, authentication) increase consumer trust in genuine products. This shifts demand away from counterfeit channels, raising demand for legitimate goods. Manufacturers may restructure channels (e.g., more direct sales) to capitalize on trust gains. Pricing strategies adjust: with stronger anti-counterfeiting, brands can maintain premium pricing and reduce price erosion from counterfeit competition. Costs of implementing anti-counterfeit measures must be balanced against benefits in sales recovery and brand equity. Implications: Online anti-counterfeiting strengthens brand control, channel power, and pricing leverage, but adoption must consider implementation costs.	The study assumes that the production costs of both genuine and counterfeit products are zero, which simplifies the analysis but does not reflect reality . The analysis is limited to non-deceptive counterfeits (consumers knowingly buy fakes). In reality, many consumers purchase deceptive counterfeits (thinking they are genuine), which was not modeled . The demand function is assumed to be certain and fixed, whereas in real markets demand is uncertain and influenced by multiple external factors .	Investigate how luxury manufacturers should select and deploy blockchain-based anti-counterfeiting strategies. Explore whether manufacturers should build in-house blockchain systems or partner with retailers/platforms (e.g., LVMH's Aura, JD.com, Tmall traceability) . Examine the emerging trend of luxury brands entering the second-hand / resale market. For example, Rolex's Certified Pre-Owned Programme shows a shift in strategy; future research should study when and why manufacturers participate in resale markets and the implications for anti-counterfeiting .
24	Journal Article	Bargaining our emotions: Exploring the lived experience of purchasing luxury fashion counterfeit	2022	John Wiley and Sons Inc	Strategic Change	31	Patrice	Piccardi	DOI: 10.1002/jsc.2521	This article explores the emotional and psychological experience of purchasing counterfeit luxury fashion items. It examines how these purchases affect consumers' self-concept, emotions, and behaviors, providing insights into why people choose to buy counterfeits and how they feel afterward.	Interviews	Consumers often felt initial positive emotions (happiness, excitement, pride) when purchasing counterfeits due to the sense of a "bargain." These feelings were later replaced by negative emotions (guilt, disappointment, shame) for many participants, linked to declining product quality and ethical concerns. Quality was a key factor in shaping post-purchase emotions. Impulsive buyers who ignored quality often regretted their purchase, while careful buyers who selected high-quality counterfeits reported sustained satisfaction. Learning about the unethical aspects of the counterfeit industry (e.g., child labor, unsafe working conditions) triggered guilt and regret, leading some to stop buying fakes. Others justified counterfeit purchases by criticizing luxury brands' high prices and perceived unfairness. For some, counterfeits created a sense of "faking the self," generating discomfort about authenticity and self-representation; For others, counterfeits enabled fashion self-expression at a lower price, aligning with their identity and style.	Only 10 limiting generalizability. Results are based on Western consumers; emotional and ethical perceptions may differ in Eastern or other cultural contexts. Interpretive phenomenological analysis provided depth but lacks quantitative validation of findings across larger populations. Focused on luxury fashion items (bags, clothes, accessories); results may not apply to other counterfeit markets (electronics, cosmetics, pharmaceuticals).	Replicate in Eastern or emerging markets to compare cultural differences in emotional and ethical responses. Use surveys or experiments with larger samples to test the generalizability of emotional patterns and self-concept effects. Explore psychological drivers (e.g., cognitive dissonance, moral awareness, identity construction) behind contrasting emotional outcomes. Assess how consumer education about ethics and sustainability influences counterfeit consumption behavior. Extend research to different counterfeit product categories (tech, cosmetics, luxury services) for broader insights.
25	Journal Article	Digital future of luxury brands: Metaverse, digital fashion, and non-fungible tokens	2022	John Wiley and Sons Inc	Strategic Change	31	Annamma	Joy	DOI: 10.1002/jsc.2502	How luxury brands are adopting to the digital future through the metaverse, digital fashion, and NFTs.	Conceptual/theoretical review	The metaverse provides new opportunities for luxury brands to extend brand storytelling, exclusivity, and immersive consumer engagement. Virtual showrooms, avatar customization, and digital communities create new forms of luxury identity expression. NFTs and digital fashion items allow luxury consumers to signal status digitally, similar to physical luxury goods. NFT ownership also functions as a tool for authenticity, scarcity, and investment value. Younger consumers (Gen Z, Millennials) are more open to digital luxury, associating virtual ownership with prestige. Traditional consumers still value tangibility, leading to a tension between physical and digital luxury adoption. Key concerns include counterfeiting of digital assets, sustainability issues, lack of regulation, and technological inequalities in consumer access.	Brands must adapt to a hybrid (phygital) strategy, balancing physical exclusivity with digital accessibility. Developing trusted NFT authentication systems is critical for combating counterfeit risks. Sustainability concerns should be addressed in digital fashion (e.g., energy-intensive blockchain). Expands the understanding of luxury consumption beyond material goods, framing luxury as also experiential and symbolic in digital spaces. Reinforces the role of scarcity, authenticity, and exclusivity as central to both physical and digital luxury.	Study how immersive environments (VR/AR) affect luxury brand attachment, trust, and loyalty . Investigate how different cultures perceive digital ownership, NFTs, and metaverse luxury, given varying views of materialism and authenticity. Explore the environmental impact of digital luxury production (NFT energy use, digital waste) and consumer acceptance of sustainable blockchain alternatives. Analyze hybrid strategies where digital assets complement physical luxury products (e.g., NFT certificates, phygital ownership). Future research should examine legal protections, intellectual property rights, and governance in metaverse luxury markets. Explore differences in adoption between digital-native generations (Gen Z, Millennials) and traditional luxury consumers (Gen X, Boomers).
26	Journal Article	The influence of blockchains and internet of things on global value chain	2022	John Wiley and Sons Inc	Strategic Change	31	Olayinka	Uadiale	DOI: 10.1002/jsc.2484	Explores how blockchain and IoT reshape global value chains (GVCs).	Survey	Combining blockchain with IoT improves scalability, security, and traceability in global value chains (GVCs) . This leads to better logistics coordination, efficiency, and competitiveness . BT + IoT enhances stock tracking, inventory safety, delivery, and warehousing management, reducing inefficiencies and errors . Integration strengthens value capture and collaboration across partners in the GVC, giving firms a competitive advantage . Retailers and manufacturers gain real-time insights on product quality, performance, and availability, improving responsiveness . Adoption of BT + IoT helps companies ensure end-to-end traceability, foster recalls, and consumer safety in agri-food and retail supply chains . Encourages GVC managers and policymakers to support IoT-enabled smart supply chains.	Study focused on the U.K.'s agri-food retail industry; limiting generalizability to other regions and industries . Based on a quantitative, closed-ended survey; qualitative insights and richer contextual data were not captured . The study examined benefits of BT + IoT integration but not the best methods for implementing it in practice . Did not address institutional, regulatory, and technical barriers (e.g., data privacy, lack of standards, interoperability issues) that could hinder adoption	Extend analysis to different industries and international contexts to compare institutional, cultural, and regulatory impacts . Use case studies, interviews, or mixed methods to capture deeper insights into integration challenges and strategies . Investigate how best firms can integrate blockchain with IoT in GVC operations (e.g., governance models, adoption roadmaps). Explore obstacles such as data privacy, cybersecurity, interoperability, and standardization—and how they can be overcome . Study how BT + IoT influences GVC performance over time, including long-term effects on sustainability, resilience, and competitiveness.
27	Journal Article	Economics of Permissioned Blockchain Adoption	2020	Elsevier BV	SSRN Electronic Journal		Garud	Iyengar	DOI: 10.2139/ssrn.3602376	Economic analysis of permissioned blockchain adoption in supply chains and industries.	Game-theoretic modeling	Permissioned blockchains are more likely to be adopted when they reduce information asymmetry in supply chains and when manufacturers hold market power. Adoption becomes feasible even when costs are small, contrasting with competitive markets where blockchain adoption may not occur. The study shows that risk-averse manufacturers are more inclined to adopt blockchain, as it enhances traceability and supply chain coordination, thereby reducing uncertainty. Blockchain adoption does not always maximize overall welfare: It can improve manufacturer welfare but potentially reduce supplier welfare. Aggregate welfare impacts are ambiguous and context-dependent. Permissioned blockchain can facilitate supplier diversification, improving resilience in certain equilibrium scenarios.	Uses a stylized economic model, abstracting from real-world complexities like multi-tier supply chains, regulatory environments, and consumer heterogeneity. The results are purely theoretical; no empirical or case study validation is included. Emphasizes manufacturers with market power, leaving out perspectives of small suppliers, retailers, or consumers. The model does not capture dynamic adjustments over time, such as technology learning curves or evolving adoption strategies.	Validate theoretical findings with industry case studies, surveys, or econometric analysis of blockchain adoption in supply chains. Explore multi-period or game-theoretic models that reflect adoption over time, technology diffusion, and competitive responses. Investigate the role of consumers, retailers, and regulators in influencing blockchain adoption decisions. Analyze the impact of different blockchain implementation costs (e.g., infrastructure, training, compliance) on adoption outcomes. Apply the framework to different industries (luxury, pharmaceuticals, electronics, food supply chains) to compare adoption patterns. Examine how government incentives, standards, or enforcement policies shape the economics of permissioned blockchain adoption.

#	SourceType	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
28	Journal Article	A low cost blockchain-based model for detecting of counterfeiting container in the road transport system	2025	Elsevier Ltd	Research in Transportation Business and Management	60	Hamid Reza	Ahmadifar	https://doi.org/10.1016/j.rtbm.2025.101	The article proposes a low-cost blockchain-based model to detect counterfeit containers in the road transport system, improving security and trust in logistics.	Framework development and evaluation	Combining container ID (Ki), truck GPS ID (Gi), and track identifier (IDi) into a SHA-3 hash stored on blockchain provides strong, tamper-proof authentication. Compared to IoT-based continuous tracking, the proposed model cuts implementation costs by ~80% (one Raspberry Pi Zero W + Bluetooth instead of GPS/IoT real-time tracking). Resistant to internet outages, GPS failures, and tag forgery since verification occurs at control stations (AICS) or the final destination. Can operate in low-connectivity environments (useful in rural or cross-border areas). Even if a counterfeit container replaces the real one, the mismatch in IDs exposes the fraud. Tracking at authorized checkpoints improves traceability without needing full-time IoT. Scales easily with more checkpoints or trucks, since continuous cloud storage and computation are not required.	The model does not provide instant notifications if a container is stolen during transit. Detection happens only at checkpoints or destination. Relies on Authorized Intermediate Control Stations (AICS) or destination checks for verification, limiting traceability between stations. The digital ID based is battery-powered; long trips or harsh conditions could affect reliability. Focused only on container-level security in road transport. Does not yet address product-level counterfeiting (e.g., items without durable packaging). Simulation-Only Testing	Apply the model in commercial shipping/logistics companies to test scalability, robustness, and cost savings in real practice. Develop solutions for individual goods without container packaging, where digital IDs cannot be embedded. Combine with IoT or vehicle monitoring systems to enable instant notifications of theft or tampering. Explore low-power or energy-harvesting hardware to improve the reliability of digital ID boards. Study how the model can be aligned with international customs and border regulations. Combine with RFID, QR codes, or blockchain-based digital twins to strengthen authenticity checks across different supply chain stages.
29	Journal Article	NFT luxury brand marketing in the metaverse: Leveraging blockchain-certified NFTs to drive consumer behavior	2023	John Wiley and Sons Inc	Psychology and Marketing	40	Eunyoung	Sung	DOI: 10.1002/mar.21854	Explores how NFTs and the metaverse reshape luxury brand marketing and consumer engagement.	Survey	Key Insights: Blockchain-certified NFTs provide authenticity, exclusivity, and digital ownership. NFTs enable new consumer experiences: virtual fashion, collectibles, community identity. Enhance brand-consumer interaction through scarcity, personalization, and immersive storytelling. NFTs also combat counterfeiting by tying physical and digital assets. Findings: Younger, digital-native consumers are especially responsive to NFT-based luxury experiences. NFTs act as both status symbols and engagement tools in the metaverse. Implications: Luxury brands should strategically integrate NFTs into marketing to blend exclusivity, innovation, and anti-counterfeiting benefits. NFTs can future-proof luxury marketing by bridging physical and digital value.	The study only surveyed metaverse platform users in the U.S. and South Korea. This restricts the generalizability of findings to other cultural contexts (e.g., Europe, Middle East, Africa, Latin America). The research used a cross-sectional survey rather than a longitudinal approach. This limits the ability to capture how consumer perceptions and behaviors toward NFTs may evolve over time. The study is confined to luxury brand fashion NFTs. Other NFT categories (e.g., music, sports collectibles, gaming assets) were not examined, which narrows the scope. Constructs such as authenticity, scarcity, and self-image congruence were studied in a controlled research framework. Real-world influences like fluctuating cryptocurrency markets, speculative behavior, or regulatory issues were not fully incorporated.	Future research should include more diverse cultural and regional contexts, as cultural orientation influences consumer perceptions of luxury and digital ownership. Track consumer perceptions and purchase intentions over time, especially as the NFT and metaverse markets mature. Extend investigations beyond luxury fashion into music, gaming, sports, and art NFTs, which may drive different consumer motivations. Examine how additional factors like risk perception, speculation, brand trust, and sustainability concerns affect NFT adoption. Future work could address intellectual property rights, copyright issues, and consumer protection in NFT marketing strategies.
30	Journal Article	Blockchain Adoption for Combating Deceptive Counterfeits	2021	John Wiley and Sons Inc	Production and Operations Management	30	Pengwen	Hou	DOI 10.1111/poms.13348	The article explores blockchain adoption as a means to combat deceptive counterfeits — fake products designed to closely imitate genuine goods and mislead consumers. Problem: Deceptive counterfeits harm brand reputation, reduce sales, and endanger consumers, especially in pharmaceuticals, luxury goods, and electronics.	Game-theoretic model	Blockchain adoption significantly reduces deceptive counterfeit sales by enabling product traceability and authenticity verification. Manufacturers and authorized retailers benefit from blockchain through higher revenues and brand protection. Counterfeiters face higher entry barriers, reducing their incentives. Consumer trust improves under blockchain systems, but in some scenarios, prices rise due to higher traceability costs, partially offsetting welfare gains. Adoption outcomes depend on cost of blockchain implementation, counterfeit prevalence, and consumer sensitivity to authenticity.	Assumes rational consumer decisions and uniform preferences, which may oversimplify real-world behavior. Does not address non-deceptive counterfeits, where consumers knowingly buy fakes. Blockchain adoption cost modeled as marginal cost, without reflecting technological complexity or integration issues. Results are purely theoretical, with no real-world testing or case-based validation.	Test the model with data from real industries (luxury goods, pharmaceuticals, electronics) to validate predictions. Extend analysis to non-deceptive counterfeit consumption and explore consumer psychology behind knowingly purchasing fakes. Explore long-term impacts of blockchain adoption, including technology evolution, repeated interactions, and brand reputation effects. Study blockchain adoption combined with AI detection, IoT sensors, and RFID for stronger anti-counterfeiting mechanisms. Incorporate the role of government policies, legal frameworks, and enforcement in shaping blockchain adoption outcomes.
31	Journal Article	"Centralized or Decentralized?": Concerns and Value Judgments of Stakeholders in the Non-Fungible Tokens (NFTs) Market	2024	Association for Computing Machinery	Proceedings of the ACM on Human-Computer Interaction	8	Yumpeng	Xiao	https://doi.org/10.1145/3637305	Centralization-decentralization dilemma in the NFT Market. While decentralization prevents centralized issues, it also enables, hacking, counterfeits and unethical content.	Analysis of tweets + 15 interviews	Top concerns: financial scams, counterfeit NFTs, hacking, and unethical NFTs. - Twitter discourse focused on trust, transparency, and diversity, but often as marketing slogans, not deep ethical debate. - Collectors prioritized investment gains; creators cared more about counterfeiting. - Interviews revealed mixed attitudes toward centralized regulation (Hacking: ~50% supported some centralization; Counterfeits: all creators supported centralization; most collectors indifferent; Financial scams & unethical NFTs: preference for community self-regulation over central authority.) - Stakeholder positions often shifted when personal interests were at stake.	Analysis focused only on Twitter and only 15 interviews. Recommendations only from technical lens and some of the researchers dont belong to the NFT community	Include more stakolders (investors, regulators,...) and incorporate social science and economics to complement technical insights. Work with NFT insiders and study discussions on NFT forums. Examine the real-world value of NFTs beyond speculation.
