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"Illegitimate trade in Luxury Supply chain: main issues and countering strategies"

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Abstract

Counterfeiting is affecting most industries around the world no more so than in Fashion and Luxury industries and it's estimated to be valued at about 5-7% of the world trade.

From a supply chain perspective, counterfeiting is only part of a wider phenomenon that I have defined as "illegitimate trade" that includes supply chain infiltrations, factory overruns, grey and parallel market, retail service counterfeiting, and shop-lifting.

Companies often address these issues by means of isolated legal actions without taking into consideration that a cross-divisional approach that would involve supply chain, technology and marketing actions could be in fact far more effective.

The aim of this thesis are to present illegitimate trade phenomena in a end to end supply chain perspective, introduce and discuss the Legitimate Illegitimate Supply Chain Model (LISC Model), understand which of the illegitimate trade phenomena are the most common and the most damaging to the fashion and luxury companies and which strategies can be the most effective in countering them.

I present the literature review in a supply chain perspective and considering the different phenomena included in illegitimate trade, then I introduce and discuss the LISC model, validating it through the analysis of five case studies related to fashion and luxury companies. Finally I discuss the results of a survey conducted on a sample of 112 managers working in 81 fashion and luxury firms. This empirical evidence shows that the most frequent events are of the pure counterfeiting and parallel and grey market types. Furthermore, the survey results demonstrates that various forms of illegitimate trade can co-exist, but each of them calls for a targeted strategy. This evidence leads to relevant managerial implications concerning the quantification of the economic impact of counterfeiting and the necessity for companies to be prepared with an holistic approach and cross-divisional group devoted to illegitimate trade and counterfeiting.

Keywords: Luxury, Supply chain, Counterfeiting, Grey markets, Illegitimate trade, Parallel trade

Illegitimate trade in Luxury Supply chain: main issues and countering strategies

Index

1. Acknowledgements

2. Introduction

2.1 Brief summary

Counterfeiting is affecting most industries around the world, in particular, Fashion and Luxury industries and it's estimated to be valued at about 5-7% of the world trade (OECD, 2008).

From a supply chain perspective, counterfeiting is only part of a wider phenomenon that I defined as "illegitimate trade" that includes supply chain infiltrations, factory overruns, grey and parallel market, retail service copycat and shop-lifting.

The first aim of my Ph.D. thesis is to treat counterfeiting as a part of a broader set of "illegitimate trade" phenomena by utilizing a supply chain perspective. This will go beyond the traditional "genuine-counterfeit" binary classification and show the different illegitimate trade problems that can occur along the supply chain.

Illegitimate trade is particularly complex to be countered in fashion and luxury industries for several characteristics related to the nature of the industry, the demand and the related supply chains, as I will better explain later.

The second aim of my research is to contribute to elevate the status of illegitimate trade from an issue that is currently awkwardly and disjointedly treated on a divisional level, to one of strategic importance. As such, I hope to lay the foundation for an all-inclusive approach to the problem, which will take into account all relevant issues and parties and help a CEO in the future to clearly see the trade-offs involved, while pursuing an optimal strategy for his company.

Companies often address these issues by means of isolated legal actions without taking into consideration that a cross-divisional approach, that would involve supply chain, technology and marketing actions, could be in fact far more effective. Several authors tried to discuss the phenomena which determined the increase of counterfeiting and illegitimate trade (Lybecker,

2008): between the different causes listed, the emergence of complex, geographically dispersed, and vulnerable supply chains and the frequent use of production outsourcing and off-shoring played a critical role.

The first outputs of my thesis are the definition of:

- "illegitimate trade" (and its counterpart, "legitimate" trade) as a phenomenon that collectively describes deceptive and non-deceptive counterfeiting, grey market trade, unauthorized or overrun production, theft, supply chain infiltrations, retail service counterfeiting and other types of activities that bring to the market goods in violation of intellectual property or commercial laws and agreements;
- "illegitimate actor" as the actor that performs one or more illegitimate trade activities;
- "illegitimate good", as I will discuss later while presenting the LISC model (which stands for Legitimate Illegitimate Supply Chain), is a good which has been handled by an illegitimate actor, even if it successfully (re)enters the legitimate supply chain. This is an important distinction that I make and that will hopefully assist the reader in circumventing the confusion that arises from trying to distinguish goods as simply "genuine" or "fake". For example, overrun goods are illegitimate even if they are identical to those legitimately distributed by the brand and distributed by an otherwise legitimate retailer.

The definitions of the phenomena under analysis allows me to introduce the main contribution of my research project, which is the development of the formal "Legitimate Illegitimate Supply Chain" (LISC) model. Through the model, I identified seven possible "illegitimate trade families", which represent the paths that a product may pass through before its final sale to end an customer, assuming the existence of two parallel supply chains, one legitimate and one illegitimate. Finally, once defined the illegitimate trade families and described in an end-to-end supply chain perspective through the model, I tried to understand which of the illegitimate trade phenomena are the most frequent and the most

damaging to the fashion and luxury companies, and which strategies can be the most effective in countering them.

I present the results of a survey conducted on a sample of 112 managers working for 81 fashion and luxury firms.

This empirical evidence shows that the most frequent events are those of the pure counterfeiting and parallel and grey market types. Furthermore, the survey results demonstrate that various forms of illegitimate trade can co-exist, but each of them calls for a targeted strategy.

This evidence leads to important managerial implications concerning the quantification of the economic impact of counterfeiting and the necessity for companies to be prepared with an inter-functional group devoted to counterfeiting.

The methodology I used to carry on my research consisted of two different phases: the first was based on a case study research and the second on a Survey. The methodology of Case study Research allowed in the first phase to carry out the empirical analysis with an explorative aim, addressing "how" and "why" questions (Yin, 2009). In fact, considering that the goal of the research is to investigate illegitimate trade and counterfeiting phenomena in fashion and luxury companies and the related supply chain strategies and technology based methods to fight counterfeiting, the case study research will allow to approach the industrial reality and to get a complete description and knowledge of it.

I selected five Italian fashion and luxury companies and three experts in Intellectual Property Protection from legal firms and government and I conducted several interviews in order to understand their point of view and approach towards counterfeiting and illegitimate trade. The case studies results supported me in understanding how the different illegitimate trade phenomena can be described in an end-to-end supply chain perspective and allowed me to define, design and discuss with them the LISC model and its "illegitimate trade families" categorization.

During the second stage of my research, the explorative survey supported me in uncovering and providing provide preliminary evidence of association among concepts. (Forza, 2002).

In fact, considering that the goal of the research is to investigate the correlation among the different illegitimate trade phenomena and the perceived usefulness of the related countering strategies for each of them, the survey research allowed to better understand and measure the related phenomena.

Thus, in my empirical investigation I tested the existence of a correlation between the different illegitimate trade phenomena and the effectiveness of the countering strategies towards each illegitimate trade phenomena to be countered. My results filled a gap in the academic literature and business press, where counterfeiting and illegitimate trade topics are usually approached in an isolated case manner and without taking into account a holistic supply chain perspective. The LISC model not fills only a literature gap regarding counterfeiting and illegitimate trade in general but, compared to previous attempts, offers some marked advantages.

In particular, LISC is grounded in graph theory, includes a design stage (that is central in the fashion and luxury industries). It is also semantically rich providing classification and definitions for illegitimate trade arcs, families, super-families, and, finally, explicitly captures the interactions between the legitimate and illegitimate actors. In addition to this, the analysis of the occurrence and of the economic impact of each illegitimate trade super-families and the correlation between the different phenomena can help companies in identifying the most vulnerable areas of their supply chain and where they should dedicate their energies to address the problem.

I used the model in order to assess which illegitimate trade typologies are the most frequent and the most damaging to fashion companies, namely "pure counterfeiting" and "gray market" and I assessed the possible strategies against them. The complexity of the phenomena is enriched by the showed correlation existent between the different phenomena: the correlations analyzed between

the defined illegitimate trade phenomena help me to understand to what extent, for example, gray market activities can create the conditions that will cause counterfeiting to flourish.

The evidence that all the phenomena are correlated is very important for firms in order to define and implement the right countering strategies.

The co-existence of the different illegitimate trade phenomena make the traditional functional approach unable to counter efficiently the complex phenomena as a whole: it becomes crucial for companies to take into account a holistic supply chain perspective, addressing the problem with a cross-functional team which is able to approach the problem considering its legal, marketing, supply chain and technology implications.

In addition to this, each illegitimate trade phenomena requires a different bundle of countering strategies so it will be relevant for companies to assess their illegitimate trade weakness in order to implement the most suitable countering strategies.

2.2 MI-FIDO Project

The involvement in MI-FIDO Project (an acronym which stands for Made in Italy Fashion Identity and Originality) has been very relevant for my Ph.D. thesis in the fields of fashion and luxury supply chain management, counterfeiting and the related countering strategies.

MI-FIDO Project was a three years project (2010-2012), included in the program "Industria 2015 - New technologies for the Made in Italy", financed by the Italian Ministry of Economic Development.

The initiative aimed to investigate, develop and implement innovative solutions to track product legitimacy, to contrast counterfeiting and to protect the integrity of the "Made in Italy label". In particular, it included two main activities:

- the development of the "Fashion passport", a label based on RFID (Radio frequency identification) technology with the aim to certify the

authenticity of products in order to protect the products from counterfeiting actions along all the end to end supply chain processes

- the development of a ICT platform, specifically designed for the "Made in Italy", able to guarantee the gathering and the centralization of data associated to RFID label and information management along all the end to end supply chain processes, in particular for the fashion industry, in order to support the creation of a system of "Safe Supply Chain"

The basic idea of the "MI-FIDO" program was to certify the authenticity of the "Made in Italy" products, through innovative technologies able to guarantee the control of the end to end supply chain, protecting the fashion industry, which is highly impacted by counterfeiting risk, and which represents one of the industries for which Italy is more famous in the world.

The project team was composed by several firms, operating in the field of RFID technology development and informatics system, two universities, such as SDA Bocconi School of Management and University of Insubria and the Versace group, one of the main players of high end fashion luxury industry, which tested the solution on its processes and products.

The final target of the project was to develop a solution that could be implemented by other companies, within the fashion industry, which aims to protect their brands and the "Made in Italy" concept from counterfeiters.

SDA Bocconi School of Management was involved in the project to provide the academic and scientific experiences related to the supply chain management and the application of RFID Technology, with a particular focus on fashion industry and anti-counterfeiting issues, and to support the team in the assessment of the economic sustainability of the solution.

The involvement in MI-FIDO project and the opportunity to discuss counterfeiting risks with Versace Group was the starting point of an interesting research and it allowed me to find and investigate a relevant gap in the literature about supply chain, counterfeiting and fashion & luxury industry.

Starting from this experience, I developed my research independently from MI-FIDO project, investigating the phenomena of illegitimate trade, the different events that it can include and the point of view and the countering strategies of other fashion and luxury companies which are facing and countering this risk.

The rest of this thesis is structured as follows: in section 3 I present the phenomena of counterfeiting and illegitimate trade, underlining why this phenomena is particularly complex in fashion and luxury industries, in section 4 I discuss the literature review of recent research related to illegitimate trade, in section 5 I introduce the literature gap identified and the research questions and in section 6 the methodology adopted.

In section 7 I introduce the LISC model, and in section 8 I present the case studies and the data gathered during the interviews. Section 9 includes the application of LISC model to fashion and luxury industries, through a brief description of the illegitimate trade super-families identified with the support of data from primary and secondary sources and in section 10 I present the survey results. Finally, in section 11 and section 12 I discuss the research conclusions and limitations.

3. Counterfeiting and Illegitimate Trade

3.1 Counterfeiting and Illegitimate Trade phenomena: definitions and data

Founded in 1951, the Museum of Counterfeiting in Paris displays counterfeit products side-by-side with originals for visitors to firsthand assess the difference between "reals" and "fakes" and to create awareness on counterfeiting (i.e., the fraudulent imitation of a good).

FIGURE 1 - MUSEE DE LA CONTREFAÇON , RUE DE LA FAISANDERIE, PARIS

Yet, counterfeiting, at least conventional sense, is becoming less meaningful to brands and consumers alike that are increasingly confronted with implausible phenomena such as the case of unauthorized Apple and IKEA stores operating in China unbeknown of the brand owners (Branigan T. , 2012) (Flock E. , 2011), a factory overrun produced by the very same contract manufacturer authorized to produce the original good (Tucker, 2006) or a stolen good sold re-inserted in the market. In this new brave world, it's possible to find a bag at sold at high-street store that was made without the permission or knowledge of its brand owner, yet, at the very same facility as an authorized one. This bag would not be classified as a "fake" even after the most stringent examination and as such, probably, it would not be eligible for the Museum of Counterfeiting.

Let this be an alert that counterfeiting is only one of the many faces of "illegitimate trade" (more about this term shortly).

Counterfeiting is defined as: "any manufacturing of a product which so closely imitates the appearance of the product of another to mislead a consumer that it

is the product of another" (OECD, 1998). Hence, it may include trademark infringing goods, as well as copyright infringements. The concept also includes copying of packaging, labeling and any other significant features of the product.