32	Journal Article	Reshoring: a strategic renewal of luxury clothing supply chains	2016	Springer New York LLC	Operations Management Research	9	Linda	Hsieh	DOI 10.1007/s12063-016-0116-x	Explores reshoring (bringing production back home) as a strategy for luxury clothing supply chains.	Case study	Key Insights: Motivated by quality control, authenticity, sustainability, and brand heritage. Reshoring strengthens exclusivity, craftsmanship, and supply chain transparency. Helps reduce risks tied to globalization (counterfeiting, long lead times, supply disruptions). Findings: Reshoring can enhance brand value but raises cost challenges. Works best when paired with innovation (digital tools, automation) to offset costs. Implications: Luxury brands can use reshoring as strategic renewal to reinforce prestige and resilience. Balances tradition with modern supply chain agility.	Single-case focus – The findings are based on Burberry's reshoring case, which may not be generalizable to other luxury clothing firms or industries. Recent reshoring initiative – Since Burberry's reshoring is a relatively recent phenomenon, it is too early to fully evaluate its impact on company performance. Limited scope: – The study mainly addresses supply chain renewal from a strategic perspective, without deeply exploring broader operational, financial, or consumer-related outcomes.	Comparative studies – Future research should analyze multiple luxury clothing firms across different countries to test the generalizability of the findings. Longitudinal research – A long-term study is needed to assess how reshoring impacts performance, competitiveness, and value creation over time. Sustainability of reshoring – Research should investigate whether reshoring strategies adopted by Western firms are sustainable in the long run. Capability development – Future studies should examine what capabilities and resources firms need to successfully implement sustainable reshoring strategies
33	Journal Article	Blockchain adoption and gray markets in a global supply chain	2023	Elsevier Ltd	Omega (United Kingdom)	115	Qing	Zhang	https://doi.org/10.1016/j.omega.2022.10	The article studies how blockchain adoption affects gray markets in global supply chains, using analytical modeling.	Game-Theoretic Modeling	Gray marketer entry lowers domestic retail prices but may increase foreign retail prices if brand equity impact is minimal. Blockchain adoption does not eliminate the gray market's influence on manufacturer pricing decisions. Blockchain adoption can either deter or promote gray market entry, depending on foreign market extra costs and real product quality. Even when blockchain promotes gray entry, the authorized channel still benefits from adoption. If product quality is high, manufacturers adopt blockchain when they are the first mover. Surprisingly, if quality is low and the gray marketer leads, the manufacturer may still adopt blockchain to disclose quality strategically. Gray market entry may actually increase consumer surplus in the foreign market, especially when foreign costs are high.	Assumes rational consumer decisions and uniform perceptions across markets. Focuses only on deceptive gray markets; non-deceptive cases not included. Blockchain adoption costs modeled simply as marginal costs, without exploring implementation complexity. Findings are theoretical only, without case-based or real-world testing. Government regulations, distributors, and logistics providers not explicitly modeled.	Validate models with data from real supply chains (e.g., luxury, electronics, pharmaceuticals). Extend to dynamic games considering repeated interactions, evolving technology, and brand reputation effects. Examine the role of IP law, trade policy, and consumer protection regulations in blockchain adoption. Include scenarios where consumers knowingly buy gray products at discounts. Explore blockchain + AI/IoT/RFID to improve quality verification and counter gray markets.
34	Journal Article	The impacts of blockchain adoption on a dual-channel supply chain with risk-averse members	2023	Elsevier Ltd	Omega (United Kingdom)	114	Yu	Gong	https://doi.org/10.1016/j.omega.2022.10	Analyzes how blockchain adoption influences a dual-channel supply chain (manufacturer + retailer) when members are risk-averse.	Game-theoretic modeling	Blockchain improves trust and reduces uncertainty. Blockchain ensures authentic, tamper-proof transaction data, improving consumer trust and reducing demand uncertainty for risk-averse supply chain members. With blockchain, consumers are willing to pay a premium for verified authenticity and traceability, leading to higher demand and competitiveness for blockchain-enabled channels. Blockchain adoption influences whether the manufacturer sells through direct channels, e-retailers, or both. In highly uncertain markets, even with higher costs, blockchain can act as a market competition tool, attracting more consumers via direct sales and later benefiting retailers as well. When channel competition is intense, optimal blockchain adoption strategies are similar to perfectly competitive markets. When competition is weak, managers should weigh blockchain costs and risks more carefully within single channels	The model assumes the manufacturer's production cost is zero, which simplifies analysis but is unrealistic. The study considers only one decision sequence in the game model. Different sequences may produce different outcomes. The paper mainly focuses on blockchain's role in consumer trust and demand preferences, without exploring broader efficiency improvements in logistics and cost reduction.	Future models should incorporate non-zero production costs, since these significantly affect equilibrium decisions in dual-channel supply chains. Study how alternative game structures and decision orders affect manufacturer and retailer strategies. Investigate how blockchain adoption can also improve logistics efficiency, reduce transaction costs, and streamline supply chain operations.
35	Journal Article	A game-theoretic strategic mechanism to control brand counterfeiting	2018	Emerald Group Holdings Ltd.	Marketing Intelligence and Planning	36	Hashim	Zameer	DOI 10.1108/MIP-02-2018-0053	The article develops a game-theoretic mechanism to help brand owners and governments control brand counterfeiting by balancing enforcement and market dynamics. A strategic model can guide decisions on enforcement intensity, penalties, and cooperation between brand owners and regulators.	Dynamic game theory of incomplete information	Joint action between brand owners and governments is most effective. Optimal strategy depends on market demand elasticity, enforcement cost, and counterfeiting profitability. Public awareness campaigns can indirectly reduce counterfeit demand.	No empirical data or real-world case validation was conducted. The study assumes that legitimate brands and consumers are unaware of counterfeiters' actions, which may not always reflect reality. Only deals with deceptive counterfeiting (where consumers unknowingly buy fakes), excluding non-deceptive cases (intentional purchases). The model does not fully incorporate the role of governments, international regulations, or law enforcement, even though these are critical in counterfeiting control	Test the proposed game-theoretic model with real industry data or case studies from sectors heavily affected by counterfeiting (luxury goods, pharmaceuticals, electronics). Extend analysis to non-deceptive counterfeiting, where consumers knowingly purchase fake products. Role of Governments & Institutions Analyze the interaction between brands, counterfeiters, and regulatory authorities, possibly through multi-player game models. Explore how blockchain, RFID, and AI-based traceability systems can strengthen anti-counterfeiting strategies and modify the game dynamics. Apply the framework across industries (luxury fashion vs. pharmaceuticals vs. consumer electronics) to see whether optimal anti-counterfeiting costs differ by sector.
36	Journal Article	Dark motives-counterfeit selling framework: An investigate on the supply side of the non-deceptive market	2018	Emerald Group Holdings Ltd.	Marketing Intelligence and Planning	36	Park	Thaichon	DOI 10.1108/MIP-04-2017-0069	Why and how sellers engage in the non-deceptive counterfeit market (where buyers know they're purchasing fakes).	Framework development through interviewes	Sellers exploit high margins, low risks, and strong consumer appetite for affordable luxury. Digital channels provide anonymity, scalability, and global reach. Non-deceptive counterfeit trade is sustained by mutual acceptance between sellers and buyers.	Based on only 22 in-depth interviews with counterfeit sellers in Vietnam, limiting the generalizability of findings. Conducted only in Vietnam, which may not represent counterfeit seller motives in other cultural or economic contexts. Focused primarily on fashion products, which may not capture motives for counterfeit sales in other industries (electronics, luxury watches, pharmaceuticals, etc.). Sellers' responses may reflect rationalizations or self-presentation biases rather than their true underlying motives. As a qualitative and exploratory study, it provides conceptual insights but lacks quantitative validation.	Replicate in other countries and cultural contexts to explore how cultural dimensions (e.g., collectivism vs. individualism) influence counterfeit selling motives. Include a broader pool of sellers across industries and demographics to increase representativeness. Combine qualitative interviews with quantitative surveys to validate and generalize the dark motives framework. Compare online vs. offline counterfeit sellers, or sellers in developing vs. developed economies, to identify differences in motives and practices. Extend research to explore manufacturers, distributors, and intermediaries in the counterfeit supply chain, not just end-retailers. Study how new platforms (e.g., TikTok, Telegram, encrypted marketplaces) are shaping counterfeit selling strategies.

#	SourceTyne	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
37	Journal Article	Should brand-owners adopt blockchain to combat deceptive counterfeits when competing with copycats? Impact of consumers' anticipated regret	2024	John Wiley and Sons Ltd	Managerial and Decision Economics	45	Zhimin	Guan	https://doi.org/10.1002/mde.4358	Examines whether brand owners should adopt blockchain against deceptive counterfeits, considering consumer anticipated regret.	game-theoretic model	Key Insights: Blockchain increases product authenticity and transparency, reducing counterfeit risks. Consumers experience two forms of anticipated regret: Regret of buying a counterfeit mistakenly → blockchain reduces this. Regret of missing a purchase → affects willingness to pay. Findings: Blockchain adoption is most effective when deceptive counterfeits dominate the market. Boosts consumer trust and allows brands to maintain pricing power. Implications: Firms should weigh blockchain costs vs. counterfeit risks. Adoption is strategically valuable when counterfeit deception undermines consumer trust.	Simplified modeling assumptions – The study relies on a stylized game-theoretic model, assuming rational consumer behavior and homogeneous market conditions, which may not capture real-world complexity. Static analysis – The model considers a one-period equilibrium and does not account for long-term or dynamic adoption of blockchain. Focus on anticipated regret only – Other behavioral factors (e.g., trust, risk perception, cultural differences) are not considered in consumer decision-making. Industry-specific generalizability – The results are conceptualized for brand–counterfeit competition in general, but outcomes may differ across industries (luxury fashion vs. electronics vs. pharmaceuticals). Lack of empirical testing – The findings remain theoretical, with no survey, case study, or experimental validation.	Empirical validation – Test the theoretical insights with consumer surveys, lab experiments, or industry case studies to confirm behavioral assumptions (e.g., regret). Dynamic modeling – Extend to multi-period or evolutionary models that capture how blockchain adoption unfolds over time. Cross-industry analysis – Investigate differences in blockchain adoption between industries with varying levels of counterfeiting and consumer sensitivity. Broader behavioral factors – Incorporate trust, uncertainty reduction, loss aversion, and brand loyalty into consumer choice models. Policy and regulation – Study the role of government interventions, international cooperation, and legal enforcement in shaping blockchain adoption strategies. Integration with other technologies – Explore synergies between blockchain, AI, and IoT in counterfeit prevention and supply chain transparency. Sustainability perspective – Examine how blockchain-enabled anti-counterfeiting contributes to sustainable consumption and circular economy practices.
38	Journal Article	Blockchain Adoption in a Supply Chain with Manufacturer Market Power	2024	INFORMS Inst.for Operations Res.and the Management Sciences	Management Science	70	Wenjun	Wang	DOI: 10.1287/mnsc.2022.02505	The article analyzes blockchain adoption in a supply chain where the manufacturer holds market power over retailers, using game-theoretic modeling.	game-theoretic model	Blockchain adoption always strictly increases manufacturer welfare if implementation costs are sufficiently low. Manufacturers adopt blockchain to: Reduce risk via supplier diversification (traceability). Exploit improved consumer information by raising prices (transparency). Suppliers adopt blockchain even if it lowers their welfare, since rejecting manufacturer orders yields zero payoff under manufacturer dominance. Consumers do not benefit because manufacturers with market power raise prices to extract any welfare gains from reduced information asymmetry. Blockchain can either increase or decrease overall welfare: Increases when manufacturer and supplier costs are low; Decreases when supplier implementation costs are high, even if manufacturers gain.	Short-term, one-shot interaction; ignores long-term dynamics, reputation effects, and repeated interactions. Homogeneous suppliers and binary product defects may not capture real-world complexity. Consumers modeled with simple utility and signals, not behavioral biases. Blockchain implementation costs simplified as fixed or marginal, excluding integration complexity, scalability, or regulatory costs. Results are entirely theoretical, with no case study or industry data confirmation.	Extend to multi-period models to capture learning, brand reputation, and technology evolution. Study differentiated supplier quality levels, defect probabilities, and consumer heterogeneity. Validate findings with real-world data from industries like food, pharmaceuticals, and electronics. Explore how laws, enforcement, and certification standards shape blockchain adoption. Compare outcomes under competitive markets vs. monopolistic settings to test robustness of findings. Investigate combined use of blockchain with IoT, AI, or RFID for traceability and consumer trust.
39	Journal Article	Supply Chain Transparency and Blockchain Design	2024	INFORMS Inst.for Operations Res.and the Management Sciences	Management Science	70	Yao	Cui	https://doi.org/10.1287/mnsc.2023.4851	How blockchain design choices affect supply chain transparency.	game-theoretic model	Blockchain that enables cost and order transparency alters both ordering and pricing decisions. It reduces inefficient overordering driven by information asymmetry in rationing games, improving supply chain efficiency. Order transparency benefits the manufacturer (higher profits) but hurts buyers by reducing their profit opportunities. This creates an incentive misalignment, requiring the manufacturer to compensate buyers to adopt blockchain. Providing cost transparency only (not order transparency) can sometimes improve supply chain profit. This setup reduces double marginalization and allows both manufacturers and buyers to benefit. Implementation requires access control layers to allow visibility across tiers but restrict visibility within the same tier . Blockchain can be designed to share data selectively across supply chain tiers rather than fully open access. Whether blockchain should be implemented depends on the manufacturer's capacity and the type of transparency it enables.	The study is based on analytical game-theoretic modeling, not empirical validation. Focuses on a simplified supply chain structure (manufacturer + two buyers), which may not capture the complexity of multi-tier global supply chains. Assumes rational and profit-maximizing actors, which may not reflect real-world behavioral or trust-related dynamics. Does not consider technological costs, security issues, or implementation frictions of blockchain systems.	Empirical validation with industry data (e.g., automotive, pharmaceuticals) to test the theoretical predictions. Extension to multi-tier and multi-echelon supply chains, capturing broader coordination and competition effects. Behavioral factors: Study how bounded rationality, trust, or information biases influence blockchain adoption decisions. Implementation challenges: Explore governance, security, and cost structures in real blockchain platforms. Hybrid transparency models: Analyze how combining partial transparency with traditional contracts affects efficiency and incentive alignment.
40	Journal Article	An Integrated Impact of Blockchain on Supply Chain Applications	2021 MDPI	Logistics		5	Renata	Ćwiklicki	https://doi.org/10.3390/logistics5020033	The article analyzes the integrated impact of blockchain technology on various supply chain applications, focusing on efficiency, transparency, trust, and security.	PLS-SEM method; Data through a survey	Blockchain adoption significantly increases supply chain transparency, flexibility, and trust in suppliers. Blockchain allows real-time information sharing and prevents data tampering, which improves visibility and traceability across the supply chain. Real-time data integration supports faster adaptation to demand changes, improving resilience and decision-making in volatile environments. Immutable records and smart contracts establish trust among partners, reducing opportunistic behavior and conflict of interest. Blockchain can enhance cooperation and integration, supporting sustainable competitive advantage for manufacturing firms.	Limits generalizability across industries and countries. Since blockchain use is still new and rare in practice, the sample excluded many companies not yet adopting it. Study focused on manufacturing companies only, excluding other important industries (e.g., logistics, services). Used PLS-SEM due to small sample size. While suitable, it limits comparison with more robust statistical models. High variability across company responses suggests differences in blockchain maturity and implementation levels.	Conduct studies with larger datasets and include companies from different countries and industries. Extend research beyond manufacturing to logistics, maritime, retail, and services where blockchain adoption is growing. Use data mining, clustering, or machine learning (e.g., support vector machines) for deeper insights. Directly include cooperation, integration, and sustainability performance in future models. Explore how government regulations, advanced technology policies, and international standards shape blockchain adoption in supply chains.
41	Journal Article	Value Proposition Assessment of Blockchain Technology for Luxury, Food, and Healthcare Supply Chains	2021 MDPI	Logistics		5	Moritz	Berneis	https:// doi.org/10.3390/logistics5040088	Evaluates how blockchain creates value in luxury, food, and healthcare supply chains.	Case-based evaluation informed by a systematic literature review	Luxury: Blockchain ensures authenticity and anti-counterfeiting, protecting brand value. Food: Enables traceability and safety assurance, reducing fraud and contamination risks. Healthcare: Enhances drug traceability, patient safety, and regulatory compliance. Cross-sector benefits: Transparency, trust, efficiency, and accountability. Challenges: High costs, scalability, regulatory uncertainty, and stakeholder adoption barriers.	Due to space constraints, the paper cannot fully discuss the wide and complex topic of blockchain in supply chains. Analysis is based mainly on literature review and selected case studies, meaning findings rely on available documented use cases rather than large-scale empirical data. Many blockchain applications in food and healthcare remain at the prototype or pilot stage, so conclusions about value propositions are theoretical rather than proven in practice. A key limitation lies in the interface problem—the link between physical goods and their digital twins in blockchain is often insecure, which undermines blockchain's theoretical benefits. Results highlight specific sectors (luxury, food, healthcare), which may not be fully representative of other industries.	Extend the proposed decision tree for blockchain adoption by adding more decision points about specific business needs, while balancing clarity and complexity. Explore how consumer awareness and understanding of blockchain affect it's value proposition. Since many customers don't understand blockchain, future work could examine how education, transparency, or communication strategies shape adoption willingness. Apply the value proposition assessment to other supply chain contexts beyond luxury, food, and healthcare, especially in sectors with different value/volume dynamics. Conduct empirical studies (e.g., surveys, experiments, or longitudinal studies) to test whether blockchain's theoretical benefits (traceability, immutability, transparency) translate into real competitive advantage. Research how to make the physical–digital interface (digital twins, tagging, IoT integration) as secure as the blockchain itself to ensure end-to-end trust.
42	Journal Article	Effects of Promotional Bundles with Non-Fungible Token (NFT) Fashion on Consumers' Perceptions	2024	Multidisciplinary Digital Publishing Institute (MDPI)	Journal of Theoretical and Applied Electronic Commerce Research	19	Song Yi	Youn	https://doi.org/10.3390/jtaer19040161	How bundling NFT fashion with physical products affects consumer perceptions.	Survey	Bundles with NFTs increase perceived value, exclusivity, and innovativeness of the brand. NFT bundles strengthen brand authenticity and digital engagement, especially for younger, tech-savvy consumers. Consumers view NFTs as signals of scarcity and uniqueness, aligning with luxury brand positioning. Potential downside: if poorly executed, NFTs can cause confusion or skepticism about value. Implications: Luxury and fashion brands can use NFT bundles as marketing tools to boost brand equity and consumer excitement. Success depends on clear communication of NFT benefits and seamless integration with brand identity.	Only two brands were studied (Gucci and New Balance), which may limit generalizability across other luxury and non-luxury fashion brands. The study is based on hypothetical scenarios and consumer perceptions, not real purchasing behavior. Focused on NFT as a promotional tool, without exploring other functions (e.g., resale, community membership, utility in metaverse). Demographic and cultural differences in NFT perceptions were not fully captured.	Test across different categories of fashion and luxury brands to enhance generalizability. Use field experiments or real transaction data to confirm whether stated perceptions align with actual purchase behavior. Explore how cultural differences influence NFT acceptance, authenticity perceptions, and bundle evaluations. Study NFTs beyond promotions, including their roles in resale value, exclusivity, and virtual community engagement. Investigate whether perceptions of NFT bundles change over time as NFT markets mature and consumer familiarity grows.
43	Journal Article	Using Blockchain Technology to Combat Counterfeits: The Optimal Pricing Scheme of Two Competitive Platforms	2024	Multidisciplinary Digital Publishing Institute (MDPI)	Journal of Theoretical and Applied Electronic Commerce Research	19	Jiai	Li	https://doi.org/10.3390/jtaer19040158	Problem: Counterfeits hurt e-commerce, and platforms face challenges in preventing them while staying competitive. Focus: How blockchain traceability can be used by two competing platforms and how it affects pricing, competition, and counterfeit reduction.	Game-theoretic modeling	Blockchain increases consumer trust and reduces counterfeit trade by making product origins verifiable. Platforms adopting blockchain can charge higher prices due to added trust and authenticity value. If only one platform adopts blockchain, it gains competitive advantage; if both adopt, competition shifts to pricing and service. Adoption decisions depend on implementation costs, consumer awareness, and counterfeit prevalence. Implications: Blockchain can be a strategic tool against counterfeits, but success depends on consumer education and industry-wide adoption. Policymakers and firms should incentivize blockchain adoption to enhance market-wide authenticity.	The model assumes only two types of platforms, one adopting blockchain (with higher costs) and one traditional (without blockchain). Real markets are more diverse with hybrid strategies. Consumers are assumed to always perfectly identify authenticity under blockchain adoption. In reality, consumers may still distrust digital certificates or lack awareness of blockchain's function . The model focuses on blockchain's deployment costs but does not capture other operational challenges (e.g., integration with supply chain partners, regulatory compliance, or scalability issues). The paper treats counterfeits as eliminated once blockchain is adopted, without modeling how counterfeiters might adapt or shift tactics .	Extend the model to study multiple competing platforms (not just two) and hybrid adoption strategies (partial blockchain use). Explore how consumer trust, awareness, and risk perception influence blockchain's effectiveness in combating counterfeits. Investigate long-term competitive dynamics, where platforms may gradually adopt blockchain or adopt it in stages depending on costs and market pressure. Incorporate strategic responses by counterfeiters, such as shifting to other markets, developing new deception methods, or attacking blockchain-verified supply chains. Analyze regulatory, interoperability, and scalability issues in blockchain adoption for anti-counterfeiting, especially across global supply chains.
44	Journal Article	Preventing return fraud in reverse logistics—A case study of espres solution by ethereum	2021 MDPI	Journal of Theoretical and Applied Electronic Commerce Research		16	Ting Wei	Wu	https://doi.org/10.3390/ jtaer16060121	Explores how an Ethereum-based blockchain solution (ESPRES) prevents return fraud in reverse logistics.	Case study	Problem: Return fraud (e.g., returning used/counterfeit goods as new) causes major losses in e-commerce and retail. Solution: ESPRES uses Ethereum smart contracts to record product lifecycle data immutably. Ensures authenticity and condition verification at each stage of the return process. Findings: Prevents fraudulent returns by providing transparent, tamper-proof records. Increases trust among retailers, logistics providers, and consumers. Implications: Blockchain can secure reverse logistics, reducing costs and protecting brand reputation. Provides a scalable model for tackling fraud in e-commerce.	Case-specific context – The study focuses only on the ESPRES solution using Ethereum blockchain, limiting the generalizability to other industries, platforms, or blockchain frameworks. Technology-centric view – The analysis emphasizes blockchain's technical features but does not deeply address organizational, legal, or consumer acceptance challenges. Implementation stage – The solution is still in an early or pilot phase, so its scalability and long-term effectiveness remain uncertain. Lack of comparative analysis – The study does not benchmark blockchain-based fraud prevention against traditional fraud detection or other digital technologies (AI, IoT). Absence of empirical testing – No quantitative evaluation of fraud reduction rates, costs, or operational improvements is provided; insights remain largely conceptual and descriptive.	Cross-industry validation – Test blockchain-based return fraud prevention across different industries (e.g., fashion, electronics, pharmaceuticals). Empirical performance measurement – Quantitatively assess fraud reduction, efficiency gains, and cost–benefit trade-offs of blockchain-based systems. Consumer acceptance studies – Explore how customers perceive blockchain-enabled return processes and whether transparency affects trust and loyalty. Integration with other technologies – Investigate how blockchain can be combined with AI, machine learning, and IoT sensors to enhance fraud detection. Policy and regulatory dimensions – Study the role of legal frameworks and regulations in shaping blockchain adoption for fraud prevention. Scalability and interoperability – Examine how blockchain solutions can scale across global supply chains and interoperate with existing enterprise systems.
45	Journal Article	Anti-counterfeiting advertisements for luxury brands in the post pandemic era: Roles of message type, visual presentation mode, and self-construal	2023 Elsevier Ltd	Journal of Retailing and Consumer Services		73	Gangseog	Ryu	https://doi.org/10.1016/j.jretconser.2023	To examine how anti-counterfeiting ads—through their message type (value-expressive vs. social-adjustive), visual presentation (single vs. comparative images), and consumer self-construal (independent vs. interdependent)—influence consumer intentions to buy counterfeit luxury products.	Test of 4 hypotheses	Independent self-construal consumers showed lower counterfeit purchase intention when exposed to value-expressive messages. Interdependent self-construal consumers showed lower purchase intention when exposed to social-adjustive messages. Independent consumers were more persuaded when ads showed only the counterfeit product. Interdependent consumers were more persuaded when ads showed both counterfeit and genuine products side-by-side. The effect of message type was mediated by perceptions of value-expressive and social-adjustive benefits. The effect of visual presentation was mediated by processing fluency (ads were more effective when self-construal matched the presentation style). Higher knowledge of counterfeit products correlated with higher purchase intention, across both experiments.	Experiments focused only on luxury watches, a gender-neutral but single category, limiting generalizability to other luxury goods. Conducted in South Korea, a society with both collectivist and individualist tendencies, which may not reflect global consumer responses. Gender did not show the expected influence, possibly due to differences in how males and females weigh risks in counterfeit consumption. Anti-counterfeiting ads might unintentionally raise awareness of counterfeits among some consumers. The study measured intentions, not actual counterfeit purchase or genuine brand consumption behaviors.	Test with other luxury products (e.g., handbags, apparel, jewelry) and consider conspicuous vs. non-conspicuous luxury goods. Examine effects in different cultural contexts (Western vs. Asian) where independent vs. interdependent self-construal may dominate. Investigate whether men and women assign different weights to value-expressive and social-adjustive risks. Look beyond counterfeit purchase intention to study effects on genuine brand attitudes, awareness, and loyalty. Explore effects when massstige brands or luxury line extensions are used as reference points instead of only top-tier luxury brands. Compare conspicuous vs. non-conspicuous luxury products, as self-construal may interact differently depending on logo prominence.

#	Source/Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
46	Journal Article	Blockchain meets luxury The role of NFT authentication in luxury retail platforms	2025		Journal of Retailing and Consumer Services		Jiyun	Kang	https://doi.org/10.1016/j.jretconser.2025	Problem: Luxury markets suffer from counterfeiting and trust issues. Proposal: Use NFTs on blockchain to authenticate luxury goods, ensuring provenance, ownership, and scarcity.	scenario-based experimental approach	Findings: NFTs enhance traceability, exclusivity, and authenticity perception, strengthening consumer–brand relationships. Challenges: High energy use, regulatory uncertainty, consumer education, and market volatility.	Only compared presence vs. absence of NFT authentication; did not benchmark against other methods like digital watermarks or serial numbers . Focused on luxury leather bags and hypothetical brands/platforms, which may limit generalizability to other categories and real-world settings . Did not account for individual differences (e.g., blockchain familiarity, trust in technology) that could shape consumer responses . Online purposive sampling may introduce bias, overrepresenting digitally savvy luxury consumers while underrepresenting others .	Compare NFT authentication with digital watermarks, serial numbers, or RFID to assess relative strengths across different luxury contexts . Extend research beyond leather bags to jewelry, watches, and apparel, and test with real-world brands (e.g., Louis Vuitton, Gucci) and platforms (e.g., The RealReal, Fashionphile). Explore how consumer blockchain familiarity, tech trust, and communication framing (security, provenance, sustainability) influence perceptions . Use mixed-mode data collection (online + offline), probability sampling, and statistical weighting to improve representativeness across demographics .
47	Journal Article	Consumer preferences for the visual presentation of non-fungible tokens (NFTs) of luxury products: The role of perceived authenticity	2025	Elsevier Ltd	Journal of Retailing and Consumer Services	82	Jungkeun	Kim	https://doi.org/10.1016/j.jretconser.2024	Examines how the visual presentation of NFTs for luxury products influences consumer preferences and authenticity perception.	Survey	Strong, clear, and premium visual design of NFTs enhances perceived authenticity and trust. Higher perceived authenticity increases consumer preference, engagement, and willingness to pay. Poor or generic NFT visuals weaken credibility and consumer interest.	The study may have relied on a relatively homogeneous demographic sample, limiting generalizability to broader luxury consumer groups. Conducted at a single point in time, making it difficult to assess how NFT perceptions evolve with increased consumer familiarity. Examined visual design aspects of NFTs, without considering other factors like pricing, blockchain type, or brand reputation. Relied on self-reported measures (intentions, attitudes), rather than tracking actual NFT purchase behavior.	Extend studies across different age groups, income levels, and cultural contexts to test consumer heterogeneity. Track changes in consumer perception over time, as NFTs and blockchain luxury adoption mature. Examine other NFT attributes, such as scarcity, utility (e.g., unlockable content), pricing strategies, and blockchain infrastructure. Study how luxury houses can integrate NFTs into phygital experiences (bridging physical and digital ownership). Use field experiments, transaction data, or behavioral tracking to validate self-reported purchase intentions.
48	Journal Article	Manufacturers' channel strategy with consumer disappointment aversion and blockchain anti-counterfeiting	2025	Elsevier Ltd	Journal of Retailing and Consumer Services	87	Tianyang	Yu	https://doi.org/10.1016/j.jretconser.2025	Examines how blockchain-based anti-counterfeiting influences manufacturers' channel strategies, considering consumers' disappointment aversion (strong reaction to receiving counterfeits).	game-theoretic modeling	Blockchain adoption strengthens direct-to-consumer or trusted retailer channels. Without blockchain, risk of counterfeit disappointment makes consumers hesitant, reducing demand. Implications: Blockchain is a strategic tool not just for security but for channel design and consumer trust management. Adoption shifts competitive advantage toward brands offering verified authenticity.	The baseline model assumes zero blockchain implementation cost and ignores product return behavior, even though both factors exist in reality. Although extensions are provided later (considering blockchain costs and consumer returns), the baseline results may not fully capture real-world complexity. The study considers only one manufacturer and one retailer, while in practice, markets involve multiple competing retailers, platforms, and manufacturers. The model captures consumer disappointment aversion (feeling when receiving counterfeits) but does not jointly consider other behavioral biases like regret aversion or loss aversion, which may also affect purchase decisions. Privacy concerns are treated as a parameter, but in reality, consumer attitudes toward blockchain privacy can vary dynamically across regions, cultures, and over time.	Extend the model to include multiple manufacturers and retailers, which would reflect more realistic competitive dynamics in blockchain-enabled and counterfeit-prone markets. Explore the combined effects of disappointment aversion, regret aversion, and other behavioral economics factors on consumer decision-making and channel strategies. Examine in greater detail how blockchain costs, government subsidies, or policy incentives influence firms' adoption strategies. Future studies could investigate regional or temporal differences in privacy concerns and how these shifts affect the adoption of blockchain-enabled retail channels. The work is largely game-theoretic and analytical. Further empirical research and case studies are needed to test the theoretical insights in real supply chain contexts (e.g., luxury goods, pharmaceuticals, electronics).
49	Journal Article	Consumers' awareness of luxury brand counterfeits and their subsequent responses: when a threat becomes an opportunity for the genuine brand	2016	Emerald Group Publishing Ltd.	Journal of Product and Brand Management	25	Silvia	Grappi	DOI 10.1108/JPBM-11-2014-0747	Investigates how consumer awareness of counterfeits shapes attitudes toward genuine luxury brands.	Survey	Awareness of counterfeits increases consumer caution and skepticism. Paradoxically, it can also strengthen appreciation for genuine brands, as consumers value authenticity more. Genuine brands can leverage counterfeit threats to highlight their quality, exclusivity, and authenticity.	May be limited to specific demographics or geographic regions, restricting generalizability. Conducted at one point in time, not capturing changes in awareness and responses over time. Relies on perceptions and intentions, which may not fully reflect actual consumer behavior. Primarily examines awareness of counterfeits, without integrating broader consumer psychology (e.g., status consumption, morality, cultural values).	Compare responses across different countries and cultural contexts, since counterfeit prevalence and consumer attitudes vary globally. Track how awareness and brand responses evolve over time, especially as counterfeit markets change. Use experimental designs, purchase tracking, or field studies to validate beyond self-reported measures. Explore roles of brand attachment, trust, moral judgment, and social identity in shaping consumer reactions to counterfeits. Investigate how luxury brand communication, anti-counterfeiting efforts, and authenticity campaigns moderate consumer responses.
50	Journal Article	Smart Contracts in Supply Chains	2025	SAGE Publications Ltd	Journal of Marketing Research	62	Liang	Guo	DOI: 10.1177/00222437251314003	Explores how smart contracts transform supply chain operations.	Conceptual Framework Development	Key Insights: Automate transactions and enforce agreements without intermediaries. Improve traceability, transparency, trust, and efficiency. Reduce risks of fraud, counterfeiting, and disputes. Findings: Smart contracts streamline processes like payments, inventory management, and logistics. Adoption enhances collaboration across supply chain partners. Implications: Firms can cut costs, boost trust, and improve resilience. Strategic use of smart contracts supports anti-counterfeiting and digital transformation.	Simplified assumptions – The study models smart contract use in supply chains under controlled assumptions, which may not capture the complexity of real-world supply networks. Early-stage adoption – Since blockchain and smart contracts are still emerging, the analysis is based on conceptual or pilot implementations rather than large-scale, long-term data. Technical constraints – The study does not deeply examine scalability, interoperability, or cybersecurity risks associated with smart contracts. Regulatory and legal issues – Legal enforceability and jurisdictional differences in contract law are only briefly acknowledged, not fully analyzed. Lack of empirical validation – The research is largely conceptual/theoretical, without extensive empirical testing across industries.	Empirical case studies – Conduct in-depth studies of real-world supply chains adopting smart contracts to validate theoretical assumptions. Cross-industry comparisons – Explore adoption across different sectors (e.g., fashion, food, pharmaceuticals) to assess generalizability. Integration with IoT and AI – Investigate how smart contracts can work with IoT sensors and AI-based decision systems for automation and fraud prevention. Scalability and interoperability – Develop models to address transaction costs, system scalability, and integration between different blockchain platforms. Regulatory frameworks – Study how different legal systems and regulatory environments influence the enforceability and adoption of smart contracts. Behavioral and managerial perspectives – Examine how managers and supply chain partners perceive and adapt to smart contract–driven automation. Sustainability impacts – Assess the role of smart contracts in enabling green supply chains, circular economy practices, and carbon tracking.