Traditionally, the literature distinguished between deceptive and not deceptive counterfeiting: the first occurring when consumers think that they are buying an original product and the second when consumers recognize that the product is a counterfeit (Grossman & Shapiro, 1988).

Counterfeiting is increasing in all industries and it's estimated to represent about the 7% of international trade for a value of 250b$.

In United States during Fiscal Year 2012, there were 23.000 intellectual property rights (IPR) seizures with a domestic value of 1.2 billion USD, and seizure of products related to fashion industry such as footwear, handbags, wallets and wearing apparels representing the 74% of the total value (U.S. Customs and Border Protection, 2012).

Across the pond, the total value of the 91,000 seizures made by European customs during 2011 was about 1.3 billion euro, 47,22% of the which was footwear, clothing, bag and wallets (Taxation and Customs Union, 2011).

In Italy, during the period 2008-2010, more than 56,000 cases have been recorded, about 174 millions of items seized for an estimated total value of counterfeited goods is around 1.8 billion euro (Ministero dello Sviluppo Economico - Ufficio Italiano Brevetti e Marchi, 2012).

The Figure 2 below summarizes the main data about counterfeiting phenomena.
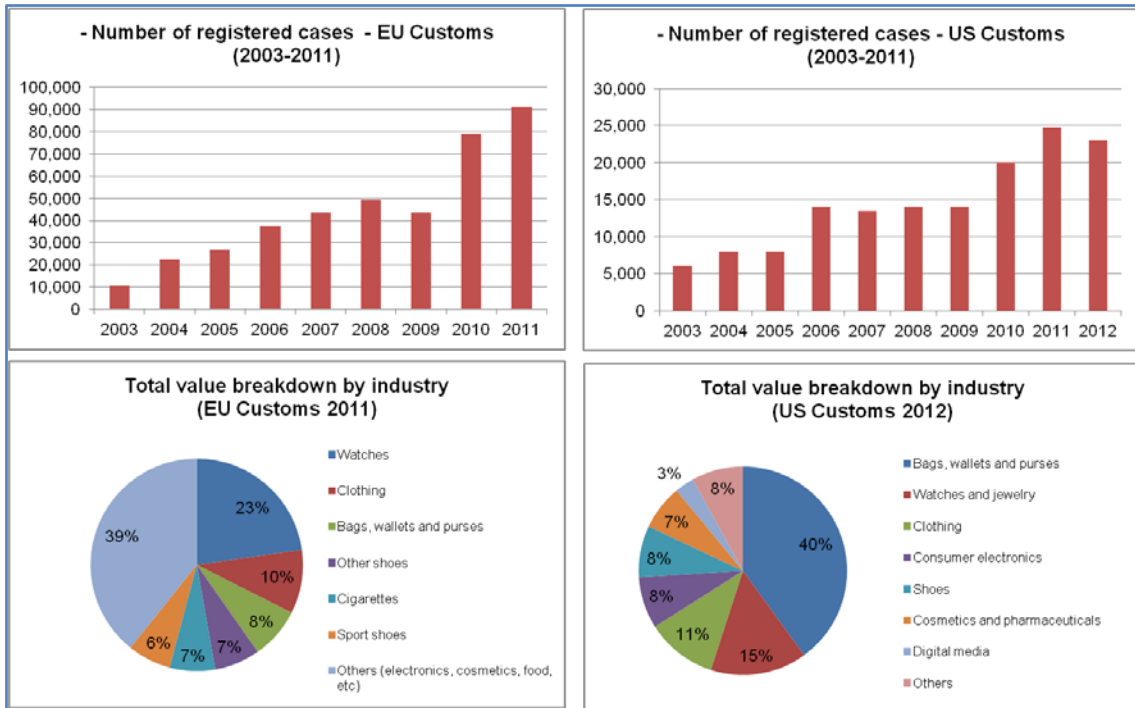
FIGURE 2 - COUNTERFEITING MAIN DATA, SOURCES: (EU CUSTOMS, 2011), (US CUSTOMS, 2012)

Counterfeiting generates different typologies of costs for countries and companies: first of all, there is a direct loss in sales, second a loss of goodwill, especially in case of deceptive counterfeiting. Third the presence of cheap and obvious copies contrasts with the goals of some companies of being perceived exclusive. Last but not least, the investments needed and the costs of protecting and enforcing intellectual property rights.

While counterfeiting has always existed, the phenomena increased in a significant way in the mid-1960s for several reasons such as advances in technology, increased international trade, emerging markets and emerging products (OECD, 1998).

Nunes (2010) attributes the increase in counterfeiting in recent years to the global supply chains with more weak links for counterfeiters to exploit, digital technology, that makes possible near instant copying, free-trade zones that allow shipments of illegal goods to move around the world, and increased Internet sales. Other authors points out how another main reason is represented by the emergence of complex, geographically dispersed, and vulnerable supply chains (Trott & Hoecht, 2007) (Christopher, Lowson, & Peck,

2004) (Bruce, Daly, & Towers, 2004). Indeed, for about 25 years the main preoccupation of many firms was to gain efficiency in production-related activities, via delocalization and outsourcing, eventually retaining direct control only of design and brand-related activities (Hamel, 1990).

The side-effect of this strategy has been the global proliferation of unwarranted manufacturing and distribution activities that have seriously eroded legitimate supply chains and their brands (Bruce, Daly, & Towers, 2004). Loosely speaking, these activities constitute "counterfeiting", but, actually, they have outgrown this term.

In addition to this, the distribution channels of counterfeit and pirated products are changing: if, in the past years, counterfeit and pirated products were mainly distributed through informal markets, now the infiltrations in legitimate supply chain are increasing and the risks of counterfeited products appearing on the shelves of established retail shops is becoming significant (OECD, 2008).

The aim of my thesis is to treat counterfeiting as a part of a broader set of "illegitimate trade" phenomena by utilizing a supply chain perspective. This will go beyond the traditional "genuine-counterfeit" binary classification and show the different illegitimate trade problems that can occur along the supply chain.

As I mentioned already, illegitimate trade is a lot more than counterfeiting alone and includes a variety of non-authorized types of activities that can harm a brand, although most of these activities are already established both in practice and in the literature, I will provide brief term definitions here for the purpose of clarity.

Counterfeiting, as already defined above, is "any manufacturing of a product which so closely imitates the appearance of the product of another to mislead a consumer that it is the product of another" (OECD, 1998).

Factory overrun describes "unauthorized production and exploitation of goods by otherwise legitimate suppliers" (OECD, 1998). In certain industries, it's quite common that suppliers produce additional quantities of products and sell them

on the black market. These goods are considered "counterfeits" by the trademark but it's difficult to take action as over-runs are usually treated as a simple breach of contract by courts. (OECD, 1998).

Parallel trading or *grey market* refers to the situation "where products are legitimately bought in one territory and diverted for sale to another territory without the consent of the right holder in the receiving territory" (OECD, 1998). Although the 1989 Trademark Directive considers parallel market as a trademark infringement, it can be difficult for trademark owners to win a litigation because the products involved are genuine. (OECD, 1998).

Retail copycatting describes the case where the retail experience of a genuine brand store is being imitated unbeknownst to customers (Harvey & Ronkainen, 1985).

Supply chain infiltration is when an unauthorized actor succeeds in inserting stolen or counterfeit products into a legitimate supply chain.

Finally, *shoplifting* is the act when an individual steals from a retailer.

I will return to those definitions in section 3 where I will present the literature review which is built on the basis of the different illegitimate trade phenomena just listed.

In the literature the closest concept that could come close to my needs is that of *illicit trade.* This stands for a wide variety of illegal or non-contractual activities, including trafficking in controlled substances, stolen and smuggled goods, and trade of all kinds with products infringing intellectual property rights and even parallel imports (Staake, Thiesse, & Fleisch, 2009).

Trafficking controlled substances is outside our scope but I include factory overruns, retail copycatting and supply chain infiltrations.

The phenomena included in "illegitimate trade" are strictly interconnected and I will illustrate exactly how while presenting later the LISC model.

I'm now ready to formally define illegitimate trade, illegitimate actors, and illegitimate goods.

Illegitimate trade collectively describes deceptive and non-deceptive counterfeiting (OECD, 1998) (Grossman & Shapiro, 1988), grey market trade (OECD, 1998), unauthorized or overrun production, smuggling, theft, retail service copycat, supply chain infiltrations and other types of activities that bring to the market goods in violation of intellectual property or commercial laws and agreements (Hilton, 2004) (Phau & Teah, 2009) (Grossman & Shapiro, 1988) (Staake, Thiesse, & Fleisch, 2009).

An *Illegitimate actor* is one that performs one or more illegitimate trade activities.

Once a good has been handled by an illegitimate actor, it becomes and remains *illegitimate*, even if it successfully (re)enters the legitimate supply chain.

This is an important distinction that we make and that will hopefully assist the reader in circumventing the confusion that arises from trying to distinguish goods as simply "genuine" or "fake".

For example, overrun goods are illegitimate even if they are identical to those legitimately distributed by the brand and distributed by an otherwise legitimate retailer.

3.2 Illegitimate trade in fashion and luxury industries

Counterfeiting and other illegitimate trade activities are running rampant in the high-end fashion industry (HEF)[1], a 142€[2] billion business worldwide in 2011

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[1] The term "fashion industry" encompasses the sourcing, production, distribution, and marketing activities of apparel, leather goods, accessories, and jewelry (Brun & Castelli, 2008) and, typically, describe those industries characterized by short-life cycles, high volatility, low predictability and high impulse purchasing (Martin, Lowson, & Peck, 2004). The term "luxury industry" refers to the high-end segment of the industrial sector (Caniato, Caridi, Castelli, & Golini, 2011). HEF is the luxury segment of the fashion industry.

[2] The turnover of HEF can be calculated in a straightforward fashion as 74% (apparel, accessories and jewelry segments) of 192€ billion which is the "personal luxury goods" according to Bain & Company.

(Bain & Company, 2012). During the same year, the value of the growing counterfeited goods trade alone was around 7€ billion [3].

In this industry, where reputation is everything, the days when the illegitimate trade issue was dealt in a taboo manner are probably over: the top-ten luxury brands in the world (KPMG International, 2011) own seven of the most desired counterfeited brands by UK consumers (Davenport Lyons, 2007).

In addition to this, if we compare the ranking of the top most valuable brands (WPP, 2012) with those of the most counterfeited brands (WCO, 2009) or the most desired counterfeited brands in UK (Davenport Lyons, 2007), we find the same brands both in the virtuous and vicious ranking: Louis Vuitton, Hermès, Rolex, Chanel, Gucci, Prada, Cartier, Burberry are all included in the three rankings, as described in Figure 3.

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[3] My estimate using available data on counterfeiting (OECD, 2008) and HEF segment (Bain & Company, 2012).

Most valuable brands (1)	Most demanded counterfeited brands (2)	Most counterfeited brands (3)
Louis Vuitton	Louis Vuitton	Louis Vuitton
Hermès	Gucci	Nike
Rolex	Burberry	Hello Kitty
Chanel	Tiffany	Adidas
Gucci	Prada	Puma
Prada	Hermès	Chanel
Cartier	Chanel	Rolex
Hennessy	Dior	Armani
Moet & Chandon	Yves Saint Laurent	Crocs
Burberry	Cartier	Kiwi
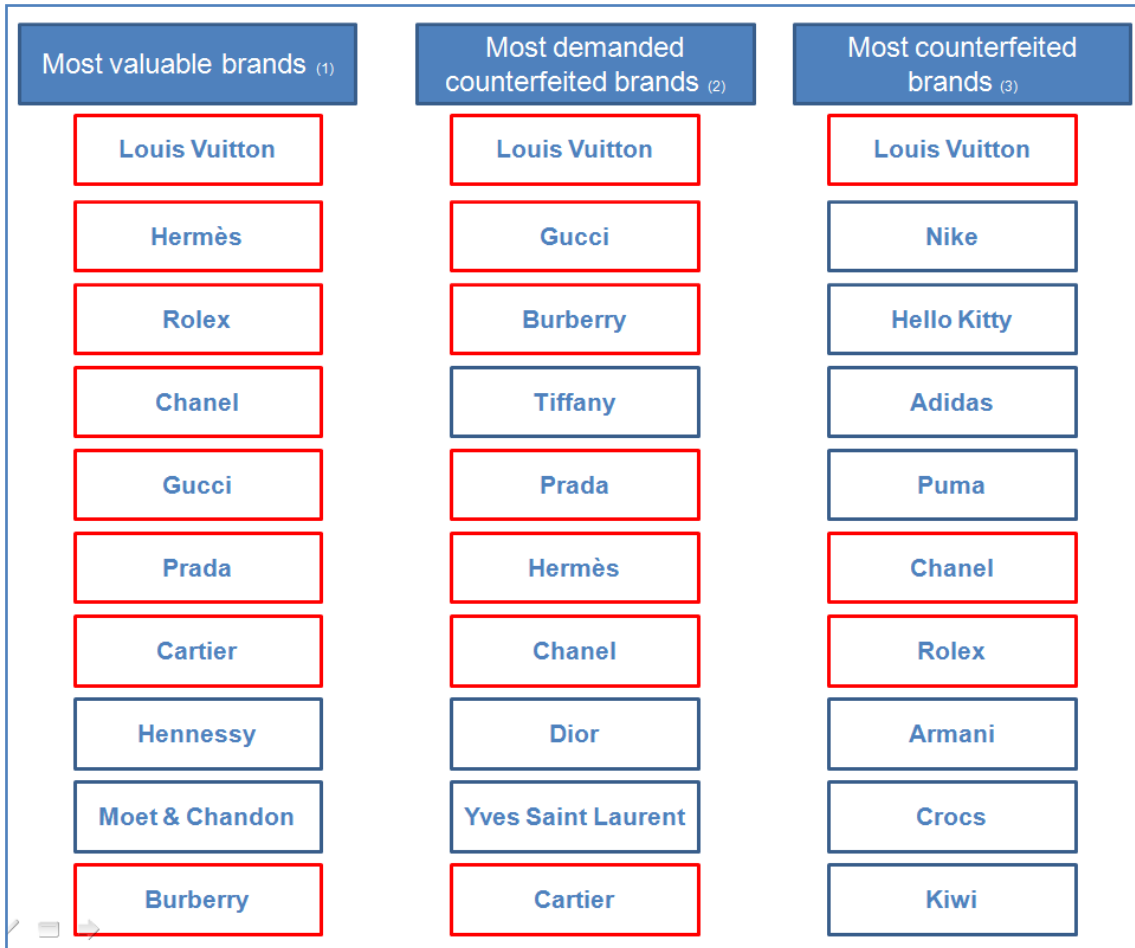
FIGURE 3 – BRANDS & COUNTERFEITING, SOURCES: (1) (WPP, 2012), (2) (DAVENPORT LYONS, 2007), (3) (WCO, 2009)

At first, illegitimate trade in the fashion industry was not perceived as outright damaging as it was in other industries such as pharmaceuticals, or food and beverage (OECD, 1998).

Although in recent years the attitude of brands towards counterfeiting and illegitimate trade in general is turning negative, in the past there have been some arguments in favor of tolerating, or at least not aggressively pursuing, illegitimate actors.

The main argument behind this policy of tolerance can be attributed to the belief that counterfeit products sold on the street were actually creating a positive "publicity effect" for the brand. Some even saw a certain degree of accomplishment in creating items that "others want to copy" (Hilton, Choi, & Chen, 2004).

The following quote attributed to Patrizio Bertelli, CEO of Prada: "Worry about who's copying you, yes, but worry more about building and maintaining a brand that others will want to copy" (Brandazza, 2008).

In fact, the moral evaluation about "copying original work" has changed significantly over time: in the past it was considered a legitimate activity. When Michelangelo replicated a work by his master Domenico Ghirlandaio, its work was considered a "proof" of its ability as an artist and not a "fake good" (Frey, 2004). Even deceptive counterfeiting was not considered so badly: the deceived purchasers of the Renaissance bust of Lucrezia Donati didn't complain at all when they discovered that it was a fake because they were happy that such a talented artist was still alive (Jones, 1990).

However most brands nowadays have a very different attitude and, as the sophistication of illegitimate trade is increasing, are urgently looking for demand-side and supply-side strategies to track and control the phenomenon and in particular the mechanisms and relationships between legitimate and illegitimate actors. Santo Versace, President of Gianni Versace Company, literally declared war to illegitimate trade by declaring "who buys counterfeiting products is financing mafia activities" (Versace, 2007).

Although this lax attitude towards this crime by some companies of fashion and luxury industry, Grossman & Shapiro (1988) describe how the counterfeiting undermines strongly the functioning of the property rights system. First of all, we should consider the direct harm created by the deception of buying unintentionally low-quality copies instead of the genuine ones and the related loss of reputation of the legitimate firms. The authors explain how consumers will be willing to pay less for high-quality products when they perceive a high risk of obtaining fakes and, especially if involved in deceptive counterfeiting, they may attribute the poor performance of a fake to the original products of the legitimate firm. That's why the availability of replica-goods can seriously impact negatively on the image and reputation of legitimate firms.

In fact, illegitimate trade is threatening not only the bottom-line of Italian fashion houses, but the very value of the "Made in Italy" label (Ministero dello Sviluppo Economico - Ufficio Italiano Brevetti e Marchi, 2012).

Approaching the illegitimate trade problem in the fashion industry is particular difficult because of the growing complexity and variety of the related supply chain models, that could increase the counterfeiting risks and influence the choice of the appropriate anti-counterfeiting strategies, and for several reasons related to the "nature of the industry" and the "nature of the goods" themselves. The main reasons are related to the nature of "aspirational goods" of luxury goods: most of the their value originates from the look and appearance rather than the functionality of the item and the quality of raw materials used. In fact, they are usually classified as "credence goods" because, for customers, it's difficult to assess the quality of the good before and after purchase and use (Hilton, Choi, & Chen, 2004).

Second, the production and the copying of designs are relatively easy and, to some extent, condoned or allowed in the industry: United States legal system only protects functionality and not design or style (Belhumeur, 2000) and, even in countries where the legal system guarantee more rights to trademark owners, it can be very complex to implement the defined rules (Blakley, 2010).

These circumstances ensure that it is very complex to enforce any rights and it's often possible to find places where it's easy to produce counterfeits and copies without risking of being persecuted by the law. Third, the purchasing behaviors are influenced by social network effects which can generate a "demand for fake goods" in those consumers who can't afford the original product. In addition to these, according to some authors, counterfeiting could contribute positively to brand awareness. (Hilton, Choi, & Chen, 2004).

As already mentioned, these problems are further accentuated by the adoption by fashion firms of complex supply chains, composed by multiple actors, geographically dispersed and with a frequent use of production outsourcing, and by other phenomena such as the globalization, the importance of countries

such as China for the economic growth of western fashion companies and the continuous advances in technology.

As (Lybecker, 2008) states discussing about counterfeiting in pharmaceutical industry, but the same rationale can be applied to fashion and luxury industry too: the counterfeiting problem was less considered in the past because it affected mainly developing nations which were not yet profitable markets. Now that, on one hand, the advances in technology and the increase globalization make it easier for counterfeiters to copy the products and to insert themselves into global supply chains, and, on the other hand, the emerging markets have become very important for European fashion and luxury companies, they can't afford anymore to ignore the issue.

Complex situations are often also interesting and, as a result, fashion and luxury firms have been increasingly receiving attention from the research community. A number of recent studies underline the importance and the relevance of supply chain management in the luxury industry and investigate the role of operation and supply chain choices for the success of luxury companies.

According to a recent study (Brun, et al., 2008), Italian fashion firms are often quite different from each other, ranging from totally integrated vertical firms to firms that entirely outsource the manufacturing processes and, while some firms copiously collect and maintain supply chain data, others appear to be still entirely unaware in this respect.

Caniato, et. Al (2011) discuss how manufacturing outsourcing is a common practice across the clusters related to fashionable products, with some cases of off-shoring at least for the entry-level products and some accessories.

In particular, they point out the need for the focal company of coordinating and controlling its partners to guarantee the firm's performance and preventing counterfeiting risks as well as the importance of building trust-based relationships.

Product, brand, and retail channels are mentioned as the main drivers affecting supply chain management choices in the fashion industry (Brun & Castelli, 2008) and supply chain strategies must be selected in order to be consistent with luxury critical success factors (Caniato, Caridi, Castelli, & Golini, 2011).

Finally, although counterfeiting is mentioned as one of the possible risk factors in the supply chain management risk literature, it has not been studied in great detail (Christopher & Peck, 2004).

4. Literature Review

In the context of illicit trade, Staake, Thiesse, & Fleisch (2009) classify the main works relevant to the issue into six main categories: general description of the phenomenon, supply-side investigations, demand-side investigations, managerial guidelines, impact analysis, legal issues and legislative concerns. More in details, supply-side investigation regards mainly how counterfeiters acquire the knowledge for imitating and replicating the original goods. Demand side investigation focus on the customer perceptions towards fake products. Managerial guidelines includes the suggested strategies and tools to counter counterfeiting. Impact analysis measures the impacts of counterfeiting on sales, reputation and other performance indicators of the legitimate companies. Finally, legal issues refer to the alternatives for intellectual property rights protection and enforcement. (Staake, Thiesse, & Fleisch, 2009)

For the purposes of my work, I focused on the luxury and fashion industries and, in particular, first on the interplay of supply chain management with the more general concept of illegitimate trade, paying special attention to the luxury and HEF industries, and second on the suggested countering strategies.

The first focus was aimed to find and define the literature gap and provide the academic basis for the LISC model, while the second focus was needed in order to define the countering strategies to be considered later in order to define the questionnaire for the survey.

To serve the motivation and objectives just mentioned above, I started with a search in electronic journal databases (ScienceDirect, Emerald, EBSCOhost Business Source Premier) with the keywords "Counterfeit" or "Counterfeiting" or "Piracy" or "Parallel import" or "Gray market" or "Factory overruns" or "Theft" or "Smuggle" or "Infiltrations" and "Luxury" and "Fashion" and "Supply Chain", then I selected the papers which were more relevant for my analysis.

First of all, I track the type of illegitimate trade implicated (as defined in the previous section) as well as the supply chain stage during which it occurs (upstream, downstream, and customer). I decided to classify the papers according to these three supply chain stages in order to be coherent with the "Legitimate Illegitimate Supply Chain" model that I will introduce later.

In particular, upstream level will include "design and factory", downstream includes "warehouse, distribution and retailer" and the last one is related to the final customer. My findings are summarized in Table 1 and Table 2 which include the most relevant papers reviewed.

	Supply Chain Stage		
Illegitimate Trade Event	Upstream level: Design & Factory	Downstream level: Warehouse & Retailer	Final Customer
Counterfeiting	- Harvey & Ronkainen, 1985 - Ben-Shahar & Assaf, 2004 - Trott & Hoecht, 2007 - Staake, Thiesse & Fleisch, 2011	- Simone, 2006 - Mavlanova & Benbunan-Fich, 2010	- Bloch, Bush, & Campbell, 1993 - Green & Smith, 2002 - Chapa, Minor &al., 2006 - Han, Nunes & al, 2008 - Phau, Teah & al., 2008 and 2009 - Romani, Gistri & al.,2008 and 2012 - Commuri, 2009 - Wilcox, Min Kim, & al., 2009 - Yoo & Lee, 2009 and 2011 - Perez, Castaño &al. 2010 - Hieke, 2010 - Turunen & Laaksonen, 2011 - Bian & Moutinho, 2011 - Poddar, Foreman & al, 2012 - Radón, 2012 - Jiang & Cova, 2012

TABLE 1 - CLASSIFICATION OF MAIN PAPERS RELEVANT TO "ILLEGITIMATE TRADE" AND "HEF" INDUSTRY (FIRST PART)

	Supply Chain Stage		
Illegitimate Trade Event	Upstream level: Design & Factory	Downstream level: Warehouse & Retailer	Final Customer
Grey and parallel imports	- Cespedes, Corey, & V, 1988 - Weingand, 1991 - Boyd and Okleshen, 2006 - Raff & Schmitt, 2007	- Boyd and Okleshen, 2006	- Chen, 2007 - Swee Hoon Ang, 2000
Supply chain infiltrations	- Green & Smith, 2002 - Berman, 2008 - Cooper, 2008 - CAPC-Accenture, 2006	- Green & Smith, 2002 - Liu, K; Li, J-A; Wu, Y; Lai, KK, 2005 - Olsen & Kent, 1992 and 1993 - Kaikati, J.G. and LaGarce, R., 1980	- Wang, Doss & al, 2010
Retail service copycatting	- Not applicable	- Harvey & Ilkka, 1985 - Kaikati, J.G. and LaGarce, R., 1980 - Branigan, 2012 - Flock, 2011	- Mavlanova and Benbunan-Fich, 2010
Factory Overruns	- Mc Donald & Roberts, 1994 - Simone, Tay, & Kavowras, 2009 - Song, Platts, & Bance, 2007	-	

TABLE 2 - CLASSIFICATION OF MAIN PAPERS RELEVANT TO "ILLEGITIMATE TRADE" AND "HEF" INDUSTRY (SECOND PART)

The main literature gap I aim to address is related to the fact that the papers I reviewed generally treated the different phenomena that I include in the definition of illegitimate trade in an isolated manner.

As a result, with very few notable exceptions, previous works have overlooked the fact that illegitimate trade phenomena share some important common

features. These include the fact they can all harm a brand and that they exhibit clear interconnections from a supply chain perspective.

Of the literature that actually attempts to weave a common thread on illegitimate trade, some provide only definitions and limited examples of illegitimate trade events (McDonald & Roberts, 1994), (Hilton, Choi, & Chen, 2004), (Kaikati & LaGarce, 1980). One study focus on the tracing of informal and illicit supply chain flows in the Slovak Republic, analyzing the micro-supply chain of two goods: clothing and cigarettes (Karjanen, 2011). Others (Bamossy & Scammon, 1985) partly address the issue by introducing a first model and exploring how counterfeit products can enter the market, be distributed through authorized or non-authorized channels, and generate both not-deceptive and deceptive counterfeiting.