51	Journal Article	A supplier evaluation model based on customer demand in blockchain tracing anti-counterfeiting platform project management	2020	KeAi Communications Co.	Journal of Management Science and Engineering	5	Aijun	Liu	https://doi.org/10.1016/j.jmse.2020.06.0	The article presents a supplier evaluation model tailored for blockchain-based tracing and anti-counterfeiting platforms, incorporating customer demand into project management decisions. The purpose is to help organizations select suppliers who can best meet the requirements of blockchain-enabled traceability systems, especially in anti-counterfeiting applications.	Evaluation framework development	Among the four dimensions (platform overview, core technology, application support, operations management), core technology had the highest weight and impact on the selection of blockchain tracing anti-counterfeiting platforms (BTAPs). While technology leads, application support (e.g., stability, storage expansion, business isolation) also plays a significant role and cannot be ignored. Within sub-criteria, data traceability, private key management, stability, and operations were the most influential factors. Proposed Framework Validated: The integrated QFD–BWM–VIKOR–DEMATEL framework (with fuzzy sets) proved effective in handling customer demand, ranking suppliers, and analyzing relationships among criteria. Sensitivity analysis confirmed core technology as the most sensitive dimension affecting rankings. Comparative analysis showed that the proposed model provides more stable and reliable results than TOPSIS or fuzzy comprehensive evaluation methods. The success of BTAPs also depends on	The BTAP criteria system is not fixed—it evolves with changing customer demands and market conditions, which limits long-term applicability of current weights. Only three groups of decision-makers (e-commerce executives, communication department heads, blockchain experts) were consulted, which may not capture diverse stakeholder perspectives. Since blockchain anti-counterfeiting applications are still in an early exploratory phase, findings may not generalize across industries or regions.	Include more diverse stakeholders (e.g., consumers, regulators, logistics providers, global supply chain actors) in evaluating BTAPs. Develop methods to dynamically adjust evaluation criteria and weights as customer needs and technologies evolve. Test the framework in different industries (luxury goods, pharmaceuticals, electronics) and across international contexts to improve generalizability. Apply the model to real-world BTAP projects to test its robustness beyond theoretical simulations. Explore how government policies, legal frameworks, and consumer protection laws can be incorporated into supplier evaluation for BTAP projects.
52	Journal Article	A focused supply chain strategy for luxury fashion management	2017		Journal of Fashion Marketing and Management		Hakan	Karaosman	http://dx.doi.org/10.1108%2FJFMM-03-	The article discusses the concept of a focused supply chain strategy, emphasizing aligning supply chain design with a company's competitive priorities to maximize performance. Rather than using a one-size-fits-all approach, firms should design different supply chain configurations for different product segments, markets, or customer needs.	Delphi study through a survey	The benefits are: Improved service levels through better demand-supply alignment; Reduced costs by eliminating unnecessary complexity and Clearer priorities and resource allocation.	Results may not be representative of the broader global luxury fashion industry. Findings on the dependence of SC performance (reactivity, dependability, flexibility, leanness, customization) on product, brand, and retail channel cannot be generalized. Different companies may experience different configurations. The study is described as a first statistical step toward SC segmentation in luxury fashion. The model is not yet a normative or prescriptive tool for all companies.	Explore differences in SC strategy drivers based on: - Brand positioning (mass, premium, luxury) - Country of origin - Target markets (traditional vs. emerging) - Industrial sectors (apparel, leather goods, jewelry, watches, furniture). Translate performance areas (reactivity, flexibility, etc.) into specific configuration and operational choices for SCs. Apply the survey framework to real-world company cases to validate findings and identify commonalities and differences.
53	Journal Article	Blockchain in Luxury Resale: The Impact of Blockchain Technology Through Regulatory Focus and Uncertainty Reduction Theories	2025	John Wiley and Sons Ltd	Journal of Consumer Behaviour	24	Ishtiaq Sharif	Swazan	https://doi.org/10.1002/cb.2433	Problem: Luxury resale markets face trust and authenticity issues due to counterfeits and information asymmetry. Approach: Applies regulatory focus theory (prevention vs promotion mindsets) and uncertainty reduction theory to study consumer reactions to blockchain in luxury resale.	Survey and interviews	Blockchain reduces uncertainty by enhancing authenticity verification and transparency. Consumers with prevention focus value reduced risks (fraud, counterfeit). Consumers with promotion focus value improved opportunities (investment, status). Blockchain increases trust, purchase intention, and willingness to pay.	Data were collected from a limited sample, which may restrict the generalizability of findings to other luxury resale contexts or industries. The study uses a cross-sectional survey approach, making it difficult to assess causal relationships or long-term impacts of blockchain adoption. Research is centered on luxury resale markets, so results may not fully apply to other retail sectors or geographic regions. Focuses exclusively on blockchain, without considering how other emerging technologies (e.g., AI, IoT, RFID) may interact with blockchain in enhancing authenticity and trust.	Conduct long-term investigations to examine how blockchain adoption in luxury resale evolves and how consumer trust changes over time. Apply the model to other industries (electronics, art, pharmaceuticals) to test generalizability of findings. Explore how consumer trust and regulatory focus orientations vary across different countries and cultural settings. Investigate how blockchain works in combination with AI authentication, IoT sensors, and digital twins for stronger anti-counterfeiting solutions. Expand research into consumer psychology, particularly how different regulatory focus orientations (promotion vs. prevention) influence adoption and trust.
54	Journal Article	Digital Luxury in the Metaverse: How Non-fungible Tokens Shape Resistance to Negative Information and Brand Purchase Intention	2025	John Wiley and Sons Ltd	Journal of Consumer Behaviour		Erin	Cho	https://doi.org/10.1002/cb.700	How NFTs in the metaverse affect consumer perceptions of luxury brands, especially when faced with negative information.	Survey	NFTs strengthen brand attachment and authenticity, making consumers more resistant to negative information. Ownership of NFTs boosts brand trust and exclusivity perception, leading to higher purchase intention. NFTs act as digital extensions of luxury identity, reinforcing symbolic and emotional value. Implications: Luxury brands can use NFTs not only for authentication and scarcity but also as reputation shields in the metaverse. Successful NFT strategies enhance consumer loyalty and buffer against reputational risks.	The study relies on survey-based experiments, possibly with a limited demographic and geographic scope, restricting the generalizability of findings. Conducted at a single point in time, meaning it cannot capture how consumer attitudes toward NFTs and metaverse luxury evolve as adoption increases. Examines authenticity and scarcity, but leaves out other attributes (e.g., utility, community belonging, interoperability across platforms). Outcomes like purchase intention and resistance to negative information are based on self-perceptions, not actual purchase behavior. Since NFTs and metaverse luxury are still emerging, the findings may become outdated as consumer familiarity and regulatory frameworks evolve.	Explore differences in NFT and metaverse luxury adoption across cultures, age groups, and income levels. Conduct time-series or panel studies to observe changes in consumer attitudes as exposure and technology maturity grow. Use field experiments or real transaction data to validate self-reported attitudes and purchase intentions. Investigate additional NFT characteristics such as interactivity, exclusivity tiers, community engagement, and resale potential. Study how NFTs interact with phygital experiences (e.g., NFT + physical product bundles) in shaping resistance to negative information. Examine how regulation, consumer protection, and sustainability concerns impact consumer trust in NFT-based luxury strategies.

#	Source/Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
55	Journal Article	Non-deceptive counterfeit purchase behavior of luxury fashion products	2021	John Wiley and Sons Ltd	Journal of Consumer Behaviour	20	Devinder Pal	Singh	DOI: 10.1002/cb.1917	Investigates why consumers knowingly buy counterfeit luxury fashion goods (non-deceptive counterfeits).	Survey	Key Insights: Drivers include status signaling at low cost, affordability, and accessibility. Consumers often rationalize purchases by downplaying ethical/legal concerns. Social influence and desire for trend participation also play strong roles. Findings: Buyers are fully aware counterfeits are fake but accept them as substitutes for luxury. Ethical dissonance is managed through justifications and moral disengagement. Implications: Anti-counterfeiting strategies must target attitudes and social acceptance, not just supply reduction.	The study is situated only in India, an important emerging market. While some insights may be transferable, the findings cannot be universally generalized to other emerging or developed markets. The research exclusively examines consumer-related (demand-side) antecedents such as materialism, risk-seeking, price–quality inference, etc. Supply-side factors (e.g., availability, distribution, enforcement, or seller strategies) are not considered. The effects found may vary depending on personality traits, cultural and political orientations, or situational factors. These boundary conditions were not explicitly modeled in the study	Conduct studies in other emerging and developed economies to examine whether cultural differences (e.g., power distance, indulgence levels) affect non-deceptive counterfeit purchase behavior. Future research should integrate both demand-side and supply-side factors to develop a more holistic understanding of counterfeit consumption. Examine how individual personality traits (e.g., risk tolerance, morality), socio-political orientations, and situational variables (e.g., economic downturns, peer pressure, regulatory enforcement) moderate consumer behavior toward counterfeit luxury goods. Future studies could test interventions (e.g., marketing strategies, social campaigns, pricing tactics) that luxury brands can use to discourage counterfeit consumption.
56	Journal Article	Antecedents of Blockchain-Enabled E-commerce Platforms (BEEP) adoption by customers – A study of second-hand small and medium apparel retailers	2022	Elsevier Inc.	Journal of Business Research	149	Mani	Venkatesh	Https://doi.org/10.1016/j.jbusres.2022.0	The article examines factors influencing customer adoption of Blockchain-Enabled E-commerce Platforms (BEEP) in the second-hand small and medium apparel retail sector. The purpose is to identify technological, social, and behavioral determinants that encourage or hinder consumers from using blockchain-powered platforms for second-hand apparel purchases.	Survey	Economic motives, hedonic motives, and critical motives significantly influence consumer intention to adopt BEEP; Attitude, performance expectancy, and facilitating conditions (from UTAUT) also positively affect adoption. Fashion motives alone do not significantly influence adoption. Instead, risk of contamination acts as a mediator: when customers are concerned about hygiene, BEEP's traceability reassures them, which increases adoption intention. Unlike many technology adoption studies, social influence and effort expectancy are not significant predictors of BEEP adoption. Consumers view the choice as an individual decision, not shaped by peers. The model explains 49% of the variance in behavioral intention, close to the original UTAUT's explanatory power, validating the integrated framework. Blockchain-enabled second-hand platforms reduce risks of counterfeit and contamination, encouraging sustainable consumption and supporting circular economy goals.	Only four motives (economic, hedonic, critical, fashion) were considered; other relevant motives may have been excluded. The study tested intention to adopt BEEP, not actual long-term usage behavior. Focused only on female consumers in India, limiting generalizability across genders, cultures, and countries. Effort expectancy was insignificant possibly due to low blockchain awareness among consumers, suggesting early-stage limitations.	Future studies could test other consumer motives (e.g., trust, sustainability values, digital literacy) in different contexts. Move beyond behavioral intention to study real adoption and continued usage of BEEP. Explore user-friendly interface designs and test how system usability influences adoption. Apply models like Expectation Confirmation Theory to explain adoption and post-adoption behavior. Study implementation challenges such as integration with existing retail systems and cost barriers for SMEs. Investigate how government regulations and consumer protection laws affect blockchain adoption in second-hand retail. Examine how AI (e.g., predictive chatbots), robotic process automation, or customer profiling can enhance BEEP adoption. Broaden the research to include male consumers, other demographics, and global markets for greater generalizability.
57	Journal Article	Behind the runway: Extending sustainability in luxury fashion supply chains	2020	Elsevier Inc.	Journal of Business Research	117	Hakan	Karaosman	https://doi.org/10.1016/j.jbusres.2018.0	The article examines how luxury fashion supply chains can extend sustainability practices beyond initial production to include post-sale and end-of-life stages.	Case study through interviews	Extending sustainability across all supply chain tiers (from raw materials to retail) is necessary for meaningful impact. Large firms need to collaborate more closely with SMEs and suppliers, who often lack financial/technological resources. Companies that adopt proactive sustainability approaches (e.g., fur-free initiatives) gain first-mover advantage and reputational benefits. Supplier development and integration are still limited in luxury fashion, yet suppliers strongly influence brand reputation. Knowledge sharing and regional SME cooperation help overcome resource barriers. Senior management awareness and commitment are crucial for embedding sustainability into supply chains.	Current luxury supply chains show low supplier integration; SMEs often lack the support needed from lead firms. SMEs face financial, technological, and knowledge limitations, restricting their ability to meet sustainability demands independently. Findings are case-based within specific fashion contexts; generalizability across industries and regions is limited.	Explore sustainability extension across other industries beyond luxury fashion to test applicability. Compare different cultural and geographical contexts, as sustainability integration may vary from lead firms. Investigate long-term effects of supplier development and sustainability practices on competitive advantage. Study how blockchain, AI, and traceability technologies can support supplier integration and transparency in luxury fashion. Examine how consumer expectations for sustainability shape supply chain practices and brand strategies.
58	Journal Article	Design piracy: An interdisciplinary investigation into competitive industrial behavior	2023	Elsevier Inc.	Journal of Business Research	164	Aceti T.	Vogel	https://doi.org/10.1016/j.jbusres.2023.11	Focus: Why and how design piracy (copying others' designs) occurs across industries. Approach: Interdisciplinary review drawing from law, economics, management, and design studies.	Conceptual framework	Design piracy is driven by competitive pressures, cost savings, weak enforcement, and consumer demand for cheaper alternatives. Industries differ: in fashion it's normalized and fast-moving; in high-tech and industrial design it raises stronger legal and ethical conflicts. IP laws (copyright, design rights, patents) often fail to protect fast-cycle industries, leaving gaps that pirates exploit. Piracy can sometimes stimulate innovation by forcing differentiation but also undermines original creators' incentives.	Current trademark dilution laws primarily protect already famous firms, leaving smaller or emerging brands with limited protection from design piracy. Findings are drawn from specific case contexts and may not fully apply across different industries, geographies, or product categories. While the study highlights the role of audience integrity in shaping responses to piracy, it does not deeply explore other individual difference variables (e.g., cultural values, socioeconomic status). The research shows that brand equity reinforcement does not always translate into higher sales, but does not investigate further conditions that moderate this gap. Being largely exploratory, the study provides conceptual insights but lacks extensive empirical testing across broader samples.	Examine how different jurisdictions handle design piracy and how laws can evolve to better protect non-famous brands. Test the framework in other industries beyond fashion and accessories, such as electronics, furniture, or digital goods. Explore other psychological factors (e.g., moral judgment, risk aversion, brand loyalty) influencing consumer responses to design piracy. Study how different retail channels (e.g., online marketplaces, multi-brand retailers, flagship stores) affect consumer choices between leaders and pirates. Conduct large-scale quantitative surveys or experiments to validate the moderating effects of integrity and competition conditions. Investigate how leaders and imitators can strategically coexist, perhaps through collaborations, co-branding, or legal settlements.
59	Journal Article	From devil to angel: How being envied for luxury brand social media word of mouth discourages counterfeit purchases	2023	Elsevier Inc.	Journal of Business Research	165	Irina Y.	Yu	https://doi.org/10.1016/j.jbusres.2023.11	Examines how luxury brand users' social media word-of-mouth (WOM) affects envy and counterfeit purchase intentions.	Survey	Luxury brand WOM generally shifts envy from malicious to benign. This reduces the likelihood of counterfeit purchases. WOM builds social value around authenticity, making counterfeits less appealing. Implications: For brands → encourage social media sharing to create admiration and protect against counterfeiting. For consumers → authenticity gains more positive recognition than fakes.	The study was conducted within a specific cultural context, which may limit the generalizability of findings across different societies. Relies on self-reported surveys, which may be subject to social desirability bias or inaccuracies in respondents' recall and reporting. The research is cross-sectional, making it difficult to establish causal relationships or observe long-term behavioral effects. Focuses mainly on social media platforms; results may not hold in offline word-of-mouth or across all digital platforms.	Replicate the study in different cultural contexts to examine whether envy-driven mechanisms vary across societies. Conduct long-term studies to track whether the discouragement effect on counterfeit purchases persists over time. Use experimental methods to better establish causal links between social media envy and counterfeit purchase intentions. Compare the effects of envy on different social media platforms (e.g., Instagram, TikTok, WeChat) or between online vs. offline word-of-mouth. Explore how other emotions (e.g., admiration, jealousy, resentment) interact with envy in shaping consumer attitudes toward counterfeits. Test whether findings hold for non-luxury brands or for other product categories beyond fashion/luxury.