An important exception is the work by Staake (2008) that introduces the "Licit-Illicit" framework where he presents the "Licit Supply Chain", composed by actors with lawful intents, and its parasite, the "Illicit Supply Chain", composed by actors with illicit intents who want to free-ride on the activities of the "Licit Supply Chain".

4.1 Counterfeiting

Few studies investigate the upstream activities of the illegitimate supply chain and describe the main characteristics of the possible actors and the ways used to get the design and production information for producing counterfeits.

Staake, Thiesse, & Fleisch (2011) define various groups of counterfeiters, investigating their strategic profiles and the main industries in which they operate. The authors identify in the Disaggregators and Imitators the typical counterfeiters operating in fashion and luxury businesses.

Harvey & Ronkainen (1985) describe possible ways for counterfeiters to acquire the necessary knowledge from legitimate manufacturers. Ben-Shahar & Assaf (2004) state that the manufacturer could be interested in promoting copyright infringements to have the possibility to apply predatory pricing. Trott & Hoecht, (2007) suggest that, while some companies contributed themselves to the

problem of counterfeiting by outsourcing or off-shoring certain activities without ensuring supply chain control, the counterfeiting companies demonstrated an ability to reverse engineer, imitate and learn, and can make a significant contribution to their economy if they succeed in becoming part of the formal economic sector.

In the case of pure counterfeiting, the wholesalers are often linked to a criminal organisation (Green & Smith, 2002), while the retailers are usually a street vendor or the sale takes place in street markets (Simone, 2006).

The "retailer level" and "point of sale" perspectives are both crucial for a customer that wishes to assess the legitimacy of the point of sale, especially when the customer is not able to assess the product's authenticity (Mavlanova & Benbunan-Fich, 2010).

The most researched area is that of non-deceptive counterfeiting at the customer level: several studies investigated the main variables which can impact on the attitudes of the final customers towards replica and fake versions of luxury brands products (Phau, Teah, & Lee, 2008) (Phau & Teah, 2009) (Wilcox, Min Kim, & Sen, 2009) , the characteristics of consumers who buy counterfeits (Han, Nunes, & Drèze, 2010), the effects on the image of luxury brand (Hieke, 2010), (Radón, 2012), the impacts on consumer choice of the past experiences with the original and counterfeited goods (Yoo & Lee, 2009), (Yoo & Lee, 2011), (Bian & Moutinho, 2011) and the meanings and attributes of counterfeiting and luxury goods (Jiang & Cova, 2012). Turunen & Laaksonen (2011) evidence how luxury goods and counterfeited are not perceived as "counterparts" but they are both opposite of "non-brand" products in the customer's perceptions. Chapa & Al. (2006) demonstrates how consumer are more favorable to buy counterfeits when they buy products to be consumed in public. Gistri & Al. (2008) focus on the consumption phase of counterfeit goods.

Summarizing, there are two main debates regarding this area. The first one is about understanding whether counterfeiting in certain cases may actually benefit luxury brands (Romani, Gistri, & Pace, 2012). This is due to the "high

visibility" and "inspirational value" effects and not due to sales losses, damaged brand reputation (Bloch, Bush, & Campbell, 1993), (Green & Smith, 2002) and loss of exclusivity (Commuri, 2009).

The second debate is about determining the characteristics of the consumer of a counterfeit product. While traditionally customers who buy counterfeits have been considered "low-income customers" in need of "status recognition" (Han, Nunes, & Drèze, 2010), several recent studies underline how they may actually be the same customers who buy original goods. (Perez, Castaño, & Quintanilla, 2010) show the existence of a new trend, that we call "fake chic". This is where consumers who can afford the price of luxury goods prefer to buy counterfeit ones because they build and express their identity through the consumption of counterfeits and discover "high quality" counterfeits. Or they buy counterfeits because they find the process of purchasing and consuming counterfeit goods fun (Jiang & Cova, 2012).

Poddar, Foreman, Banerjee, & Scholder Ellen (2011) show that when a legitimate brand has a negative image in terms of its perceived corporate citizenship, higher price differentials trigger significantly greater intentions to purchase the counterfeit product.

I suggest that, first of all, the presence of significant volumes of counterfeits in the market and the lack of control along the supply chain (both upstream and downstream) contribute to the development of illegitimate trade that can definitely harm the brand.

Secondly, I think that in an industry where the product quality difference between original products and counterfeits is constantly decreasing, luxury companies need to differentiate themselves on the basis of the processes that created the product. In other words, they should be able to sell and guarantee not only the product but also the whole supply chain the product has passed through.

4.2 Parallel Imports/ Grey Markets

Although parallel imports and the grey markets are legal, the main studies in the field have been developed around the issues of unfair competition, conflicts with trademark laws, free riding, price discrimination and market characteristics (Chen, 2007). I will mention here only a few papers that are relevant for my analysis in terms of the supply chain stage and luxury industry.

On the upstream-side of parallel imports several papers explain the reasons for the existence of parallel imports. Typically they need three conditions: a source of supply, easy access from one market to another, and price differentials. These are characteristics that are easy to find in HEF industries (Cespedes, Corey, & V, 1988), (Weingand, 1991) (Boyd Thomas & Okleshen Peters, 2006).

Raff & Schmitt (2007) explain why manufacturers may be interested in allowing parallel trade for certain categories of products, including clothes, cosmetics and perfumes.

On the downstream-side, in their study about the "underground mall" – a specific grey market retail format which is emerging in USA – (Boyd Thomas & Okleshen Peters, 2006) underline how consumers prefer this formula, not only for price reasons but also for socialisation benefits, and how they are not concerned about the lack of product warranty or the absence of a formal return policy. In our opinion this and the other forms of grey markets can create confusion in the distribution channel and the conditions that counterfeiters use to infiltrate their products.

On the demand-side, Ang (2000) investigates the customer perception of parallel imports and how beneficial and image properties for each product category can influence purchase intention and expected discount. The author underlines how, especially in the emerging markets, parallel imports can be confused with counterfeiting, and how the perceived legality of a parallel imported product is a critical decision factor in purchasing intention. Finally, (Chen, 2007) demonstrates that the source channel (grey goods vs. authorized goods) has a significant impact on brand equity.

4.3 Supply Chain Infiltrations

Papers about supply chain infiltrations usually describe possible strategies to secure the end to end legitimate supply chain, in order to eliminate the possibility of counterfeiters infiltrating it from the design stage to the final sale when its bought by the customer (Cooper, 2008) (CAPC - Accenture, 2006).

(Green & Smith, 2002) propose an interesting study where they introduce counterfeiting risk, present a case of "Supply Chain infiltrations," and underline how collusion between counterfeiters and channel members was the main cause of counterfeiting problems experienced by a major brand owner in Thailand. Smaller retailers and bars were especially lured by the higher profits that they could gain from selling counterfeits, which could be obtained for a mere fraction of the original price from local criminals.

Deceptive counterfeiting and the problem of supply chain infiltrations at retail level is studied by (Olsen & Granzin, 1992) who stress the importance of controlling and gaining the collaboration of the retailers. They propose a model that would help manufacturers to establish a relationship with their distributors and gain support in fighting counterfeiting.

While investigating the propensity of Chinese consumer to shop abroad, Wang, Doss, Guo, & Li (2010) find that one of the main reasons why the Chinese prefer to shop in western countries is the potential risk of buying counterfeit products in Chinese marketplaces.

4.4 Retail service copycatting

Recently, counterfeit IKEA and Apple stores (Branigan, 2012) (Flock, 2011) have been detected in China. They are both examples of "retail services copycatting" a phenomenon already discussed by Kaikati & LaGarce (1980) and Harvey & Ronkainen (1985).

Considering the customers' side of things, (Mavlanova & Benbunan-Fich, 2010) explores the role that seller-level and product-level information has on online sales, in order to find ways to prevent sellers from deceiving their buyers with counterfeited products.

4.5 Factory overruns

Factory overruns are mentioned in a few papers (McDonald & Roberts, 1994), (Hilton, Choi, & Chen, 2004) but only in a descriptive way. Simone (2009) presents some suggestions on how to deal with the suspicion of backdoor production in a manufacturing factory and (Song, Platts, & Bance, 2007) include both counterfeiting and possible factory overruns in the risks that should be considering while evaluating counterfeiting.

4.6 Countering strategies

The second part of the literature review is focused on the detailed analysis of the possible countering strategies suggested by the academic literature and business press, with the aim of finding a specific literature gap in this area and of defining the countering strategies categories to be used for building the questionnaire for the survey presented later.

Several authors have tried to classify the main actions that a company can do to counter counterfeiting, focusing especially on supply chain management.

In Table 2 I summarize the existent literature, listing the best practices that each author or company underlined as main actions to contrast and reduce counterfeiting events, considering the contribution of the papers reviewed, I define a list of twenty best practices.

Main practices to fight counterfeiting	CACP, 2006	Lybereck, 2008	Berman, 2008	Cooper, 2008	Nunes, 2008
1) Ensure the authenticity of raw materials and component parts (authorized suppliers, qualify vendors, agreement on spot audit/ controls)	Secure Legitimate Inputs	Cooperation across the Supply Chain	Supply side strategies	Tighten Supply Chain	Defend
2) Employ the concept of "strict liability" for failure to deliver authentic components and parts in contracts with suppliers					
3) Institute shipping policies to protect the integrity of raw materials and component parts					
4) Utilize risk management procedures to verify legitimacy of customers (track customer history, develop guidance for the sales force on how to assess the legitimacy of customers)	Verify Legitimacy of Customers and Distributors			Formulate crisis management plan	
5) Ensure that subcontractors only produce authorized merchandise (spot audit, strict contracts, etc)				Monitor Distribution Chain	Defend
6) Institute policies to certify that production waste and damaged and unusable products are destroyed or appropriately disposed of	Manage Production Waste and Damaged or Unusable Inventory				
7) Verifying product authenticity	Ensure Legitimacy of Purchased Products at Retail Level		Demand - side strategies		Detect
8) Employ track and trace methodologies with bar codes or RFID				Monitor Distribution Chain	
9) Authenticate distribution partners		Cooperation across the Supply Chain	Demand - side strategies		Defend
10) Collaborate with local customs authorities	Monitor Brand Integrity		Supply side strategies	Establish excellent government relations	
11) Enhance market intelligence			Developing early warning signals of counterfeiting	Employ excellent internal recordkeeping	
12) Monitor sales of brand name products on the Internet					
13) Consider using technology to ensure product security			Demand - side strategies	Update packaging	Detect
14) Vigorously pursue legal remedies to deter trademark infringements		Cooperation in enforcement	Supply side strategies	Investigate Leads fully	Discourage
15) Partner with retailers (Certified retailers programs)			Demand - side strategies	Monitor Distribution Chain	Defend
16) Develop informational materials that explain the harm that counterfeit products cause businesses, consumers, and governments	Outreach to Law Enforcement and Regulatory Officials			Establish excellent government relations	Doubt
17) Meet with key federal, state, and local officials and customs authorities to personally brief them and learn more about their priorities		Cooperation in enforcement	Supply side strategies		
18) Establish procedures for sharing information that can be used in law enforcement investigations and offer to provide legitimate products, under appropriate conditions, to assist in investigations				Investigate Leads fully	Discourage
19) Technological changes to the product and packaging to make more difficult to replicate		Technological changes to product and packaging	Demand - side strategies	Update packaging	Detect
20) Budgeting to monitor,deter, and remove counterfeits and organization			Budget and organization	Formulate crisis management plan and Prepare to litigate	

TABLE 3 – COUNTERING STRATEGIES LITERATURE REVIEW

More in details, a report published by the U.S. Chamber of Commerce Coalition Against Counterfeiting and Piracy and Accenture proposes the following best practices to minimize the risks of counterfeiting (CAPC - Accenture, 2006) adopting an end to end supply chain approach: "secure legitimate inputs, verify legitimacy of customers and distributors, manage production waste and damaged or unusable Inventory, ensure legitimacy of purchased products at retail level, monitor brand integrity, outreach to law enforcement and regulatory Officials".

Lybecker (2008) underlined the importance of the cooperation along the supply chain and with the external stakeholders, the author classifies the anti-counterfeiting strategies into the following three categories:

- technological changes to product and packaging, mainly implemented to make imitation more complex and expensive;
- collaboration along the supply chain, in order to increase the costs of distributing fake goods and inserting them into the legitimate supply chain
- collaboration in enforcement, in order to increase the likelihood of detection and the probability of prosecution.

D. Nunes (2010) suggests an approach which includes the following steps: "Defend" with the goal of fortifying the supply chain; "Detect" in order to help victims spot fakes; "Doubt" in order to make customers think twice, "Discourage" with the goal of increasing the business and legal risks for counterfeiters and reduce their profits.