60	Journal Article	Illegitimate trade in the fashion industry: relevance and counterstrategies in the Italian context	2019	Emerald Group Holdings Ltd.	Journal of Business and Industrial Marketing	34	Thanos	Papadimitriou	DOI 10.1108/JBIM-05-2018-0178	Analyzes the scope of illegitimate trade (mainly counterfeiting) in Italy's fashion industry and possible counterstrategies.	Survey	Counterfeiting is a major economic and cultural threat to Italy's fashion sector, harming brand value, jobs, and innovation. Demand is fueled by price-sensitive consumers, weak awareness of risks, and social acceptance of fakes. The problem is systemic, involving supply chains, organized crime, and consumer behavior.	The study focuses on the Italian fashion industry, which may limit the generalizability of findings to other countries or regions with different institutional, cultural, and legal settings. Relies heavily on case-based analysis and secondary sources, which might not fully capture the diversity of illegitimate trade practices across the global fashion sector. While the paper discusses counterfeiting and piracy, the breadth of illegitimate trade (e.g., smuggling, parallel markets, digital piracy) may not have been fully covered. The emphasis is on company and institutional counterstrategies, with less focus on consumer motivations and perceptions, which play a key role in sustaining counterfeit demand.	Investigate illegitimate trade and anti-counterfeiting strategies in different cultural and institutional contexts, to understand whether the Italian case is unique or part of broader patterns. Incorporate large-scale surveys, interviews, or quantitative data to strengthen evidence beyond case studies. Explore in-depth consumer attitudes, drivers, and deterrents toward counterfeit products to complement the business- and institution-focused approach. Extend analysis to online and digital counterfeit markets, given the rise of e-commerce, social media, and global distribution channels for fakes. Combine legal, managerial, socio-legal, and technological perspectives to build a more comprehensive view of illegitimate trade and effective counterstrategies. Empirically test the effectiveness of different interventions (e.g., legal enforcement, brand communication, technological traceability) in reducing counterfeiting.
61	Journal Article	BCPIS: Blockchain-based Counterfeit Product Identification System	2023	Routledge	Journal of Applied Security Research	18	Pallavi	Chavan	https://doi.org/10.1080/19361610.2022.	The article presents BCPIS (Blockchain-based Counterfeit Product Identification System), designed to detect and prevent counterfeit products in supply chains.	Developed Product Identification System	System successfully identified counterfeit products through QR code + blockchain verification. BCPIS enabled secure product ownership transfer, useful in resale markets and warranty claims. Blockchain ensured tamper-proof, decentralized, and immutable records, reducing reliance on costly traditional methods (RFID, holograms). Compared to conventional methods, BCPIS is more cost-effective while providing high reliability and user accessibility.	Ethereum public chains face low throughput and high latency, limiting large-scale adoption. PoW consensus consumes significant computational power and gas fees. As the system scales, blockchain storage demands increase, which may challenge practical deployment. Current design lacks integration with other supply chain systems or databases. Tested only in a simulated environment (Ganache); no real-world case validation was conducted.	Explore permissioned blockchains, sidechains, or Proof-of-Stake (PoS) for higher efficiency and lower costs. Develop models to integrate blockchain with ERP, IoT, and logistics systems. Test BCPIS with real supply chains (e.g., pharmaceuticals, fashion, electronics) to assess robustness and adoption feasibility. Combine blockchain with AI-based image recognition, RFID, or digital twins for multi-layered security. Investigate consumer acceptance, ease of use, and behavioral responses to blockchain-based counterfeit detection.
62	Journal Article	Blockchain adoption strategy in a platform dual-channel supply chain with risk-averse sellers	2024	John Wiley and Sons Inc	International Transactions in Operational Research	31	Huimin	Zhang	DOI: 10.1111/itor.13474	The article studies blockchain adoption strategies in a platform dual-channel supply chain where sellers are risk-averse, using game-theoretic modeling.	Game-theoretic modeling	Blockchain adoption benefits the platform when consumer trust significantly boosts demand. Risk aversion reduces sellers' willingness to join unless cost-sharing mechanisms or incentives are offered. The platform may adopt blockchain selectively, focusing on high-value or sensitive product categories. Joint adoption (platform + sellers) maximizes transparency but requires profit-sharing agreements.	The study assumes rational and risk-averse sellers with simplified demand and pricing structures, which may not capture the full complexity of real-world markets. The model examines a single-period decision-making scenario, without considering dynamic or long-term impacts of blockchain adoption. Focuses on sellers and the platform but does not include consumers, regulators, or logistics partners, whose roles could significantly affect blockchain adoption outcomes. Adoption costs are modeled in a simplified way, without incorporating technological integration, scalability, or regulatory costs. Findings are purely theoretical, with no case-based or real-world supply chain validation.	Explore long-term adoption dynamics, repeated interactions, and learning effects between platforms and sellers. Extend the model to consider consumer trust effects, policy enforcement, and government incentives/regulations. Validate the theoretical results using real-world supply chain data from industries prone to counterfeiting and dual-channel structures. Compare outcomes under permissioned vs. public blockchains, and explore impacts of scalable consensus mechanisms like Proof-of-Stake or sidechains. Investigate blockchain adoption in combination with AI, IoT, and RFID for enhancing traceability and anti-counterfeiting efficiency. Examine how different levels of seller risk aversion (or even risk-seeking behavior) influence blockchain adoption strategies.
63	Journal Article	Combat counterfeits effectively or not? Encroachment and financing strategies with production disruption risk	2026	John Wiley and Sons Inc	International Transactions in Operational Research	33	Yangyang	Huang	DOI: 10.1111/itor.13582	Problem: Counterfeiting in supply chains threatens brand value and profitability, especially under production disruption risks. Approach: Uses game-theoretic modeling to study how firms should design anti-counterfeiting, financing, and encroachment strategies.	Game-theoretic modeling	Anti-counterfeiting investment improves brand protection and consumer trust, but effectiveness depends on costs and disruption risks. Financing choices (e.g., trade credit vs. bank loans) influence firms' ability to invest in protection. Encroachment (manufacturers selling directly to consumers) can either strengthen or weaken anti-counterfeiting efforts, depending on market conditions.	The model assumes that market-clearing prices are the same in both direct and retail channels, which oversimplifies real-world scenarios. The study only examines bank credit and trade credit, ignoring other financing mechanisms that may influence supply chain strategies. Focuses solely on the manufacturer's encroachment strategy, without considering counterfeiters' adaptive responses or competition dynamics.	Future models should allow differentiated prices and account for channel/product heterogeneity in dual-channel markets. Explore broader financing mechanisms, such as manufacturer guarantees, crowdfunding, or blockchain-enabled finance. Extend the analysis by incorporating strategic reactions of counterfeiters, enabling a more realistic and competitive game-theoretic framework.

#	Source/Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
64	Journal Article	Improving supply chain transparency with blockchain technology when considering product returns	2024	John Wiley and Sons Inc	International Transactions in Operational Research	31	Jianmai	Shi	DOI: 10.1111/itor.13303	Focus: Investigates how blockchain can enhance supply chain transparency, especially for product returns. Problem: Returns create complexity—risk of fraud, inefficiency, and loss of trust between customers, retailers, and suppliers. Solution: Blockchain records return transactions immutably. Provides visibility of product history (authenticity, ownership, condition). Strengthens accountability and reduces disputes.	Game-theoretic modeling	Improves trust, efficiency, and customer satisfaction. Helps companies detect fraudulent returns and streamline reverse logistics. Implications: Blockchain makes returns management a value-adding process instead of a liability. Transparency benefits all stakeholders by ensuring fairness and credibility.	The study relies on a game-theoretic model with assumptions such as homogeneous consumer behavior, ideal blockchain implementation, and simplified product return processes. The findings are theoretical only; no real-world data or case studies were used to test the model's predictions. Focuses specifically on product returns in supply chains, which may not capture the full range of blockchain's impact in broader supply chain settings. The model does not fully account for multi-channel or cross-border supply chain complexities, which are highly relevant in global markets. Assumes certain fixed costs and benefits of blockchain traceability, which in reality vary significantly depending on industry, scale, and technology maturity.	Validate the model with real-world case studies, experiments, or survey-based research in industries with high product return rates (e.g., fashion, electronics, e-commerce). Extend research to analyze how blockchain transparency impacts returns management in different industries beyond the scope studied. Investigate how consumer trust, privacy concerns, and willingness to pay influence blockchain adoption in returns management. Explore the combined effect of blockchain with IoT, AI, or big data analytics for tracking, predicting, and managing product returns. Study blockchain-enabled transparency in omnichannel and cross-border supply chains, where return processes are more complex. Conduct long-term studies to understand the evolving impact of blockchain on returns management as adoption scales and technologies mature.
65	Journal Article	Sales channel competition for supply chain with the blockchain technology	2024	John Wiley and Sons Inc	International Transactions in Operational Research	31	Yuxuan	Kang	DOI: 10.1111/itor.13370	Analyzes how blockchain technology influences sales channel competition in supply chains.	Game-theoretic modeling	Key Insights: Blockchain ensures authenticity, transparency, and trust, reducing counterfeit risks. Strengthens online channels by increasing consumer confidence. Alters competitive dynamics between direct sales and retailer channels. Findings: Blockchain adoption can shift market power toward brands' direct channels by enhancing credibility. Retailers may need to adjust pricing or service strategies to remain competitive. Implications: Blockchain is both an anti-counterfeiting tool and a strategic factor in channel competition. Firms should align blockchain adoption with channel strategy to optimize supply chain performance.	Simplified modeling – The study relies on a stylized game-theoretic model with assumptions (e.g., linear demand, symmetric firms, rational customers), which may not fully capture real-world dynamics. Lack of empirical validation – Results are theoretical; no case studies, surveys, or experiments were used to confirm blockchain adoption impacts. Static analysis – The model examines equilibrium outcomes but does not consider dynamic changes such as learning effects, evolving costs of blockchain, or consumer adoption over time. Scope of supply chain structure – The study mainly analyzes a dual-channel framework (online vs. offline) and does not address multi-layer, global, or more complex supply chain networks. Limited consumer behavior integration – Consumers are modeled in aggregate; individual differences in trust, privacy concerns, or attitudes toward blockchain are not considered.	Dynamic and longitudinal studies – Extend the model to account for time-varying adoption costs, consumer learning, and diffusion of blockchain technology. Empirical validation – Conduct case studies, surveys, or experiments in industries (e.g., retail, luxury goods, pharmaceuticals) to test theoretical predictions. Consumer heterogeneity – Integrate more nuanced models of consumer behavior, such as trust, risk aversion, or privacy concerns regarding blockchain adoption. Multi-tier and global supply chains – Explore more complex settings with multiple manufacturers, retailers, logistics providers, and international trade factors. Policy and regulation – Study the role of government enforcement, industry standards, and sustainability regulations in shaping blockchain adoption and channel competition. Technology interplay – Examine how blockchain interacts with IoT, AI, and big data in managing transparency and competition across channels.
66	Journal Article	Orchestrating blockchain adoption in dual-channel supply chains with consumer privacy concern	2025	John Wiley and Sons Inc	International Transactions in Operational Research		Lu	Xiao	DOI: 10.1111/itor.70030	Analyzes blockchain adoption in dual-channel supply chains (online + offline) considering consumer privacy concerns.	Game-theoretic modeling	Key Insights: Blockchain boosts authenticity, transparency, and trust, but may raise privacy risks when handling consumer data. Privacy concerns affect consumer willingness to engage, influencing channel performance. Adoption decisions depend on balancing trust gains vs. privacy costs. Findings: Coordinated blockchain adoption across channels improves efficiency and reduces counterfeit risk. Misalignment (one channel adopting, the other not) can worsen consumer concerns and reduce effectiveness. Implications: Firms must manage blockchain design carefully to protect privacy while ensuring transparency. Collaboration across online/offline channels is key for successful blockchain integration.	Model-based limitations – The study relies on a game-theoretic model with simplified assumptions (linear demand, deterministic blockchain cost), which may not fully capture real-world dynamics. Privacy concern assumptions – Consumer privacy is modeled as a single factor, while in practice privacy concerns are multi-dimensional and context-dependent. Narrow supply chain scope – The analysis focuses on a manufacturer–retailer dyad in a dual-channel setting, without considering multi-tier or platform-based supply chains. Static approach – The model examines equilibrium outcomes in a static setting, not accounting for long-term dynamics such as blockchain learning curves, cost reduction, or evolving consumer trust. No empirical validation – Findings remain theoretical without testing against real-world case studies or data.	Extend to multi-tier supply chains – Future work could analyze blockchain adoption across broader networks, including suppliers, logistics, and third-party platforms. Incorporate consumer heterogeneity – Introduce different consumer groups with varying privacy sensitivities, digital literacy, and trust in blockchain. Dynamic modeling – Explore long-term adoption dynamics, including technological improvements, regulatory changes, and consumer learning effects. Empirical studies – Validate the theoretical results with case studies or survey data from industries adopting blockchain (e.g., luxury, healthcare, or food supply chains). Integration with other technologies – Examine how blockchain interacts with IoT, AI, and big data analytics in dual-channel operations. Policy implications – Investigate the impact of privacy regulations (e.g., GDPR) and government incentives on blockchain adoption in supply chains.
67	Journal Article	Optimal pricing strategies of e-commerce supply chain considering consumers' anticipated regrets under the background of blockchain anti-counterfeiting technology	2024	John Wiley and Sons Inc	International Transactions in Operational Research	31	Tianyang	Yu	DOI: 10.1111/itor.13394	Develops pricing strategies for e-commerce supply chains using blockchain anti-counterfeiting technology, considering consumers' anticipated regret (fear of buying counterfeit or missing out).	Game-theoretic modeling	Key Insights: Blockchain reduces counterfeit risk, changing consumer expectations and regret perceptions. Two forms of regret matter: Regret from purchasing counterfeits → blockchain alleviates this. Regret from not purchasing → influences urgency and willingness to pay. Findings: Blockchain adoption allows higher optimal prices due to greater consumer trust. Anticipated regret drives stronger demand and can be leveraged for strategic pricing. Implications: Blockchain not only protects against counterfeits but also enhances pricing power and profitability. Firms should integrate psychological factors like regret into pricing under blockchain-enabled markets.	The study is purely theoretical and model-driven, relying on mathematical modeling and equilibrium analysis rather than real-world empirical data. It assumes simplified consumer behavior based on anticipated regret but does not capture heterogeneity in consumer psychology (e.g., cultural differences, ethical concerns). The blockchain anti-counterfeiting technology is modeled in an idealized way, without considering technical, implementation, or adoption barriers. The analysis focuses only on a single manufacturer–retailer–consumer framework, which may not reflect the complexity of multi-tier or global e-commerce supply chains. External factors such as government regulations, logistics disruptions, and dynamic competition are not included in the model.	Empirical validation: Test the model using real-world data from e-commerce platforms applying blockchain for anti-counterfeiting. Expand consumer heterogeneity: Incorporate behavioral differences, cultural influences, and psychological drivers beyond anticipated regret. Broader supply chain scope: Extend the framework to multi-manufacturer, multi-retailer, or platform-based ecosystems. Dynamic models: Study long-term adoption of blockchain in supply chains, including cost reduction over time and technology learning curves. Policy and regulation: Investigate how government anti-counterfeit regulations and subsidies influence optimal pricing and adoption strategies. Integration with other technologies: Explore interactions between blockchain and AI, IoT, or big data analytics for supply chain optimization.
68	Journal Article	To be traceable and responsive: blockchain adoption and information sharing in a fresh produce supply chain	2024	John Wiley and Sons Inc	International Transactions in Operational Research	31	Songxuan	Ma	DOI: 10.1111/itor.13397	How blockchain adoption affects traceability and information sharing in fresh produce supply chains.	Game-theoretic modeling	Blockchain improves real-time traceability (product origin, safety, quality) and responsiveness to disruptions (e.g., contamination, recalls). Encourages information sharing among farmers, distributors, and retailers by creating trust in shared data. Benefits: improved food safety, reduced waste, faster problem resolution, and higher consumer trust. Challenges: high costs, technical barriers, need for partner coordination. Implications: Blockchain adoption makes fresh produce supply chains more transparent, safe, and responsive, but requires collaborative adoption and cost-sharing.	The study models a single-supplier, single-retailer fresh produce supply chain, which may not fully represent the complexity of real-world multi-tier supply chains . Assumes linear demand functions and simplified freshness decay patterns, which may not capture the full uncertainty and variability of consumer demand and product deterioration . Other technologies (e.g., AI, IoT, RFID) that often complement blockchain in practice were not considered . The blockchain adoption cost is assumed fixed and known, while in practice, costs vary significantly with scale, governance, and integration challenges . The model does not capture consumer heterogeneity, risk aversion, or trust perceptions, which strongly influence fresh food purchase decisions.	Future studies could analyze multi-supplier and multi-retailer networks, reflecting the true complexity of fresh produce distribution . Introduce stochastic demand, supply disruptions, and perishability uncertainty into blockchain adoption models . Examine how IoT sensors, RFID, and AI interact with blockchain to enhance traceability, freshness monitoring, and responsiveness. Study how consumer trust, willingness to pay for traceability, and risk perception affect blockchain adoption benefits . Extend the static model into dynamic or multi-period frameworks to study how blockchain adoption evolves over time and how long-term investments pay off. Use case studies, pilot projects, or empirical data from fresh food retailers to validate the theoretical findings.
69	Journal Article	Traceability strategy choice in competing supply chains based on blockchain technology	2024	John Wiley and Sons Inc	International Transactions in Operational Research	31	Fangchao	Xu	DOI: 10.1111/itor.13332	How supply chains competing with each other should choose traceability strategies using blockchain.	Game-theoretic modeling	Blockchain enables different levels of traceability (partial vs. full). Full traceability improves consumer trust, deters counterfeits, and increases demand, but is costly. Partial traceability is cheaper but less effective in competitive markets where consumers value authenticity. Competing firms' strategies are interdependent—if one adopts full traceability, rivals may be pressured to follow. Over-adoption risk: excessive transparency could expose sensitive competitive information. Implications: Firms must weigh costs, consumer trust demand, and rival strategies when choosing blockchain-enabled traceability.	The paper models two competing supply chains, each with one manufacturer and one retailer, which may not capture the complexity of multi-echelon, global supply chains . Assumes consumers gain extra utility from traceability, but does not account for consumer heterogeneity, varying levels of trust, or bounded rationality in adoption decisions. Blockchain adoption cost is modeled as fixed and uniform, ignoring variability in cost structures due to scale, governance, or industry-specific integration challenges. The framework is static (one-period), without considering dynamic competition or the long-term evolution of blockchain adoption strategies. The role of IoT, AI, or RFID—technologies often integrated with blockchain for traceability—is not incorporated into the analysis.	Future research could examine multi-supplier, multi-retailer, or multinational networks, better reflecting real-world traceability challenges. Study how different consumer types (trust-sensitive, price-sensitive, blockchain-aware vs. unaware) affect demand and traceability adoption. Use multi-period or evolutionary game frameworks to capture how traceability strategies evolve over time under competition. Explore how blockchain costs vary with industry, scale, and governance models, and how subsidies or government incentives affect adoption. Examine the joint adoption of blockchain with IoT, RFID, and AI, to understand how these technologies together enhance transparency and traceability. Test the theoretical results with case studies or survey-based empirical research, especially in industries where traceability is critical (food, luxury goods, pharmaceuticals).
70	Journal Article	Transforming luxury: young consumers' motivations towards purchasing virtual luxury non-fungible token wearables	2024	Emerald Publishing	International Journal of Retail and Distribution Management	52	Hanna	Lee	DOI 10.1108/IJRDM-12-2023-0712	Why young luxury consumers buy virtual NFT fashion wearables.	Survey	Key Drivers: Social/psychological motives – identity expression, social recognition, exclusivity. Economic motives – investment, resale value, scarcity. Experiential motives – enjoyment, novelty, innovation. Findings: Virtual NFT wearables act as status symbols, similar to physical luxury goods, but tailored to digital lifestyles (gaming, metaverse, social media). Implications: Luxury brands can reach Gen Z and Millennials by offering exclusive, scarce, and status-enhancing NFTs, blending fashion, technology, and investment appeal.	The study focuses on a narrow consumer group (young luxury consumers), which limits generalizability to broader demographics . Data were collected at one point in time, preventing analysis of how motivations and behaviors evolve over time. Research was conducted in the context of virtual luxury NFTs, which may not translate to other industries or digital assets. Relies on consumer self-reported attitudes and intentions, which may be subject to biases such as social desirability or overestimation of purchase intentions. The NFT and metaverse landscape is rapidly evolving, meaning that consumer motivations identified today may change significantly in the near future.	Future studies should examine different age groups, income levels, and cultural contexts to test whether motivations differ across consumer segments. Conduct long-term studies to explore how consumer perceptions and purchase behaviors change as NFT markets and the metaverse mature. Apply the framework to other industries beyond luxury fashion (e.g., gaming, art, real estate) to assess whether motivations are industry-specific. Use actual transaction data or experiments instead of self-reports to validate consumer motivations and reduce bias. Investigate how new technological features (e.g., interoperability, AR/VR integration, token-gated communities) impact motivations for purchasing NFT wearables.
71	Journal Article	The interplay of manufacturer encroachment and blockchain adoption to combat counterfeits in a platform supply chain	2024	Taylor and Francis Ltd.	International Journal of Production Research	62	Yating	Li	https://doi.org/10.1080/00207543.2023.2...	Analyzes how manufacturer encroachment (selling directly to consumers) and blockchain adoption interact in platform-based supply chains to fight counterfeits.	Game-theoretic modeling	When encroachment costs are low, the brand manufacturer tends to establish a direct channel on the platform. This strategy effectively reduces counterfeit demand, and its effectiveness grows with the proportion of counterfeits in the market. Blockchain can encourage manufacturers to encroach, as it increases consumer trust in authenticity. Both encroachment and blockchain alone can combat counterfeits effectively. Unexpected effect of combining encroachment + blockchain When both strategies coexist, counterfeit demand can rise. This is due to fiercer competition in the genuine goods market, which unintentionally leaves space for counterfeiters to survive. If blockchain costs are low, combining blockchain adoption and encroachment can lead to a Pareto improvement for the manufacturer, reseller, platform, and overall social welfare. However, consumer surplus may decline under these conditions.	The model does not account for the reality that manufacturers often sell through both online and offline channels simultaneously. The study assumes consumers fully trust blockchain, without considering privacy concerns, awareness, or skepticism about its anti-counterfeiting value. Blockchain costs are borne by the platform only; the potential for shared investment among manufacturers, resellers, or government support is not addressed. The model is more suitable for large brand manufacturers, with less discussion of how small or emerging firms could adopt blockchain under resource constraints.	Future research could study integrated online–offline supply chains with blockchain and encroachment strategies. Examine how consumer trust, recognition of blockchain's anti-counterfeiting value, and privacy concerns affect adoption outcomes. Explore models where manufacturers, resellers, and platforms share blockchain setup and operating costs, and assess fairness and efficiency. Investigate how government policies, subsidies, or dominant platforms/brands can accelerate blockchain adoption. Study how blockchain adoption strategies differ for smaller brands with limited resources.
72	Journal Article	The role of blockchain technology in the dual-channel supply chain dominated by a brand owner	2023	Elsevier B.V.	International Journal of Production Economics	258	Shichao	Zhu	https://doi.org/10.1016/j.ijpe.2023.108...	Examines blockchain adoption in a dual-channel supply chain (brand owner selling directly + via retailer).	Game-theoretic modeling	Blockchain boosts traceability, authenticity, and consumer trust, reducing counterfeit risks. In brand-dominated supply chains, blockchain helps coordinate channels and manage information asymmetry. Adoption strengthens direct channels (brand-to-consumer) by enhancing trust, but may weaken retailers' power. Profitability depends on balancing adoption costs vs. benefits in demand and trust. Implications: Blockchain is most valuable when counterfeit threats and trust issues are high. Brand owners must manage channel conflict and adoption costs to ensure win–win outcomes.	The model assumes a dual-channel setup (brand-owned direct channel + retail channel) with a dominant brand owner, which may not capture more complex, multi-echelon or networked supply chains. The analysis is static (single-period) and does not consider the dynamic evolution of blockchain adoption, competition, or demand over time. Assumes homogeneous consumers and simplified blockchain trust effects, without considering heterogeneity in preferences, awareness, or willingness-to-pay for blockchain-enabled authenticity. Blockchain adoption costs are modeled as fixed and known, whereas in reality they are variable, uncertain, and context-dependent. Other digital enablers (IoT, AI, RFID) that often work together with blockchain for traceability are not incorporated	Explore blockchain adoption strategies in multi-supplier, multi-retailer, or global supply chain networks. Model multi-period settings to capture the long-term implications of blockchain adoption, competitive dynamics, and learning effects. Incorporate different consumer types (e.g., blockchain-aware vs. unaware, price-sensitive vs. quality-sensitive) into demand modeling. Analyze how blockchain adoption costs evolve with scale, technology maturity, and government incentives. Study how blockchain interacts with IoT, RFID, and AI to provide end-to-end transparency and supply chain efficiency. Use case studies, experiments, or survey-based methods to validate and refine the theoretical predictions.

#	SourceTyne	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
73	Journal Article	Strategic analysis for adopting blockchain technology under supply chain competition	2023	Taylor and Francis Ltd.	International Journal of Logistics Research and Applications	26	Guangming	Li	https://doi.org/10.1080/13675567.2022.2	When and how firms should adopt blockchain technology in competitive supply chains.	Game-theoretic modeling	When consumers' traceability awareness is high, neither supply chain should adopt blockchain technology (BT), since meeting high traceability needs is costly and may intensify price competition. When awareness is low or moderate, adoption depends on retailers' cost-sharing proportions. The equilibrium strategy could be one chain adopting (BN/NB) or both chains adopting (BB). Under BN (only one adopts), the traceability level increases with consumer awareness and the retailer's cost-sharing proportion. Under BB (both adopt), the traceability level changes non-monotonically with these factors. Retailers' cost-sharing should be moderate under both BN and BB. In BB, one retailer should bear more BT costs than the competitor, which helps their supply chain gain a competitive advantage. Early adoption of BT can be profitable, especially when competitors hesitate. Firms should assess consumer willingness to pay for traceability (via surveys or historical data) before setting traceability levels. Competitive advantage comes from balancing traceability level with consumer awareness and	The study assumes a duopoly (two supply chains only), which may oversimplify real-world competitive markets . Focuses only on operational competition (prices, traceability, cost-sharing), without considering other strategic factors like marketing, partnerships, or regulatory environments. The analysis is based on theoretical game models, not empirical validation. Potential privacy and data security challenges of blockchain are not explicitly modeled in the framework .	Privacy and risk attitudes: Explore how supply chain members' risk perceptions about privacy/security affect blockchain adoption strategies . Product defects scenario: Analyze equilibrium strategies when product recalls or defects occur, since blockchain could play a crucial role in quality and recall management . Cooperation strategies: Extend to scenarios where supply chain members might cooperate instead of purely competing, to see how alliances or partnerships affect adoption .
74	Journal Article	A blockchain-based framework of cross-border e-commerce supply chain	2020	Elsevier Ltd	International Journal of Information Management	52	Zhiyong	Liu	https://doi.org/10.1016/j.ijinfomgt.2019.	The article proposes a blockchain-based framework to address the challenges of cross-border e-commerce supply chains (CBEC SCs), aiming to improve transparency, efficiency, trust, and coordination among diverse stakeholder.	Framework development and testing	A blockchain-based multi-chain framework was successfully designed to enhance product traceability in cross-border e-commerce supply chains; Improved Data Management by separating data into account, transaction, and IoT chains, the framework improves efficiency, security, and reliability of supply chain information; Developed key distribution methods to enhance security and trust (using Hierarchical Deterministic Wallets), encryption algorithms (RSA + ECC + AES), and anti-counterfeiting traceability tags to ensure product authenticity and prevent fraud; The system proved capable of resisting clone attacks, counterfeit tag attacks, and counterfeit product attacks, while also solving the key recovery problem; Provides a comprehensive solution for product traceability, offering both theoretical insights (in blockchain system design and SCM research) and practical implications (for building secure, transparent cross-border supply chain systems).	The study does not address how to motivate participants (enterprises, regulators, consumers) to adopt and actively use the system; The proposed framework was not tested in actual business environments, only evaluated through theoretical and simulated attack cases; Real-world implementation would face higher complexity due to differences in laws, regulations, and trust across countries. The framework does not yet fully solve the problem of interfacing with existing enterprise systems or establishing universal data exchange standards and Blockchain can provide tamper-proof evidence but cannot independently resolve legal or commercial conflicts in supply chains.	The study concludes that a blockchain-based CBEC SC framework can significantly enhance trust, transparency, and efficiency in global trade, but its success depends on collaborative adoption, technical scalability, and legal harmonization. It calls for further pilot projects and industry-government cooperation to refine standards, ensure interoperability, and build stakeholder confidence.
75	Journal Article	Combating lookalike product through adopting advertising appeals to consumer value: Strategic implications to brand imitation management	2024	John Wiley and Sons Inc	International Journal of Consumer Studies	48	Chengfu	Wang	DOI: 10.1111/ijcs.13073	Problem: Lookalike products imitate brands without being exact counterfeits, creating confusion and harming brand value. Approach: Studies how advertising appeals aligned with consumer values can counteract lookalike threats.	Survey	Value-congruent advertising (matching consumer values) strengthens brand loyalty and reduces susceptibility to lookalikes. Emotional and symbolic appeals are particularly effective against imitators. Strategic advertising can shift consumer perception toward the authentic brand.	The study used controlled experiments, which limits external validity. Results may not fully reflect actual consumer behavior in real markets. Relied on self-reported purchase intentions, not actual purchase behavior, which may introduce bias. Primarily used college students in Studies 1–3, which may restrict the generalizability of findings. Data were collected from Chinese consumers, who are frequently exposed to counterfeits and lookalikes, limiting global applicability. Assumed luxury goods are just one type of branded product without differentiating luxury and non-luxury brands in the context of lookalike products. Found that embarrassment affected responses but did not deeply explore how other individual characteristics (e.g., risk aversion, cultural values) might influence results.	Use field studies, interviews, or qualitative approaches to capture richer insights into how advertising appeals affect real-world consumer decisions. Employ heterogeneous consumer samples across different age groups, cultural contexts, and income levels to improve generalizability. Test the framework in different countries and cultural settings (e.g., India, Europe, U.S.) to examine cultural influences on responses to lookalikes. Explicitly compare luxury vs. non-luxury branded products in the context of lookalikes to identify whether brand status changes ad appeal effectiveness. Explore variables such as embarrassment, social status concerns, materialism, or digital literacy as moderators in consumer responses. Move beyond intentions and use behavioral data (e.g., purchase tracking, eye-tracking, experiments with real products) to validate findings.
76	Journal Article	Toward an ontology-driven blockchain design for supply-chain provenance	2018	Academic Press Inc.	Intelligent Systems in Accounting, Finance and Management	25	Marek	Laskowski	DOI: 10.1002/isaf.1424	Proposes an ontology-driven approach to designing blockchain systems for supply chain provenance.	conceptual design + proof-of-concept implementation	Ontologies (formalized domain knowledge) can improve blockchain applications for supply-chain provenance by ensuring consistent interpretation of data across organizations. The authors translated concepts from the TOVE Traceability Ontology into smart contracts written in Solidity and deployed them on Ethereum. Demonstrated that traceability axioms (e.g., a resource can only be produced once, once consumed it cannot be unconsumed) can be enforced on blockchain. Contributions of ontology-based design: -Provides formal specifications for provenance logic. -Supports automated inference and verification through smart contracts. -Enhances interoperability and interpretability across supply-chain partners	Only a simplified version of the TOVE Traceability Ontology was implemented, not the full set of traceability constructs. Converting ontology representations (in first-order logic) into Solidity smart contracts is difficult and error-prone, partly due to Solidity's immaturity as a programming language. The study remains conceptual and experimental; it does not test adoption in a real-world supply-chain setting. The prototype does not evaluate issues like scalability, efficiency, or cost of running ontology-based blockchain systems.	Encode more traceability constructs from TOVE and other ontologies to enrich blockchain provenance capabilities. Develop formal methods, APIs, or tools to automatically convert ontology-based representations (e.g., OWL, RDF) into blockchain-compliant smart contracts. Study how ontology-driven blockchain systems can combine with IoT sensors and real-time supply-chain data for more granular provenance. Assess efficiency, scalability, and cost trade-offs of ontology-driven blockchain in realistic industrial contexts. Apply the ontology-based blockchain design in real-world supply chains (e.g., food, pharma, luxury goods) to validate feasibility and business impact.
77	Journal Article	The impact of blockchain technology on competing suppliers on an E-commerce platform	2025	Elsevier B.V.	Information and Management	62	Rongyi	Huang	https://doi.org/10.1016/j.im.2025.104016	How blockchain adoption affects competing suppliers operating on e-commerce platforms.	Game-theoretic modeling	Increases consumer trust, enabling higher product prices. Benefits low-class suppliers too, since they can "free ride" on improved market transparency and raise their own prices. The high-class supplier's decision to adopt blockchain depends primarily on operation costs. The low-class supplier's choice of selling contract (agency vs. reselling) depends on product quality. Both products' retail prices rise after blockchain adoption, but demand for the low-class product typically falls. Demand for the high-class product often remains stable, since blockchain ensures perceived authenticity. When the low-class supplier adopts a reselling contract, double marginalization weakens its competitiveness, benefiting the high-class supplier. When both adopt agency contracts, blockchain adoption tends to benefit all players, including the platform. A win–win–win outcome (for both suppliers and the platform) can be achieved through side-payment contracts (possibly automated via	Only considers two suppliers (high- and low-class) and one platform, ignoring multi-supplier or multi-platform competition. Assumes uniform consumer trust responses, not accounting for heterogeneity in blockchain awareness or trust levels. Single-period model, not reflecting long-term or dynamic blockchain adoption and contract evolution. Blockchain adoption cost is modeled as fixed, while in practice costs may be variable, scale-dependent, or subsidized. Government regulation, subsidies, or integration with IoT/AI traceability tools are not considered.	Explore blockchain adoption when several suppliers of varying quality compete across multiple e-commerce platforms. Incorporate consumers with different trust levels, risk perceptions, and willingness-to-pay for blockchain-enabled authenticity. Use multi-period or evolutionary game models to capture the long-term interplay of blockchain, contracts, and quality competition. Study cost-sharing mechanisms (suppliers, platforms, or governments) and how subsidies affect blockchain adoption strategies. Examine blockchain combined with IoT, AI, and RFID for more robust e-commerce supply chain traceability. Test theoretical predictions with real e-commerce data or case studies (e.g., JD.com, Amazon, luxury brands adopting blockchain).