Berman (2008) focuses its attention on the importance of risk management plan, he underlines that it's crucial to have reporting tools able to detect eventual signals of counterfeiting and to have already defined a specific budget and risk actions plan in order to minimize the reaction time. He divides the countering actions in two categories, namely demand-side and supply-side: the first ones aimed at reducing the demand for fake, by making original goods easier to be distinguished from the fake ones, and on educational initiatives aimed at creating awareness on the risks associated with counterfeiting. The second ones have the goal of reducing the supply of counterfeited goods through better monitoring of contract manufacturers and control of gray market activity. In particular, companies should monitor: any relevant decreases in sales, the availability of large amount of company's goods on eBay or other Internet auctions and sites, any relevant increases in orders for components or in parallel market activity, any increases in returns, warranty claims or product failure rates (Berman, 2008).

Finally, Cooper (2008) suggests eight main actions in order to minimize counterfeiting: first tighten the supply chain and monitor the distribution one, investigate leads fully, trying to understand the end to end supply chain of the counterfeiters, manage carefully relations with authorities, manage rigorous internal recordkeeping, update frequently product's packaging, define a crisis management plan and prepare to litigate.

According to the literature review analyzed, the practices mentioned by the different authors can be classified in the following four functional areas:

- *Marketing and communication strategies:* these are those strategies used to reduce the demand for counterfeited or illegitimate goods through awareness campaigns with the aim of informing and educating consumers and other involved actors on potential risks that counterfeiting and illegitimate trade represent for the society.

- *Innovation, Technologies and end-to-end traceability:* these are those strategies and tools used to "track and trace" the products along the entire end to end supply chain with the purpose to verify goods authenticity at each stage and detect their path, thus blocking any possibility of counterfeits intrusions. In addition to this, they include any technological improvements developed directly on the product and packaging to make them more difficult to replicate (rfid labels, etc) and all those activities executed in order to distinguish and secure product features, making it more and more difficult to be counterfeited.

- *Supply chain integration and collaboration:* these are those strategies used to increase the collaboration and the vertical integration along the supply chain between the different actors. They include vertical integration strategies, collaboration with suppliers and distributors in order to have a greater control on end to end supply chain, security and certification practices of suppliers and retailers, verifying raw materials source and final products destination markets, as well as routine inspections of manufacturing plants and storage warehouses. In addition to this, they include tightening, monitoring and cooperation activities

along the end to end supply chain in order to avoid that counterfeited products or counterfeiting companies enter the legitimate supply chain.

- *Legal tools* finally aim at preventing and discouraging any counterfeiting initiatives through patents and trademarks registration and protection, and defending intellectual property rights. Collaborations with governments, local authorities, and Customs, law enforcement, activation of investigations over suspicious operations. All the activities needed to ensure complete and successful litigations procedures.

The Table 4 below contains the best practices listed by the different authors, classified according with the four functional areas defined above.

Functional areas	Practices to fight counterfeiting
Marketing and communication strategies	Apply risk management procedures in order to be able to check customer's legitimacy
	Enhance market intelligence
	Monitor internet sales
	Create awareness of the harms and damages caused by counterfeits
Innovation, technologies and traceability	Verify product authenticity
	Apply technology to guarantee product security
	Implement track and trace tools (bar codes, RFID, etc)
Supply chain integration and collaboration	Check raw materials and component in order to guarantee their originality (authorized suppliers, qualify vendors, agreement on spot audit/ controls) and implement shipping policies to protect their integrity
	Check that subcontractors only produce authorized merchandise (spot audit, strict contracts, etc)
	Implement procedures to ensure the destruction of damaged products and production waste
	Authenticate distribution partners
	Partner with retailers (Certified retailers programs)
Legal tools	Collaborate with local customs authorities
	Look for legal remedies to counter counterfeiting and trademark infringements
	Collaborate with governments, customs and authorities
	Define and implement policies for sharing data and information in order to assist in investigations

TABLE 4 - MAIN ANTI-COUNTERFEITING PRACTICES CLASSIFIED BY FUNCTIONAL AREA

5. Literature Gap & Research Questions

The main literature gap I aim to address is related to the fact that the papers I reviewed generally treated the different phenomena that I included in the definition of illegitimate trade in an isolated manner.

As a result, with very few notable exceptions, previous works have overlooked the fact that illegitimate trade phenomena share some important common features. These include the fact they can all harm a brand and that they exhibit clear interconnections from a supply chain perspective.

For what it concerns the countering strategies, the functional approach in countering strategies definition prevails and companies don't look to consider any connection between countering strategies and illegitimate trade phenomena to be addressed. Considering these results, I developed a research proposition and two research hypothesis:

P1: The different illegitimate trade phenomena can be described in an end-to-end supply chain perspective

H1: The different types of illegitimate trade phenomena are positively correlated with each other

H2: The effectiveness of each strategy varies depending on the counterfeiting typology to be contrasted

6. Methodology

To serve the motivation and objectives that I stated above, I started my research effort using an exploratory methodology (William G. Zikmund, 2012) with the aim to unveil evidence that illegitimate trade can be viewed as a cohesive set of interdisciplinary phenomena (Buckley, Buckley, & Chiang, 1976). As mentioned before, to achieve my goal, I searched for the following keywords and their variants: "counterfeit", "counterfeiting", "grey market", "parallel market", "supply chain infiltrations", "factory overruns", "fashion", "luxury" across the literature using a host of on-line databases such Emerald and Science Direct. Once a preliminary list of works had been identified, I sieved through references to find additional works that could be added to my pool. In the process I observed that the great bulk of relevant references came from the three major streams of literature: international trade, counterfeiting, and supply chain management. Using a coding process (Karlsson, 2009) I identified a first draft of the LISC model and its path categorization, that I will describe later in Section 6.

Once defined the LISC model, I discussed counterfeiting and illegitimate trade issues with the participants of the "MI-FIDO" project, with other three industry experts, including, a veteran executive working on intellectual property rights (IPR) and counterfeiting on behalf of the Italian government in China, two

managers of legal firms working on IPR protection in China and I interviewed the executives of five Italian companies operating in the luxury industry: with turnover ranging from 300€ to more than 2€ billion and employing extensive supply chains[4], applying a case study research methodology.

The interviews allowed me to discuss and validate the LISC model on the field.

The five companies selected for the interviews are very famous brand of "Made in Italy" in the fashion and luxury industry, they produce, in-house or through contract manufacturers, and sell, through directly operated stores and wholesale channels, apparel, shoes, accessories, jewelry, fabrics in Italy and in the world. All the companies selected have experienced significant counterfeiting and illegitimate trade problems in the last years and the main aim of the interviews was understanding the different type of counterfeiting and illegitimate trade phenomena they had experienced and the main countering strategies implemented.

I selected the case study research for the first phase because the objective of this study was to investigate a specific issue mainly with an explorative aim: several authors underline how case study research can be used for exploration in order to develop research ideas and questions, and, to study emergent practices (McCutcheon & Meredith, 1993). Case study research is recognized as being useful for addressing the "how" and "why" questions in unexplored research areas (Yin, 2009), especially "when the variables are still unknown and the phenomenon not at all understood" (Meredith, 1998).

When implementing case study research, it's suggested to have a prior view of the general constructs and of their relationships (Voss, 2009) or, if possible, a conceptual framework (Miles & Huberman, 1994) which can explain the main elements to be analyzed and the expected relationships between them (Voss, 2009). This can allow to measure constructs more accurately (Eisenhardt, 1989).

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[4] A precondition set forth to us to conduct these interviews was anonymity.

As mentioned before, first, I recorded all such phenomena using an end-to-end supply chain perspective and detected common patterns and opportunities for simplification and further generalization. This activity led to the design of the LISC model and the possible trade paths, which became the "conceptual framework" underlying the research and which was discussed with the IPR experts and the companies interviewed.

In order to avoid the disadvantages in terms of generalizability of conclusions drawn on a single case, I decided to adopt a multi-case approach. According to Voss (2009), the multi-case studies includes, generally, the analysis of three to thirty cases and, in particular, the specific phase of theory development, according to some examples provided in the same chapter, has been conducted with a number of cases which varied from one, as in the work of Akkerman and Vos (2003) to five, as in the paper of Sousa and Voss (2011).

I decided to analyze five cases related to fashion and luxury companies and enrich my research with three additional interviews to industry experts. In addition to this, I had the opportunity to participate to several conferences and seminar related to brand protection and anti-counterfeiting activities during which I discussed my ideas with several experts coming from fashion companies, legal firms and anti-counterfeiting technology providers.

For what it concerns the case selection, I tried to look for similar cases, using replication logic, and to search for very different ones, in order to be able to identify polar types although (Eisenhardt, 1989), (Yin, 2009).

Table 5 summarized the main characteristics of the five companies selected for the case-study research phase.

	Turnover range	Main product category	Brand awareness	Upstream integration	Downstream integration
Company A	Between €400 - €700 million	Apparel and clothing	Very high	Medium	Medium
Company B	More than €1 billion	Leather goods	Very high	Medium	High
Company C	More than €1 billion	Jewelry and Watches	Very high	High	High
Company D	Between €400 - €700 million	Active-wear	Very high	Medium	Medium
Company E	More than €1 billion	Apparel and clothing	Very high	High	High

TABLE 5 - CASE STUDY COMPANIES

Looking at the five companies selected, it emerges that all of them have very know brands and are victim of counterfeiters.

Two companies, A e D, are smaller in terms of turnover than the other three, B, D and E, which are similar between them. Although all the companies operate in more than one product categories, their main product category they are involved in is different and their selection allows to cover and represent the main fashion and luxury categories (apparel, leather goods and jewelry).

Finally, there are two very vertical integrated companies, Company C and E, two companies which are less integrated, Company A and D, and the last one, company B, which is very integrated downstream but not upstream. The selection of these companies will allow me to assess the validity of the LISC model in the fashion and luxury industry in its broader definition (apparel, leather goods and jewelry) and both in vertical integrated companies and in network-based ones.

The goal of the research phase conducted with a case-study research was to validate the first research proposition: *The different illegitimate trade phenomena can be described in an end-to-end supply chain perspective.*

At the end, I arrived at a dual 5-stage supply chain design descriptive model founded on graph theory. I validated this design with our interviewees and identified 12 common illegitimate trade paths (families) and 7 groups of illegitimate trade paths (super-families) out of the initial 32 paths presented during the interviews. The LISC model and its first application will be presented in Section 8.

The second part of the research was conducted carrying out an explorative survey (Forza, 2002), which involved the collection of a questionnaire from managers working in fashion and luxury companies. As evidenced by several authors, a survey involves "the collection of information from individuals about themselves or about the social unit they belong" (Rossi, Wright, & Anderson, 1983). Survey research can be exploratory, confirmatory or descriptive (Forza C. , 2009).

Explorative survey research can be used to gain preliminary insight into a subject in order to provide the basis for more in-depth analysis: "an explorative survey can be used to uncover or provide preliminary evidence of association among concepts and, later, to explore the validity boundaries of a theory" (Forza C. , 2009).

I decided to use explorative survey research methodology in order to check if the results from literature and case-studies could be generalized, as Salvador & Forza did in one of their papers (2004), and to explore associations between concepts or boundaries of validity in these associations.

In addition to these objectives stated and, although the explorative aim is the first goal of my survey, considering that counterfeiting is a topic relevant and interesting not only to academics but even to practitioners and policy makers, the survey conducted has a descriptive goal too.

In fact, its aim is to understand the relevance of a phenomenon, such as counterfeiting and illegitimate trade, describing its incidence in a specific population. There are several authors which states that these objectives aren't in contrast with each other and that descriptive survey research can provide useful hints for exploration and theory building (Forza C. , 2009).

As I will better explain later, the first part of the survey, which aims at describing the relevance of illegitimate trade phenomena is conducted with a descriptive aim while the second and the third part, where I will investigate the correlations among events and the countering strategies, is more explorative.

In addition to this, several authors suggest the use of cases based research and surveys in combination (Forza C. , 2009). This is needed especially when the available knowledge on a research issue is limited, the concepts are not well defined, measures are not available, associations between concepts and explanations of these associations may be unknown. In these cases, explorative and descriptive survey research are the available survey choice, but, although they can provide useful new insights on the phenomena, the highly structured questionnaire and the limited presence of open questions, necessary to perform good quantitative analysis, limit the exploration capability in comparison with the cases. That's why case and survey should be seen as complementary in exploration research and that's why I selected these two research tools.

As mentioned before, the questionnaire is built on the LISC model, output of the first part of the research, and consists of 40 statements to be assessed on a 1 (very low) to 7 (very high) Likert scale. The Likert scale is suggested when the goal is to assess people's "position" on certain topic or statements and has the advantages of being more readily analyzed than open-ended attitude questions. In addition to this, it can obtain a summated value in order to measure a more general construct. On the contrary, the respondent may be lulled into marking the same response for each item.

The questionnaire has been e-mailed to 200 companies working in fashion and luxury companies, including 74 companies which are members of Fondazione Altagamma (the association of the Italian high-end companies) and several companies members of "Sistema Moda Italia". The companies have been selected from an internal database of SDA Bocconi. My sampling is not based on a probabilistic approach (Rungtusanatham, Choi, Hollingworth, Wu, & Forza, 2003) but I selected those companies which I considered more consistent with the aim of the research. In particular, considering the topic of the study, I selected companies operating in the different fashion and luxury industries considered (apparel, leather goods, perfumes, jewelry and shoes), some of them have very known brands while the others are unknown to the majority of customers.