78	Journal Article	Combating Deceptive Counterfeits With Blockchain Technology Under Asymmetric Information	2024	Institute of Electrical and Electronics Engineers Inc.	IEEE Transactions on Engineering Management	71	Jun	Wang	10.1109/TEM.2022.3223899	Problem: Deceptive counterfeits (low-quality fakes sold as genuine) exploit information asymmetry, undermining consumer trust and brand value. Approach: Uses game-theoretic modeling to study blockchain's role in reducing asymmetry.	Game theoretic modeling	Blockchain enhances traceability and authenticity verification, reducing deception. Improves consumer trust and demand for genuine products. Effectiveness depends on implementation costs, consumer awareness, and market conditions.	The model assumes only deceptive counterfeits while in reality markets often contain both deceptive and non-deceptive counterfeits. Consumers are modeled as making decisions purely based on price and blockchain signals, overlooking behavioral, social, and psychological factors. The study uses a static game-theoretic model, which may not capture dynamic interactions or long-term adjustments in the supply chain. Focuses on a simple supply chain structure without accounting for multi-tier supply chains, intermediaries, or global complexity. The findings are theoretical only, without real-world testing or validation in practice.	Extend the framework to include non-deceptive counterfeits and analyze their impact on blockchain adoption and firm strategies. Develop multi-period or dynamic game models to study long-term impacts of blockchain on counterfeiting. Incorporate trust, brand loyalty, and digital literacy to better model consumer decision-making in anti-counterfeit contexts. Apply the model to multi-tier, global supply chains with multiple stakeholders and regulatory bodies. Validate theoretical findings with case studies, experiments, or industry pilots in sectors like luxury fashion, pharmaceuticals, or electronics. Investigate the role of government enforcement, international trade laws, and industry standards in shaping blockchain's effectiveness.
79	Journal Article	The Choice Strategy of Authentication Technology for Luxury E-Commerce Platforms in the Blockchain Era	2023	Institute of Electrical and Electronics Engineers Inc.	IEEE Transactions on Engineering Management	70	Xue Yan	Wu	10.1109/TEM.2021.3076606	How luxury e-commerce platforms should choose authentication technologies in the blockchain era.	Game theoretic modeling	in non-monopoly and monopoly manners, the choice between manual authentication and blockchain authentication depends on the cost difference. When the cost difference is small, blockchain is optimal → higher profits, consumer surplus, and social welfare. When the cost difference is large, manual authentication is preferred. Platforms adopting blockchain can charge higher retail prices and often gain higher profits if authentication defects are significant. Blockchain adoption creates a win–win for platforms and consumers when costs are manageable. Equilibrium occurs when both platforms adopt the same technology. Small cost difference → both adopt blockchain (BB equilibrium). Large cost difference → both adopt manual authentication (NN equilibrium). Under certain moderate cost ranges, platforms may fall into a prisoner's dilemma: both adopt blockchain even though profits would be higher with manual authentication. Competitive pressure increases the likelihood of blockchain adoption.	The study is theoretical and model-based (game-theoretic Cournot competition), not empirical. Assumes simplified market settings (monopoly or duopoly), whereas real luxury e-commerce markets may involve many players and complex dynamics. Assumes homogeneous consumer preferences for authenticity, while in practice consumers vary in awareness and willingness to pay. Does not consider implementation frictions (technical, regulatory, cross-border challenges). The prisoner's dilemma analysis may oversimplify long-term strategic interactions and cooperation possibilities.	Analyze how profit-sharing with blockchain institutions influences adoption incentives. Explore cases where consumers lack perfect information about product quality or demand, and how blockchain changes platform decisions. Use data from real platforms (e.g., Farfetch, Secoo, TheRealReal) to test theoretical results . Extend beyond monopoly/duopoly to competitive ecosystems with multiple players and global networks. Examine how government subsidies or regulations could resolve the prisoner's dilemma and enhance social welfare.
80	Journal Article	Limited or Limitless? Exploring the Potential of NFTs on Value Creation in Luxury Fashion	2022	Routledge	Fashion Practice	14	Bethan	Alexander	https://doi.org/10.1080/17569370.2022.	Investigates how NFTs (non-fungible tokens) can create value in luxury fashion.	Conceptual framework	Key Insights: NFTs offer digital scarcity, authenticity, and ownership, extending luxury beyond physical goods. They enable new revenue streams (digital fashion, collectibles, resale royalties). Strengthen brand-consumer relationships through exclusivity, personalization, and community engagement. Provide traceability and anti-counterfeiting benefits by linking physical and digital assets. Findings: NFTs redefine luxury by making it both limited (scarce digital items) and limitless (infinite creative/experiential possibilities). Implications: Luxury brands can leverage NFTs to blend digital and physical experiences, appeal to younger consumers, and protect brand value. Success depends on strategic integration and maintaining exclusivity in a scalable digital space.	The study is primarily conceptual and exploratory, not based on empirical testing, which limits its ability to provide definitive conclusions on NFT adoption in luxury fashion. NFTs are still in their nascent stage of development, making their long-term impact on luxury value creation uncertain. The research concentrates on luxury fashion brands, which may not fully represent NFT applications in other sectors of luxury (e.g., jewelry, watches, automobiles). The analysis focuses more on brand and industry perspectives, with limited exploration of how different consumer segments perceive or adopt NFTs. Issues such as legal frameworks, environmental sustainability of NFTs, and market volatility are acknowledged but not deeply examined.	Conduct surveys, interviews, or experiments with luxury consumers to understand how NFTs shape perceptions of authenticity, exclusivity, and brand loyalty. Extend research beyond luxury fashion to other luxury industries (e.g., jewelry, art, watches) to compare how NFTs drive value creation. Examine the evolution of NFTs over time, including consumer adoption patterns, market maturity, and brand strategies. Study how different consumer groups (e.g., digital natives vs. traditional luxury buyers) respond to NFTs in luxury fashion. Explore how NFT adoption intersects with sustainability concerns (e.g., blockchain's energy consumption, digital waste) and ethical brand practices . Analyze the role of intellectual property rights, copyright law, and international regulations in shaping the future of NFT use in luxury fashion. Investigate how NFTs interact with metaverse platforms, AR/VR, and AI to enhance luxury brand experiences.
81	Journal Article	Blockchain transparency in reducing second-hand luxury shopping uncertainty and the role of price consciousness	2025	Springer	Fashion and Textiles	12	Nuan	Ju	https://doi.org/10.1186/s40691-025-0044	: Second-hand luxury markets face uncertainty and distrust due to counterfeits and lack of transparency. Approach: Examines how blockchain transparency affects consumer trust, purchase intention, and how price consciousness moderates these effects.	Survey	Blockchain transparency reduces perceived uncertainty and increases trust. Leads to stronger purchase intention in second-hand luxury shopping. Price-conscious consumers are more influenced by transparency since they are more cautious about risk.	The study primarily considers consumer concerns about technology and second-hand products, leaving out technical and service barriers that retailers and platforms may face in blockchain adoption. Used a cross-sectional survey, analyzing data at one point in time. This limits the ability to capture long-term changes in consumer adoption behavior and trust. The study focussed only on intention to adopt blockchain platforms in second-hand luxury shopping, without assessing actual consumer behavior over time. Potential limitations in generalizability since the study may not fully represent diverse age groups, racial backgrounds, or geographic regions.	Examine technical and service barriers to blockchain adoption in second-hand luxury markets, alongside consumer concerns. Conduct long-term or longitudinal research to track how blockchain transparency shapes adoption, perceived value, and consumer trust over time. Incorporate big data analytics to study adoption trends, repeat purchase behavior, and long-term shifts in consumer preferences. Test the model across different age groups, ethnicities, and cultural contexts to improve generalizability and understand consumer heterogeneity.

#	Source Type	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
82	Journal Article	Blockchain enabled traceability — An analysis of pricing and traceability effort decisions in supply chains	2025	Elsevier B.V.	European Journal of Operational Research	321	Prakash	Aswathy	https://doi.org/10.1016/j.ejor.2024.10.01	Examines how blockchain-based traceability affects pricing and effort levels in supply chains.	Game theoretic modeling	Blockchain improves traceability and consumer trust. Higher traceability effort can justify premium pricing. Profitability impact depends on cost of blockchain adoption and consumer sensitivity to traceability. Both cooperation and competition scenarios are analyzed.	The study uses a static decision-making model, which may not capture the dynamic, long-term interactions among supply chain partners. Assumes full information and common knowledge between supply chain partners, overlooking information asymmetry scenarios Focuses primarily on buyer–supplier interactions; does not account for wider ecosystems such as industry consortia, regulators, or consumers. Does not incorporate challenges like energy-intensive computing requirements, high implementation costs, or governance hurdles that real firms face. The study is theoretical only, without case-based or real-world testing to validate the analytical findings.	Develop multi-period or dynamic models to explore the long-term effects of blockchain adoption and traceability. Examine scenarios with unequal or hidden information among supply chain participants for richer insights. Investigate the success and governance of industry consortia, where competing firms collaborate on blockchain networks. Include consumers, regulators, and logistics partners to reflect the full scope of supply chain ecosystems. Conduct case studies and empirical research to test adoption conditions in industries like banking, shipping, finance, and manufacturing. Study the integration of blockchain with AI, IoT, and digital twins to address energy use, scalability, and data-sharing challenges.
83	Journal Article	Supply chain structure in a market with deceptive counterfeits	2015	Elsevier	European Journal of Operational Research	240	Rachel Q.	Zhang	https://doi.org/10.1016/j.ejor.2014.06.0	Studies the role of blockchain in production, manufacturing, and logistics supply chains.	Game theoretic modeling	Key Insights: Blockchain ensures traceability, transparency, and authenticity across production and logistics flows. Enhances coordination between manufacturers, suppliers, and logistics providers by reducing information asymmetry. Helps combat counterfeiting and fraud by recording immutable product data. Findings: Blockchain adoption improves supply chain efficiency, trust, and risk management. Optimal adoption strategies depend on balancing cost, data privacy, and scalability. Implications: Firms gain competitive advantage through trust-based collaboration and efficiency. Blockchain acts as both a technological innovation and a strategic enabler for supply chain resilience.	Model simplifications – The study relies on mathematical modeling with assumptions such as linear demand, deterministic costs, and rational decision-making, which may not fully reflect real-world complexities. Static analysis – The analysis is conducted in a static equilibrium framework, without considering long-term dynamics such as technological learning, blockchain cost evolution, or strategic adaptation. Limited scope of actors – The supply chain structure considered is simplified, often focusing only on manufacturers and retailers, while ignoring upstream suppliers, logistics providers, and consumers' heterogeneous behaviors. Absence of empirical testing – The findings are purely theoretical and lack validation through case studies, experiments, or real-world data. Context specificity – Results may not generalize well across industries with different regulatory environments, consumer trust levels, or digital adoption rates	Extend to multi-tier supply chains – Future studies could incorporate suppliers, logistics firms, and other stakeholders to analyze blockchain adoption in more complex networks. Dynamic models – Introduce time-dependent elements such as blockchain learning curves, technology adoption diffusion, or evolving consumer trust. Consumer heterogeneity – Explore how differences in consumer preferences, trust, and privacy concerns influence blockchain adoption and supply chain strategies. Empirical validation – Conduct surveys, case studies, or experiments in industries adopting blockchain to test the robustness of the theoretical results. Policy and regulation – Investigate how government incentives, data privacy laws, or anti-counterfeiting regulations shape blockchain adoption strategies. Technology integration – Study interactions between blockchain and other digital technologies like AI, IoT, and big data for supply chain optimization.
84	Journal Article	Price competition and blockchain adoption in retailing markets	2022	Elsevier B.V.	European Journal of Operational Research	300	Zhiming	Zhang	https://doi.org/10.1016/j.ejor.2021.08.0	Examines how blockchain adoption affects price competition in retail markets.	Game theoretic modeling	Key Insights: Blockchain increases transparency and authenticity, reducing counterfeit circulation. Shifts competition away from purely price-based rivalry toward trust and quality differentiation. Findings: Retailers adopting blockchain can charge premium prices due to higher consumer trust. Non-adopters face pressure to lower prices, intensifying competitive imbalance. Implications: Blockchain is both an anti-counterfeiting tool and a strategic differentiator in retail. Widespread adoption could stabilize markets, while partial adoption may widen competition gaps.	Model simplifications – The study builds a theoretical game-theoretic model with simplified assumptions (e.g., symmetric retailers, linear demand, deterministic blockchain costs). Consumer perception assumptions – Consumer attitudes toward blockchain and information transparency are modeled in a limited way, not reflecting the full diversity of consumer behaviors. Static analysis – The paper only considers static equilibrium outcomes and does not capture long-term dynamics like technology learning curves, cost evolution, or changes in consumer trust. Exclusion of external influences – Regulatory factors, competitive pressures from outside the modeled market, and cross-industry spillovers are not addressed. Lack of empirical testing – The conclusions are derived mathematically, without case studies or real-world data validation.	Consumer heterogeneity – Future work could integrate different consumer segments with varying attitudes toward privacy, transparency, and blockchain adoption. Dynamic modeling – Extend the model to explore time-dependent adoption patterns, cost reduction of blockchain, and consumer learning effects. Multi-retailer/multi-platform competition – Analyze scenarios with more than two competing retailers or platform-based retail ecosystems. Empirical validation – Conduct case studies, surveys, or experiments to test how consumers and retailers respond to blockchain adoption in real markets. Integration with policies – Study the effect of government privacy laws, subsidies, or anti-counterfeiting regulations on blockchain adoption in retail. Technology convergence – Investigate how blockchain adoption interacts with IoT, AI, and big data in enhancing retail transparency and competitiveness.
85	Journal Article	Strategic blockchain adoption to deter deceptive counterfeiters	2023	Elsevier B.V.	European Journal of Operational Research	311	Joe	Naoum-Sawaya	https://doi.org/10.1016/j.ejor.2023.04.0	How blockchain adoption can strategically deter deceptive counterfeiters (fake products sold as genuine).	Game theoretic modeling	Unlike prior work assuming blockchain fully eliminates counterfeits, this paper models it as a detection tool with costs. Adoption depends on a critical ratio between the cost of producing counterfeits and the market price of the product. If counterfeit production costs are low, blockchain adoption becomes more attractive for genuine manufacturers. Surprisingly, higher product prices discourage blockchain adoption, since counterfeiters' profits remain attractive. Manufacturers can strategically balance product quality and blockchain adoption. Blockchain availability may cause firms to reduce product quality improvements and instead rely on blockchain as a defensive measure. Blockchain adoption is most effective in markets where counterfeiters' production cost is not extremely low compared to genuine products. Adoption strategy varies depending on product type and market conditions.	The study is analytical and theoretical (game-theoretic model), with no empirical validation. The model assumes rational actors and may oversimplify counterfeiters' strategies in real markets. Focuses on deceptive counterfeits (where consumers cannot distinguish) and ignores non-deceptive counterfeits (luxury fakes knowingly bought). Does not account for regulatory, legal, or enforcement mechanisms, which also influence blockchain adoption. Assumes blockchain adoption has a uniform detection capability, while in practice, effectiveness may vary by implementation.	Test the model with real-world data from industries facing severe counterfeiting (e.g., pharmaceuticals, luxury goods). Extend the model to include non-deceptive counterfeits or mixed markets. Study how government policies, industry standards, and legal penalties affect blockchain adoption strategies. Examine how consumer trust and willingness to pay for authenticity influence adoption. Explore scenarios where multiple manufacturers or entire industry consortia adopt blockchain together.
86	Journal Article	When Is It Wise to Use Blockchain for Platform Operations with Remanufacturing?	2023	Elsevier B.V.	European Journal of Operational Research	309	Xiaoping	Xu	https://doi.org/10.1016/j.ejor.2023.01.0	Examines whether blockchain is beneficial for platform-based remanufacturing operations (where used products are collected, refurbished, and resold).	Game-theoretic modeling	Blockchain can enhance trust, transparency, and traceability in remanufacturing supply chains. It is most valuable when information asymmetry and counterfeit risks are high. If remanufacturing costs are low and trust issues minimal, blockchain adds little benefit. Widespread adoption depends on consumer awareness, platform competition, and regulatory support.	The study models only one platform and two manufacturers (new product and remanufactured product), which may not capture the complexity of real-world multi-platform or multi-manufacturer competition. Blockchain is assumed to perfectly eliminate information asymmetry and guarantee transparency. In reality, implementation may face data quality, interoperability, and trust challenges. The analysis does not consider dynamic effects over time, such as learning, consumer adoption of blockchain-based traceability, or changes in remanufacturing costs. Consumers are treated as homogeneous in their trust and willingness to pay for blockchain-enabled products, ignoring heterogeneity across different consumer segments. Blockchain adoption cost is modeled as fixed and known, while in practice it may be variable, uncertain, or subsidized by governments or platforms.	Explore blockchain adoption in more complex ecosystems where several manufacturers compete on multiple e-commerce platforms. Develop multi-period or evolutionary game models to study the long-term impacts of blockchain adoption, remanufacturing innovation, and consumer learning. Incorporate different consumer types (blockchain trusting vs. skeptical, environmentally conscious vs. price-sensitive) into demand models. Study how blockchain costs could be shared among manufacturers, platforms, or governments, and how subsidies/incentives alter adoption strategies. Examine how blockchain works together with IoT, RFID, or AI to enhance remanufacturing traceability and supply chain sustainability. Test theoretical findings with case studies or real data from e-commerce platforms and remanufacturing firms that have piloted blockchain adoption.