I decided to send the questionnaire via email, which, compared to the other means of sending survey such as mail, telephone, personal interview, and so on has some advantages related to the distribution cost, the possibility to cover a larger sample, and the ease of securing information. Although some authors expressed some doubts concerning the use of e-surveys (Klassen & Jacobs, 2001), the web survey technique has made impressive improvements in the last years, researchers have gained better understanding of its requirements and respondents continuously increased their confidence with web tools. All these changes together make the web-based survey much less problematic in terms of and non-respondent bias (Forza C. , 2009).

In addition to this, the questionnaire has been proposed in a paper-format to several managers interested in counterfeiting and illegitimate trade issues who participated to the following events: the round-table "Contraffazione: un fenomeno senza confini. Quali strumenti a tutela delle aziende? – Milan, September 25th 2013", where I was invited as a guest speaker, and to the seminar which I organized in SDA Bocconi "Moda & design nell'era digitale: brand reputation, comunicazione commerciale e protezione della supply chain, Milan, October the 15th 2013". In both occasions I presented and discussed the

LISC model with the audience. Before sending the questionnaire, I've tested it with the executives involved in the first research phase.

After an initial call aimed at checking the interest of the firm in our survey, I sent via e-mail the questionnaire targeting four professional roles, who are the most consistent with the illegitimate trade countering strategies that can be undertaken: marketing manager, legal service manager, IT manager, supply chain manager. As a consequence, depending on the way in which the company is organized and on the actions already taken to address the problem of counterfeiting, up to four questionnaires per company have been received. Insofar, 112 questionnaires have been collected from 81 companies.

The Figure 4 above describes the methodology process phases, relating it with the methodology selected and the research questions to be answered.

Methodology

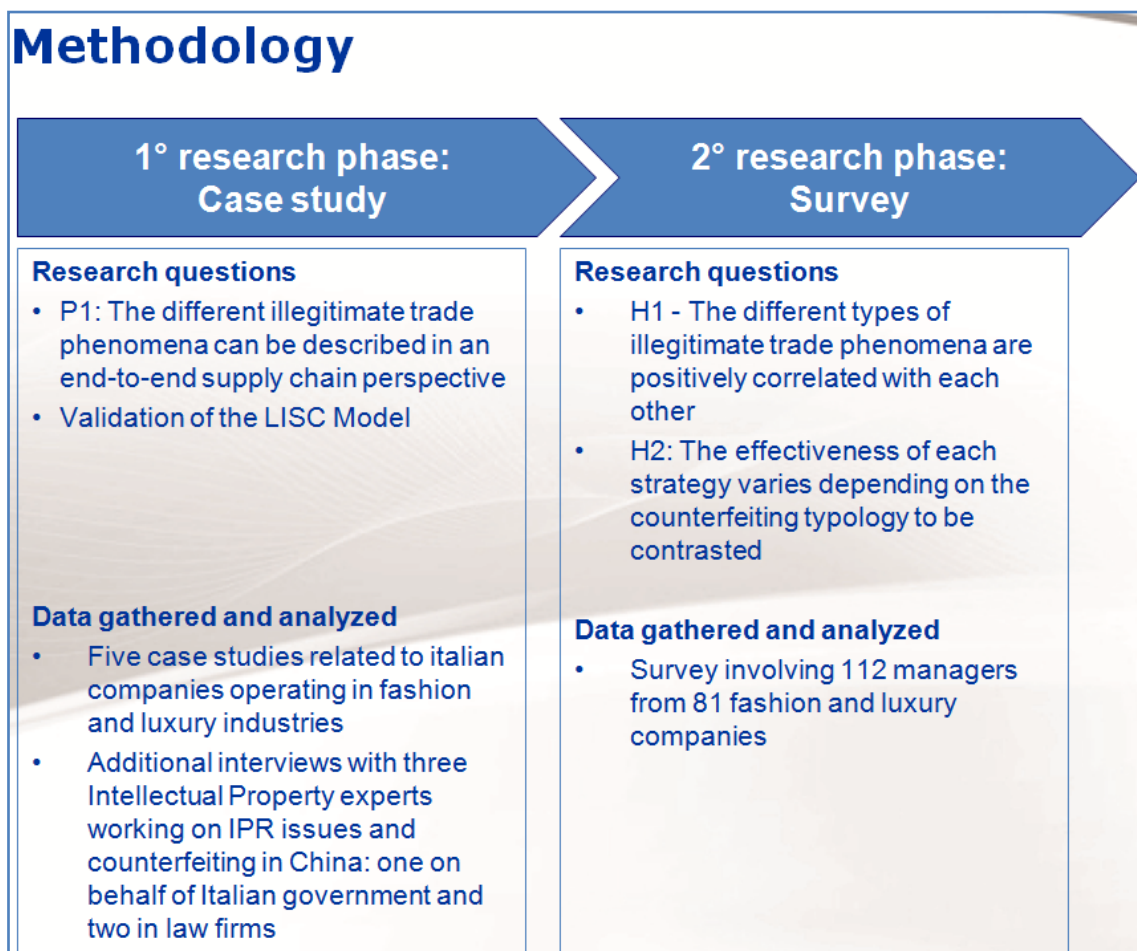| 1° research phase: Case study	2° research phase: Survey
Research questions • P1: The different illegitimate trade phenomena can be described in an end-to-end supply chain perspective • Validation of the LISC Model	**Research questions** • H1 - The different types of illegitimate trade phenomena are positively correlated with each other • H2: The effectiveness of each strategy varies depending on the counterfeiting typology to be contrasted
Data gathered and analyzed • Five case studies related to italian companies operating in fashion and luxury industries • Additional interviews with three Intellectual Property experts working on IPR issues and counterfeiting in China: one on behalf of Italian government and two in law firms	**Data gathered and analyzed** • Survey involving 112 managers from 81 fashion and luxury companies

FIGURE 4 - METHODOLOGY PROCESS

7. The Legitimate – Illegitimate Supply Chain Model

I now introduce the "Legitimate-Illegitimate Supply Chain" model (LISC) that tracks activities along an extended supply chain that consists of design, factory, warehousing (distribution), retail, and customer stages.

LISC accounts for two types of actors at each stage of the supply chain. These are:

- "Legitimate actors" that act in response to a direct or indirect relationship with the brand. A product designed by the in-house design studio of the brand, a supplier factory fulfilling a brand order to specification, a 3rd party logistics provider contracted by the brand to distribute its goods, a brand-authorized dealer, and a customer willing to buy an original good are all examples of the functions that can be performed by legitimate actors.
- "Illegitimate actors" that shadow the activities of the legitimate actors without permission or knowledge from the brand and almost invariably harming its interests. A grey import, a shoplifted item, and a knocked-off design are all cases of illegitimate actors in play.

The five-level supply chain is a simplified model meant to capture a great variety of situations on each stage without resorting to unnecessary complexity. Some clarifications follow.

As I have already mentioned, I started off my supply chain model with a "design" stage for two reasons. Firstly, because it is very relevant in fashion and luxury industries; secondly, one just cannot meaningfully talk about counterfeiting (which is a violation of intellectual property rights) without it.

The second stage, which I call "factory", includes both sourcing and manufacturing activities. I decided to collapse the two because, while our model accounts for the flow of the "product concept" between the design and factory stage, as well as the flow of the "finished product" after the factory stage, it does not account for the flow of its components and raw materials.

I'm aware that illegitimate trade events can also occur during sourcing and manufacturing. For the sake of model simplicity, I assume that a "legitimate factory" carries out both sourcing and manufacturing in a legitimate fashion, while an "illegitimate factory" is carrying out at least one of the two in an illegitimate manner.

The third stage, which I call "warehouse & distribution", includes the whole distribution process occurring between the production phase and the delivering of the goods in the final point of sale. It includes warehousing, quality check, packing, transportation, wholesale, and final delivery to the shops.

The main goals of LISC are to:

- Capture exhaustively all the phenomena that we refer to as "illegitimate trade" (as defined above).
- Highlight all possible interactions between the legitimate and illegitimate actors.
- Provide a systematic way in which illegitimate trade phenomena can be grouped.
- Deliver a tool for companies to better assess their illegitimate trade risk.

As previously mentioned, there are two models in literature that attempt to describe licit and illicit supply chains and their relationships. The first one is the model proposed by Bamossy & Scammon (1985) and the other is the Licit-Illicit Framework proposed by Staake (2009). I have presented an early version of this model during the 17th Working Seminar on Production Economics (D'Amato, Papadimitriou, & Baglieri, 2012). Since then my model has evolved considerably expanding from three to five stages and, as a result, it now captures a lot more illegitimate trade phenomena.

7.1 Definition and Properties

The LISC model consists of 10 vertices connected by 16 feasible arcs, representing the interactions between the stages of the legitimate and illegitimate supply chains, as depicted on the figure below.
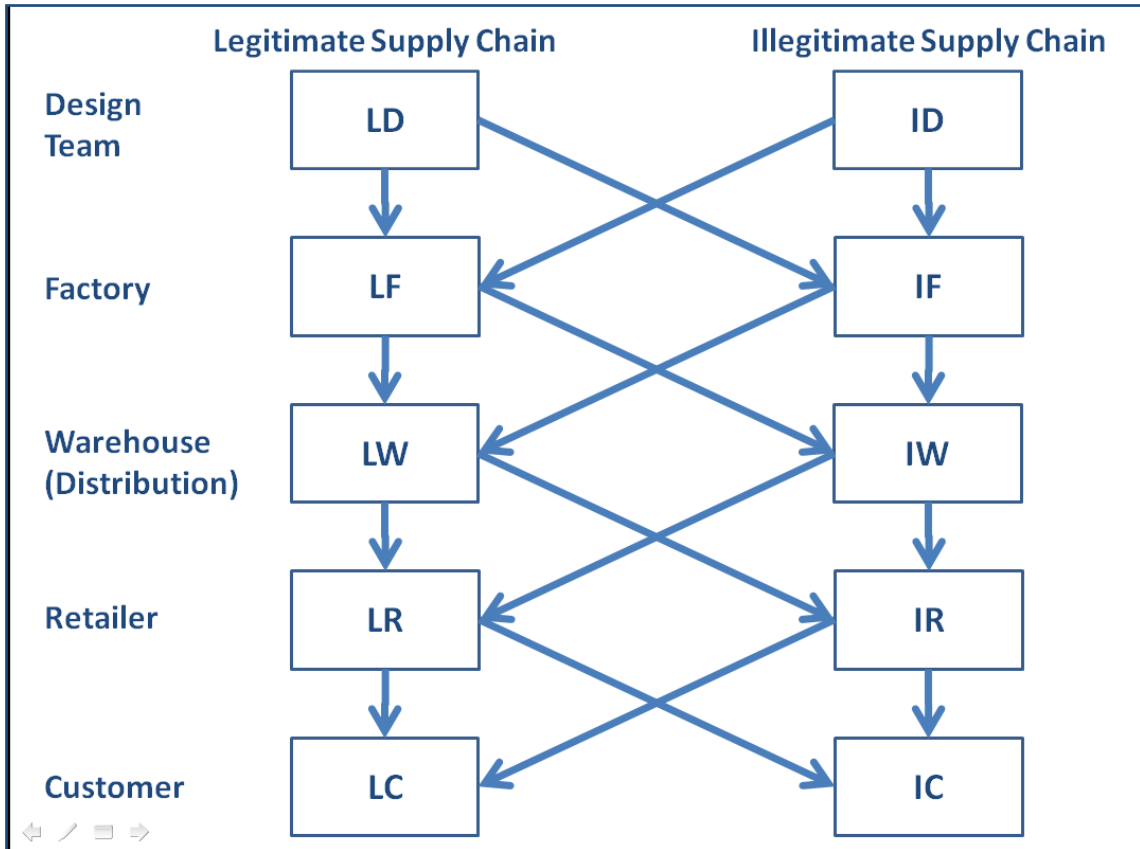
FIGURE 5 – THE LEGITIMATE-ILLEGITIMATE SUPPLY CHAIN MODEL (LISC MODEL)

I make the following working hypothesis:

- A product must follow top-down from all the five stages of at least one of the supply chains. It should be designed, manufactured, managed in a warehouse, delivered to a retailer, and finally bought by a customer. It's not possible to circumvent a stage (even if that stage is degenerate).
- At each stage a product can be handed by only one of the actors (i.e. manufacturing activities can be performed by the legitimate factory or by the illegitimate one, but not by both).

Supply stages are sets of actors, i.e. when we say that an *actor* participates in a *stage* , this implies that .

I can now formally define LISC as an *acyclic digraph* [5] where the set of vertices   represents the stages of the legitimate and illegitimate supply chains:

$$(1)$$

and the set of arcs   represents all the possible direct transitions between the stages of the legitimate and illegitimate supply chains:

$$(2)$$

      is the set of legitimate chain stages, whereas   is the set of the illegitimate ones.