87	Journal Article	Who should invest in blockchain technology under different pricing models in supply chains?	2024	Elsevier B.V.	European Journal of Operational Research	319	Chang	Fang	https://doi.org/10.1016/j.ejor.2024.07.0	Examines which supply chain members (manufacturer or retailer) should invest in blockchain under various pricing models.	Game-theoretic modeling	Blockchain boosts traceability, trust, and anti-counterfeiting but requires high investment. Wholesale pricing model: Manufacturers benefit more from adopting blockchain, as it strengthens brand reputation and product authenticity. Retail pricing model: Retailers benefit more, since they interact directly with consumers and capture trust-based gains. Dual adoption can maximize system efficiency but risks cost duplication unless sharing mechanisms exist.	The model only considers one manufacturer and one retailer, which does not reflect the complexity of real-world multi-tier supply chains with multiple players. The analysis is conducted in a single-period setting, overlooking dynamic adoption processes, learning effects, or long-term blockchain impacts. Assumes blockchain completely ensures information transparency and trust, ignoring practical issues such as data quality, interoperability, and cybersecurity risks. Blockchain adoption costs are treated as fixed and exogenous, while in reality they may be variable, uncertain, or subsidized by governments/platforms. Consumers are modeled as homogeneous and rational in their trust and demand responses to blockchain adoption, overlooking heterogeneity in awareness, risk perception, or willingness-to-pay. The model focuses solely on blockchain, without considering how it interacts with IoT, AI, or RFID to achieve traceability.	Explore blockchain adoption decisions in more complex supply chain networks with multiple retailers, suppliers, and platforms. Develop multi-period or evolutionary game-theoretic models to study long-term impacts of blockchain investment, including technology diffusion and consumer learning. Incorporate consumers with different trust levels, awareness, and willingness-to-pay for blockchain-enabled authenticity. Model blockchain costs as variable and endogenous, accounting for scale economies, technology maturity, and possible subsidies. Investigate cost-sharing mechanisms (between manufacturers, retailers, and platforms) and their impact on incentives to adopt blockchain. Analyze how blockchain adoption interacts with IoT devices, RFID tracking, and AI analytics for enhanced transparency and efficiency. Conduct case studies, experiments, or data-driven analysis from industries (e.g., food, luxury, pharma) where blockchain adoption is being piloted.
88	Journal Article	How retailers can gain more profitability driven by digital technology: Live streaming promotion and blockchain technology traceability?	2024	Elsevier B.V.	Electronic Commerce Research and Applications	68	Xingfen	Liu	https://doi.org/10.1016/j.elerap.2024.10	Examines how live streaming and blockchain traceability help retailers improve profitability.	Game theoretic modeling	Key Points: Live streaming promotion → boosts sales through interactivity, trust-building, and real-time engagement with consumers. Blockchain traceability → ensures product authenticity, enhances transparency, and strengthens consumer trust, especially for high-value or sensitive goods. Findings: Combining both tools creates synergistic effects: live streaming builds demand, while blockchain provides credibility and security. Retailers leveraging these technologies gain higher consumer confidence, stronger loyalty, and better margins. Implications: Digital technologies should be integrated strategically to maximize profitability. Future retail competitiveness will depend on both interactive engagement and trust through transparency.	The analytical model assumes simplified market conditions (e.g., consumer homogeneity, fixed blockchain costs, simplified demand functions), which may not fully capture the complexity of real-world retail settings. The study only examines live-streaming promotion and blockchain traceability. Other emerging digital technologies (e.g., AI personalization, AR shopping, metaverse platforms) were excluded. The results are derived from theoretical modeling rather than real-world case data or experiments, which limits practical generalizability. The analysis primarily reflects online retail settings in markets like China, where live-streaming commerce is highly developed; findings may not generalize globally.	Validate the theoretical findings through case studies, field experiments, or consumer surveys to confirm how blockchain traceability and live-streaming interact in practice. Explore the combined effects of other digital technologies (e.g., AI-driven recommendation, VR/AR shopping) alongside blockchain and live-streaming to see how they jointly shape profitability. Test the model in different countries and cultural settings to examine whether consumer responses to blockchain traceability and live-streaming are universal or culture-dependent. Conduct long-term studies on how blockchain and live-streaming influence profitability and consumer trust over time, especially as technology adoption matures. Investigate how differences in consumer traits (e.g., tech-savviness, trust orientation, price sensitivity) moderate the effects of live-streaming and blockchain. Extend research to include how blockchain traceability not only increases profitability but also enhances sustainability, transparency, and ethical sourcing.
89	Journal Article	Who should adopt blockchain? The interplay between blockchain adoption and online channel under competition	2023	Elsevier B.V.	Electronic Commerce Research and Applications	62	Shuhua	Chang		Analyzes which firms benefit most from adopting blockchain in competitive markets with online and offline sales.	Game-theoretical modeling	Blockchain improves trust, traceability, and authenticity, attracting consumers worried about counterfeits. The benefit of adoption depends on: Market structure (whether competitors adopt or not). Channel strategy (online vs. offline presence). Cost of blockchain implementation. If only one firm adopts, it gains a trust-based competitive edge. If all adopt, differentiation decreases and competition shifts to pricing/service. Adoption is most valuable for firms with strong online channels, where trust deficits are highest.	The study assumes symmetric information among supply chain members, but in reality, information is often asymmetric between manufacturers, retailers, and platforms. All supply chain members are modeled as risk-neutral, whereas in practice, players may be risk-averse or risk-seeking, affecting adoption and pricing strategies. The analysis focuses on a manufacturer–retailer structure with online channel competition, leaving out multi-echelon, multi-platform, or global supply chain networks. The paper uses a single-period static framework, not capturing the dynamic nature of blockchain adoption and online channel evolution over time. Blockchain is assumed to perfectly enhance transparency and authenticity, ignoring issues of data entry errors, interoperability, and adoption barriers.	Explore blockchain adoption under information asymmetry, e.g., when manufacturers or retailers have private knowledge about costs, demand, or blockchain quality. Extend the model to include risk-averse or risk-seeking players, to study how attitudes toward uncertainty influence blockchain adoption and channel strategies. Use multi-period or evolutionary models to capture the long-term impacts of blockchain adoption, online channel competition, and consumer learning. Extend the framework to multi-tier, multi-retailer, or cross-platform competition, making the results more applicable to real-world e-commerce ecosystems. Study the synergies of blockchain with IoT, RFID, or AI analytics to provide stronger guarantees of traceability and supply chain efficiency. Conduct case studies, experiments, or data-driven research to test the theoretical predictions in industries such as luxury goods, food, or pharmaceuticals.
90	Journal Article	Non-fungible token (NFT) markets on the Ethereum blockchain: temporal development, cointegration and interrelations	2023	Routledge	Economics of Innovation and New Technology	32	Lennart	Ante	https://doi.org/10.1080/10438599.2022.2	Analyzes the evolution and dynamics of NFT markets on Ethereum.	Analysis of 14 projects	Key Insights: NFT markets (art, collectibles, gaming, etc.) have grown rapidly but show high volatility. Categories are interrelated but not fully integrated—meaning shocks in one (e.g., art NFTs) can spill over but not completely dictate others. Cointegration tests reveal partial long-term linkages among NFT segments. Findings: NFT markets are still fragmented and speculative, lacking full maturity. Each category follows distinct patterns, yet connected enough to transmit risks. Implications: Investors face both diversification opportunities and contagion risks. Policymakers and platforms need to consider volatility, interdependence, and systemic risk in NFT markets.	The study relies on blockchain wallet data, but a single user can hold multiple wallets. This makes it difficult to accurately capture the number of real NFT users. Some NFT transactions may not be "genuine" market activity. Examples include artificially inflating liquidity by trading between own wallets or using NFTs for tax evasion and money laundering. The analysis only includes NFT projects on the Ethereum blockchain. Other blockchains (e.g., Flow, Tezos, Solana, Polygon) were excluded, though they increasingly host NFT activity. The study only considers three variables: number of sales, USD transaction volume, and number of wallets. Other NFT characteristics (e.g., rights conveyed, functionality, project-specific tokens) were not analyzed. Only the 14 NFT projects with cumulative trading volume above $10 million were studied.Other potentially influential but smaller projects were excluded.	Expand research beyond Ethereum to include NFTs on multiple blockchains. This would allow examination of how scalability, transaction costs, and migration ("chain swap") influence NFT adoption. Future studies should account for project-specific features (e.g., revenue-sharing, voting rights, utility functions). This would help explain differences in adoption, frequency of transactions, and trading volume. Analyze the relationship between NFT pricing and major cryptocurrencies (Ether, Bitcoin) to measure dependence and spillover effects. Investigate how the launch of new successful NFT projects affects existing ones. For example, whether integration (like SuperRare joining Decentraland) changes cross-market influences. Examine whether the interrelations between NFT markets (cointegration, Granger causality) persist over time or change with market maturity. Explore unresolved legal rights, intellectual property, and storage concerns (e.g., centralized vs. decentralized hosting of NFT assets). These issues could significantly impact long-term trust and adoption.

#	SourceType	Title	Year	Publisher	Journal Name	Vol.	First Name	Last Name	Paper Reference	Study Objective	Methodology applied	Findings	Limitations	Suggestions
91	Journal Article	What can blockchain do and cannot do?	2021	Routledge	China Economic Journal	14	Zhong	Xu	https://doi.org/10.1080/17538963.2020.	ritically examines blockchain's real capabilities vs. myths.	Theoretical Framework Development	Mainstream blockchains (Bitcoin, Ethereum, etc.) are best understood through the Token Paradigm, where tokens are state variables governed by consensus, smart contracts, and cryptography. Blockchain ensures trustless transactions and settlement for on-chain token transfers but cannot guarantee authenticity of off-chain information. Oracles remain a weak point—data written on-chain may still be false at the source. Four types of applications identified: -Without tokens (blockchain as a distributed ledger). -With tokens representing off-chain assets (e.g., supply chain finance, digital commercial papers). -Tokens as units of account or underlying assets (e.g., crypto ETFs, futures). -Tokens as payment/incentives for decentralized applications (DAOs). Each faces unique challenges (legal, volatility, governance, performance). Cryptocurrencies like Bitcoin lack intrinsic value, sovereign backing, and monetary flexibility → cannot replace fiat money. Their volatility and role in illegal activities limit	Blockchain cannot solve authenticity of off-chain data; oracles remain unreliable. Low efficiency (TPS far behind Visa/PayPal). Impossibility trinity → can't achieve scalability, decentralization, and security simultaneously. Smart contracts' cannot handle incomplete contracts or guarantee full repayment in financial contracts. Token duality (as financing and utility) creates instability in blockchain platforms. DAOs and token-based incentives are undermined by volatility, weak investor alignment, and lack of effective governance integration with real-world institutions. Tokenization of off-chain assets and stablecoins depend heavily on law, regulation, and global policy harmonization.	Develop reliable decentralized Oracle mechanisms to bridge blockchain with the real world. Improve smart contracts to handle credit risk, incomplete contracts, and financial instruments. Study stablecoins, CBDCs, and hybrid token models to address volatility and ensure monetary stability. Explore hybrid governance models that combine on-chain (code, tokens) with off-chain (law, regulation, reputation). Investigate solutions to blockchain's trilemma (scalability, decentralization, security) and evaluate trade-offs between public, consortium, and private blockchains. Analyze real-world blockchain pilots (e.g., digital commercial paper platforms, CBDC trials) to validate theoretical insights. Examine blockchain's role in global monetary systems, cross-border finance, and systemic risk management under BaaFI.
92	Journal Article	Genuine brands or high quality counterfeits: An investigation of luxury consumption in China	2018	Wiley-Blackwell Publishing	Canadian Journal of Administrative Sciences	35	Juan	Shan	DOI: 10.1002/CJAS.1416	Explores why Chinese consumers choose between genuine luxury goods and high-quality counterfeits.	Survey	Many consumers adopt a dual strategy: buy genuine brands for important/status-signaling occasions, and counterfeits for casual use. The line between authentic and counterfeit consumption is blurred, as fakes can still deliver social prestige if convincing. Implications: Luxury brands must stress heritage, authenticity, and exclusivity to maintain advantage. Anti-counterfeiting strategies should address not only legality but also consumer perceptions of quality and social acceptance.	The study is conducted in China, which may limit the generalizability of findings to other countries or cultural contexts with different consumer behaviors toward luxury and counterfeits. Relies on a snapshot of consumer attitudes and behaviors, preventing analysis of changes over time in luxury vs. counterfeit consumption. Uses survey-based self-reports, which may be biased by social desirability or inaccurate recall. Focus is limited to certain luxury product categories; findings may not extend to all luxury goods (e.g., fashion vs. watches vs. cosmetics).	Replicate the study in different countries to explore cultural differences in perceptions of genuine vs. counterfeit luxury goods. Conduct long-term studies to examine how consumer attitudes and purchasing behaviors evolve over time. Use controlled experiments to better establish causal relationships between factors such as brand image, counterfeit quality, and purchase decisions. Extend the research to other luxury product categories (e.g., jewelry, cosmetics, automobiles) to test generalizability. Investigate deeper psychological drivers, such as identity signaling, social comparison, and moral justification, behind preferences for genuine vs. counterfeit goods. Explore how e-commerce platforms and social media influence luxury vs. counterfeit consumption, especially in younger demographics.
93	Journal Article	How blockchain technologies impact your business model	2019	Elsevier Ltd	Business Horizons	62	Vida J.	Morkunas	https://doi.org/10.1016/j.bushor.2019.01	Explores how blockchain changes business models.	Conceptual framework	Key Point: Blockchain is not just a technology but an institutional innovation that enables new ways of organizing trust, transactions, and value creation. Main Impacts: Value proposition: Increases transparency, security, and traceability. Value creation: Reduces intermediaries, automates processes via smart contracts, and enhances efficiency. Value capture: Opens new revenue models (e.g., tokenization, decentralized platforms). Findings: Adoption success depends on aligning blockchain with business strategy and ecosystem readiness. Implications: Firms must rethink roles, partnerships, and governance. Blockchain may disrupt existing players while enabling new entrants.	Most blockchain projects analyzed are pilot initiatives, not large-scale rollouts. This restricts the ability to draw conclusions about long-term effects on business models. The article relies on a limited number of case studies and illustrative examples, which may not fully represent the diversity of blockchain applications across industries. The discussion is conceptual and illustrative, without large-scale empirical data to validate the proposed impacts on business models. It is unclear whether blockchain adoption will primarily lead to incremental, architectural, or radical innovations, due to the early development stage of the technology.	Conduct studies with larger samples of firms using blockchain to assess which business model components (e.g., customer relationships, revenue streams, cost structures) are most affected. Investigate whether private (permissioned) or public (open) blockchains create greater value across different business model elements. Explore blockchain's impact on business models across various industries (finance, healthcare, retail, manufacturing, supply chains) to identify sector-specific opportunities and challenges. Examine whether blockchain projects result in radical innovations (new industries/businesses) or architectural innovations (reconfiguring existing systems). Study blockchain adoption over time to understand scaling, sustainability, and evolution of blockchain-based business models.
94	Journal Article	Technology and counterfeiting in the fashion industry: Friends or foes?	2018	Elsevier Ltd	Business Horizons	61	Laura	Mercuiglia	https://doi.org/10.1016/j.bushor.2018.0	The dual role of technology in the fashion industry's counterfeit problem.	literature-based and case-informed analysis	Technology both enables counterfeiters (cheap digital reproduction tools, online platforms, global e-commerce) and empowers brand owners (traceability, tagging, DNA analysis, RFID, blockchain solutions like VeChain). Social media, search engines, auction sites, and messaging apps have created a powerful, low-cost distribution channel for counterfeit goods. Counterfeiters exploit anonymity, global jurisdiction gaps, and technological tools (bots, algorithms) to operate almost without punishment. Tools like RFID tags, DNA marking of fibers, and blockchain-based solutions allow authentication and traceability along the supply chain. Software platforms monitor websites and detect fraudulent listings, but enforcement remains weak. Current anti-counterfeiting strategies neglect consumers, who are crucial in shaping demand. Many consumers either unknowingly buy fakes or knowingly purchase them for psychological or cultural reasons (e.g., "Robin Hood" syndrome, identity signaling). A sustainable anti-counterfeiting strategy must involve consumers, public institutions, and	The article is conceptual and descriptive, not empirical or model-based. It focuses mainly on the fashion industry, though lessons may extend to other sectors. Adoption of advanced technologies faces cost, complexity, and accessibility barriers, particularly for SMEs. Enforcement challenges (legal, transnational, institutional) remain largely unresolved.	Investigate how to better involve consumers in anti-counterfeiting (e.g., apps, awareness campaigns, education). Quantitative research on the economic trade-offs of adopting different anti-counterfeiting technologies. Extend analysis beyond fashion to pharmaceuticals, food, and electronics, where counterfeiting also has safety implications. Explore the role of harmonized laws, transborder agreements, and public–private partnerships in supporting technological solutions. Examine how networks of SMEs can pool resources to implement advanced anti-counterfeiting systems.