A (supply chain) flow represents any feasible movement of goods in LISC. Since is acyclic, the set of flows really represents the set of open walks (or chains) of L. A complete flow (or complete chain) is the set of flows (v1, v2, v3, v4, v5) where v1= LD or v1=ID and v5=LC or v5=IC.

The fully legitimate complete flow of LISC is (LD, LF, LW, LR, LC), or a walk over L. Equivalently, the fully illegitimate complete flow is (ID, IF, IW, IR, IC) or a walk over I. A good that has flowed down the fully illegitimate complete flow (a "counterfeit") is a good which is the copy of an original "legitimate" good.

I use the   symbol as a vertex wildcard for the purpose of capturing *flow families.* For example,   =   . We can also use the wildcard to indicate any stage of the illegitimate chain   , or the

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[5] In graph theory (Brandstädt, Le, & Spinrad, 1999), a digraph is defined as an ordered pair of sets G=(V,A) where V is a set of vertices and A is a set of ordered pairs (called arcs) of vertices of V. A directed walk w=(v_(1,) v_2...,v_k) of G is a sequence of nodes in V such that (v_(j,) v_(j+1))∈A forj=1,...,k-1.

legitimate one   . Finally, I can use it to signify either chain stage, for example,   for the warehouse stage.

An illegitimate *flow*   is a flow where   . In other words, an illegitimate flow involves at least one vertex (stage) of the illegitimate supply chain. I define   to be the set of all complete illegitimate flows and   to be the set of all complete legitimate flows.

An important concept of LISC is perspective. I recognize that in real life the actual state of the world and the one perceived by somebody may be different. The obvious ill-fated point in case is that of the oblivious buyer of an illegitimate good (a good that has flowed down an illegitimate flow) believing that he has actually bought a legitimate one.

I will use subscripts to indicate different flow perspectives. For example, for an (actual) flow   of some good,   can represent the flow of a good as perceived by a certain customer and   that of the brand. In world free of counterfeiting   ,   ,   would be identical, but unfortunately this is always not the case.

This distinction also allows me to better explain the difference between   and   : A legitimate customer   is confronted with a good that he believes has flowed down fully legitimate flow . In other words,   . Instead, the reality may be that   Since   , this particular customer was deceived. If, however, some other customer   is confronted with the same good she may actually be comfortable with the fact that   .

7.2 LISC arc categories

Considering these constraints, I can categorize the 16 possible arcs into three main categories, as described below and summarized in Table 6:

- *Standard interactions*: all the interactions that occur between actors of the same supply chain represent respectively the "legitimate supply chain" and the "illegitimate supply chain"
- *Diversion from legitimate supply chain*: all the interactions that begin from an actor of the legitimate supply chain and end in an actor of the

illegitimate one. They can represent the diversion of an ideas, components, final products, parallel and gray markets as well as factory overruns

- *Infiltrations into the legitimate supply chain*: all interactions that begin from an actor of the illegitimate supply chain and end in an actor of the legitimate supply chain

Category	LISC Edge	Description
Standard	(	Base flow of legitimate supply chain from design to production
Standard		Base flow of legitimate supply chain from production to warehouse/ distribution
Standard		Base flow of legitimate supply chain from warehouse/distribution to the final retailer
Standard		Base flow of legitimate supply chain from the retailer to the final customer
Standard		Standard flow of illegitimate supply chain from design to production
Standard		Standard flow of illegitimate supply chain from production to warehouse/ distribution
Standard		Standard flow of illegitimate supply chain from warehouse/distribution to the final retailer
Standard		Standard flow of illegitimate supply chain from the retailer to the final customer
Diversion		Copy of models, design, formulas protected by intellectual property laws or theft of prototypes
Diversion		Unauthorized factory overruns, defective products that did not pass quality control but were not mangled, or stolen products diverted to the illegitimate distribution process.
Diversion		Finished product theft and diversion to illegitimate retailers.
Diversion		Shop-lifting. A customer enters in a legitimate retailer shop and successfully steal goods without paying for them
Infiltrations		No examples have been documented thus far, but there are some cases in literature that don't exclude the legitimate company copying idea from the "counterfeiters" and including it in their products
Infiltrations		Infiltrations into the legitimate Supply Chain at the warehouse/ distribution level
Infiltrations		Infiltrations into the legitimate Supply Chain at the retailer level
Infiltrations		Infiltrations into the legitimate Supply Chain at the moment of purchase: the customer thinks that he's dealing with a legitimate retailer but actually he's dealing with an illegitimate one

TABLE 6 – LISC ARCS CATEGORIES

After the interactions analysis and definition, we continued analyzing the possible paths a product can pass through considering the different possibilities for moving from the initial "design" stage to the "customer" stage.
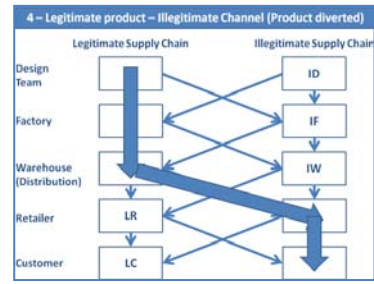
7.3 LISC super-families and families

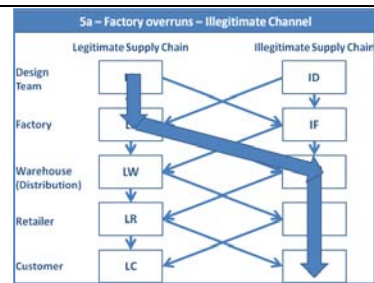As we have seen above, there are 32 complete (end-to-end) flows.

In the Table 7 below we defined 12 families of trade and 7 super-families, according to their main characteristics, the selection rules and the results of the discussions with the executives we interviewed.

Super-family Code and Description	Family Code and Description	# of Flows	Flow Families	Picture
1 - Legitimate Trade	1 - Demand for original goods fulfilled with original goods by a legitimate retailer	1		
2 - Pure counterfeiting	2 - Demand for counterfeited goods fulfilled with counterfeited product by a illegitimate retailer	2		
3 - Supply Chain Infiltrations	3 - Demand for original good fulfilled with counterfeited goods by a legitimate retailer (SC infiltrations)	4		

4 - Product diversion	4 - Demand for counterfeiting fulfilled with legitimate goods by a illegitimate retailer (legitimate product diverted)	2	
5 - Factory overruns	5a - Demand for counterfeiting goods fulfilled with factory overruns by an illegitimate retailer	2	
	5b - Demand for original goods fulfilled with factory overruns by a legitimate retailer	2	
6 - Retail service copycatting	6a - Demand for original goods fulfilled by illegitimate retailer with semi-original goods (theft, original products diverted, etc.)	2	
	6b- Demand for original goods fulfilled by illegitimate retailer with factory overruns	2	
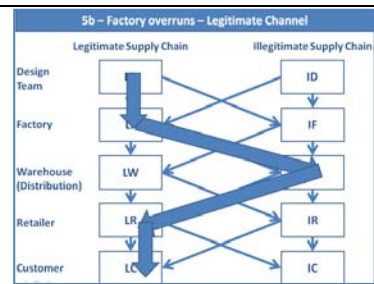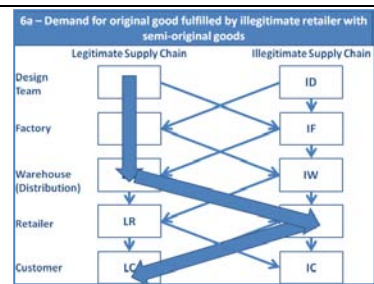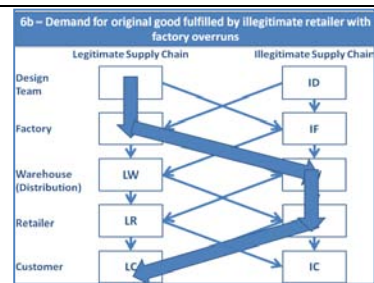
	6c - Demand for original goods fulfilled by illegitimate retailer with counterfeited goods	4	
7 - Shop-lifting	7a - Demand for original goods fulfilled through shop-lifting at a legitimate retailer, stealing original product	2	
	7b - Demand for original goods fulfilled through shop-lifting at a legitimate retailer, stealing factory overruns	2	
	7c - Demand for original goods fulfilled through shop-lifting at a legitimate retailer, stealing counterfeited products	4	
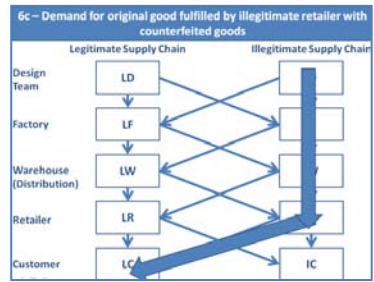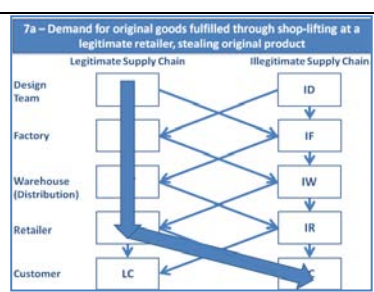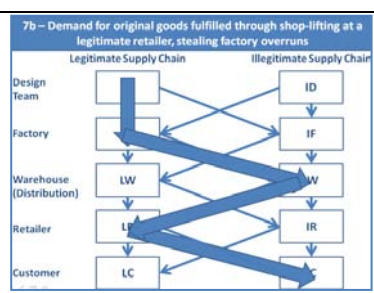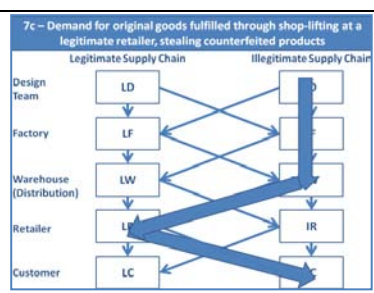
TABLE 7 – LISC PATH FAMILIES

Our model is different from the models proposed by (Bamossy & Scammon, 1985) and (Staake F. , 2008) in the following ways:

- It is a formal model grounded in graph theory that focuses on overlapping but not identical types of harmful activities (as explained in the definition of illegitimate trade);

- Includes a design stage which in the fashion and luxury industries is very critical, and, some would argue, is the business itself. A design can be carried in-house or be outsourced and – of course – can be copied;

- Our model excludes three stages included in the "Licit-Illicit" framework such as "Part Suppliers", "Component Suppliers", and the activities related to waste management and refurbishing, since it specifically focuses on the supply chain activities via which legitimate and illegitimate actors bring products to the market;

- In addition to this, the originality of our model lies in the possibility of classifying the different illegitimate trade arcs, families, and super-families, analyzing the interrelations between the legitimate and illegitimate actors.

In particular, while the model proposed by Staake introduced the idea of presenting two parallel supply chains (licit and illicit), its author does not consider possible connections and paths between them, suggesting this analysis as a future research topic. Also, while Bamossy & Scammon consider the phenomena of counterfeiting and grey markets, they don't include in their analysis the remaining of the illegitimate trade phenomena.

8. Case Studies

Once defined the LISC model and its illegitimate trade paths categorization, I discussed it with five fashion and luxury companies and three executives iin order to validate the LISC model itself and the research proposition stating that:

The different illegitimate trade phenomena can be described in an end-to-end supply chain perspective.

I will present below the five case studies and the information gathered through the three additional interviews.

8.1 Company A

Company A was founded in 1978 redefining what a fashion house could do combining fashion, the arts, and celebrity. The company recorded total sales for

more than 400 million euro in 2013 and it's one of the main players of high-end luxury apparel and accessories.

The current Company A first line supply chain previews production processes completely outsourced to a series of selected and qualified suppliers in Italy, quality check performed through the central warehouse in the North of Italy which serve directly all the European customers and delivers products to a second level of warehouses in USA, China and Hong Kong to serve the international markets. The company delivers its products using both retail and wholesale channels all around the world.

During 2010, about 300.000 counterfeited Company A items have been identified and seized by the Italian authorities and 2011 data shows increasing counterfeiting risk, the company spent in 2011 about 700.000€ in legal fees related to anti-counterfeiting issues. The annual budget dedicated to intellectual property protection and anti-counterfeiting projects is around € 2 million. The company has realized that its defensive policy against illegitimate trade had run its course and is currently shifting towards a proactive strategy that is described as "Prevention, Involvement and Control", or PIC. In particular, the strategy includes:

- Prevention through the protection of its logo and main designs in every major market and implementation of end-to-end supply chain controls.
- Involvement through the collaboration with the contract manufacturers, retailers, customers, customs, and the police for the detection and signaling of illegitimate trade.
- Control through aggressive monitoring of the illegitimate trade activity. Illegitimate actors are becoming increasingly sophisticated constantly changing locations and techniques. The company need to keep up and stay alert at all times.

Meanwhile we have presented and discussed our LISC model with the Legal Department Office of the Company A.

It emerged that all of main "illegitimate trade" category paths discussed are relevant, could present a risk for Company A and, being caused by different events, should be managed through specific supply and demand-side actions. More in details, the main problem for Company A is "Pure counterfeiting", such as the sale of low-quality items on the street markets to customers who are knowingly looking for fake goods, this phenomena occurs especially for the low-end products, such as Jeans and T-shirts, that are more easy to imitate and that meet the exigencies of a wider segment of "potential counterfeited-items consumers" while the "high-end luxury products", for their characteristics to be unknown to the majority of people, are less attacked by counterfeiters.

The "pure counterfeiting" is more difficult to contrast because it's linked to "exogenous" factors, such as consumer preferences and inspirational needs, while the other analyzed paths, that imply some interactions with the legitimate supply chain, could be better secured through an attentive program of supply chain controls and counterfeiting prevention measures.

Recently, Company A won a case against an established retailer in southern Italy that even though was not authorized to sell Company A goods was nevertheless selling genuine and counterfeit items to its unsuspecting customers engaging in deceptive illegitimate trade.

Similarly, the company won a case against Los Angeles-based manufacturer Tres Hermanos Inc. and its owner Monir Awada. Thanks to the Lanham Trade-Mark Act (Lanham Trade-Mark Act), Awada was ordered to pay the brand $20 million in damages for selling fake Company A t-shirts and other items like jeans and sweatshirts to at least 72 stores in the Los Angeles area, involving almost 110 people in the traffic (Sacchi, 2010).

In 1996, the company experienced 6 thefts in Italy and Europe, for a collective damage of about €260K. The stolen goods were sold through not-authorized retailers (Pollo, 1996). Nowadays, theft are unusual: the company has been victim of only one and not relevant theft of perfumes during 2011.

Company A has never had issues with unauthorized "factory overruns". Its suppliers are certified and controlled, penalties for factory overruns are previewed in their contracts and, in general, they have a strong and positive relationship with the company. In any case, for the moment, the production of first line is completely executed in Italy and there isn't any outsourcing of a "full line production" outside of Italy.

Regarding infiltrations of the legitimate supply chain and parallel market imports, retailers and distributors are discouraged by contract conditions and penalties, especially after the implementation of the "anti-counterfeiting" program.

Company A is already working to be able, starting by the end of 2012, to track at item-level the processes of its products and identify them one by one.

The company implemented Certilogo system on all the product categories managed such as Apparel, Accessories and Shoes for the three of its main brands, starting from the collection "Spring/Summer 2013/2014".

Certilogo solution for traceability and brand protection allows consumers to verify on internet the authenticity of a product by entering an item-level, unique identification code, provided by the company. A "Certilogo Code" is used to tag products of those brands who have decided to implement the Certilogo brand protection solution to fight counterfeits.

It is a "human readable" and it can be found in different locations, depending on the type of product: on clothing labels, around the neck of a bottle, or on a certificate of authenticity. The implementation of Certilogo system represents a significant step in the PIC strategy adopted by the company because, in addition to the series of internal controls already performed by Company A, all Company A customers have the possibility to directly check the product authenticity, regardless of the place where they bought the products.

8.2 Company B

Company B recorded more than €3 billion during financial year 2013 and it operates mainly in leather goods and luxury handbags categories in more than 60 countries around the world.

The design is crucial for Company B which aims to conciliate tradition, heritage and innovation. The design team is composed by more than 50 people in-house for each brand, including designers and graphic artists, with a strong commitment to innovation in materials, fabrics and designs. The sourcing department is divided in two groups: one in charge of leather, the company uses more than 2 million square meters of leather each year, and one in charge of fabrics.

Intense Research & Development activities are performed in collaboration with the top fabric producers: that's why the selection of suppliers is based on their high quality of craftsmanship and their capacity to keep up with the style's department requests for creative innovation. The group creates strong and long-lasting relationship with suppliers in order to get negotiated terms and conditions and to be sure that they will give priority to the group's procurement needs. The company performs strong quality controls before the raw materials are used: in many cases raw materials and fabrics are exclusively produced for the company, on the basis of rigorous and specific requirements of both the style department and the purchase department.

The company has 11 production plants, ten in Italy and one in Great Britain, coming from internal development or acquisitions of former suppliers, the plants employ 1,800 employees for manufacturing about 20% of the finished products sold yearly. The remaining 80% is produced through a network of 480 contract manufacturers, of which 390 in Italy and the remaining in China, Vietnam, Turkey and Romania. Finally, the 80% of the total sales is achieved through Directly Operated Stores and the remaining 20% through the wholesale channel. According to the group IPR responsible, the best prevention is indeed to arrange a robust trademark protection program which must guarantee the utmost protection within the international classes of products pertaining to the core commercial and those that are compatible on a commercial perspective.

The territorial coverage should include all the countries where commercial activities are conducted, those countries which do carry strategic commercial appeal and, finally, all those countries where counterfeiting undertakings are considered to be high. This clearly emerges from the Figure 5 which compares the countries where the products are sold with the countries where the products are protected.
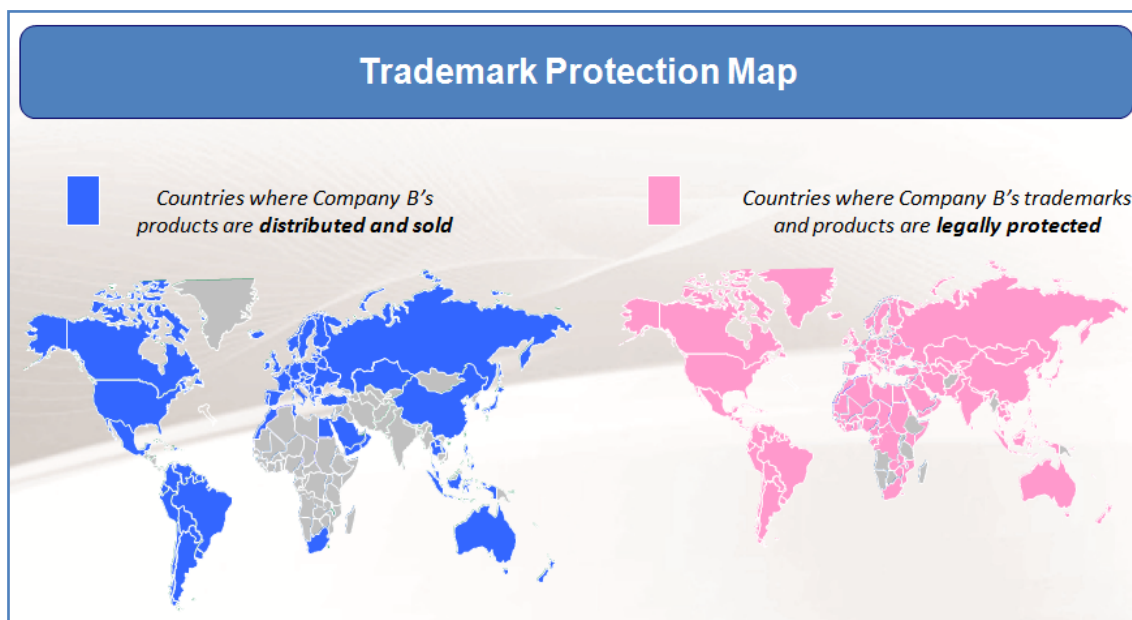
FIGURE 6 – TRADEMARK PROTECTION MAP

The company was involved in trademark opposition in several countries such as United Kingdom, Tunisia, Greece, China and Turkey and in some cases they discovered final point of sales using their trademark and signs. The most representative illegitimate trade categories for the company are: pure counterfeiting, grey and parallel market and retail service copycat.

Although the choice of adopting a selective distribution network can reduce significantly the risks of supply chain infiltrations, Company B states that, when they occur, are very harmful for the company.

The IP department has built a tight network of investigators and legal advisors and actively cooperates with competent authorities such as customs and police on a worldwide scale in order to combat the counterfeiting phenomenon. Especially, the mentioned collaboration with customs authorities, which takes

place on a daily basis, is of dire importance in so far that it enables Company B to monitor and intervene by keeping track of the flow in relation to counterfeited products and to be able to intercept more than 250,000 counterfeited items during 2012. Summarizing, Company B believes that, surely, strong legal protection, constant monitoring of contract manufacturers and a selective and exclusive distribution are necessary main points of a brand protection program but the continuous development of internal know-how is the best possible guarantee of the company's commitment to product innovation and production process improvement. Although all the phenomena represented through the LISC model can represent a risk, Company B believes that fast, continuous and successful innovation in materials, designs and products is the best protection from imitation and from counterfeiters.

8.3 Company C

Company C is an Italian company operating in jewelry, watches, leather accessories and perfumes, with more than 1 € billion net revenues in 2013 and more than 3,000 employees. Company C believes that counterfeiting is an issue for all its product categories ranging from very precious jewels and watches to products easier to be counterfeited such as perfumes: it didn't observe any specific product categories in which the problem is weaker or stronger than in others.

The quality of counterfeited they have had the opportunity to seize is variable and range from low-quality replica, with low cost material or where the appearance of the watch was the same but without its complex and precious mechanisms, to goods really similar to the original ones and difficult to be distinguished from the last ones. According to Company C, regardless of the countering actions implemented, the issue is remained constant in the last three years. The company believes that is crucial to implement a 360° cross-functional strategy to counter the issue, involving all departments such as legal, marketing, production and supply chain. In addition to this, in order to define and implement the appropriate countering strategies, it's crucial to distinguish between two main categories of illegitimate trade: those phenomena originated

by exogenous factors, which are external to the firm, and those illegitimate trade phenomena which can derive from information, materials or actors which belong to the end to end supply chain of the firm itself.

The degree of control along the supply chain is very relevant in contrasting illegitimate trade and it's the result of a "trade-off" choice between control and flexibility. In the last years, Company C started a process aimed to increase its upstream and downstream control for different reasons, most of which related to the key success factors in luxury business (know-how, value of heritage, scarcity of supplies, etc). This process supported the firm in approaching another problem that it was experiencing: a strong presence of Company C products on parallel markets.

In particular, the company found original products sold through not-authorized retailers/ markets and the presence on the market of products very similar to their original products. First of all, before contrasting, Company C thinks that the most important word is "prevention": the firm is implementing preventing actions both on the product itself and on the process/ supply chain level.

For example, they are inserting a series of micro-characteristics on the product to make it unique and guarantee its authenticity. These characteristics can be recognized only by the company itself and are inserted on the product in a specific production phase managed internally. All the products manufactured in outsourcing should have at least one important production phase managed in-house, directly by the firm.

In this way, Company C is able to add a "certificate" to the product and to be sure that the product followed the defined production process.

In addition to this, Company C is starting a project with the aim of being able to track and trace each item by serial number: the mechanism will be firstly implemented to the most important product categories and then it will be extended gradually to all their products.

The ability to track the product by a unique serial number and to guarantee without any doubts its authenticity is not only useful for an anti-counterfeiting strategy: with this tool, the firm aims to give more value to its products and customers, giving an "authenticity certificate" that tells the story of the product today and will tell it in the future.

On the supply side, the firm is working carefully on the relationships and collaboration with its suppliers. Compared with the last five years, Company C has decreased the number of suppliers and it has built stronger relationships with them. On some specific product-categories, the firm is taking back in-house the production activities that were previously outsourced.

In any case, for those production activities still executed in outsourcing, the company selects and defines carefully the network of suppliers and sub-suppliers, it performs periodical and extraordinary inspections, requesting periodic reports from the suppliers, and, last but not least, their first level suppliers can have only one level of sub-suppliers, on which the company a "veto power".

The same integration is occurring downstream, on the demand side: if in the past it was more common to use wholesaler channels, nowadays the company is trying to manage internally the "first distribution level", at least in the most important markets. Selling the goods directly to the retailers limits the space and the conditions for product diversion and parallel/ grey markets.

For the more exclusive product categories, the firm manages the final sales through Directly Operated Stores or franchising stores.

In any case, Company C believes the solution of selling only through DOS is not viable: in some cases for the nature of the product category, such as perfumes and cosmetics, which requires numerous and various final point of sales, but even in case of more precious products, such as watches, ibn the industry there are a lot of very qualified external retailers: so the firm can't afford to declare something such "all what is sold on other channels, it isn't our product" but should find other ways to keep the phenomena under control.

The more common illegitimate trade events for Company C are pure counterfeiting, followed by gray and parallel market and finally factory overruns.

Considering the fact that the occurrence of factory overruns so strongly contributed to insert in the illegitimate market high quality copies that can be confused with the original one, Company C considers factory overruns phenomena as those that can more threaten the company, cause the higher economic damage and are more difficult to contrast.

The company has never experienced phenomena such as supply chain infiltration or retail service copycat.

8.4 Company D

Company D was founded in 1952 in France, operating in the high-end apparel industry, mainly sportswear and accessories and nowadays it's between the leaders in outerwear and down jackets categories. Company D recorded more than €500m total sales during 2013, the group had an exceptional growth in Japan, China, and the US. The group sales are divided almost equally through Directly Operated Stores and the wholesale channel.

The company decided to manage in-house key activities such as design and product development, purchasing of fabrics, accessories and threads, and to outsource the activities of "cutting, production and trimming" to a carefully managed network of long-term reliable contract manufacturers in Italy and Eastern Europe, retaining in-house the final activity of quality check and the distribution through the retail and wholesale channels.

In the last years, Company D has experienced several illegitimate trade phenomena in its production and distribution network all over the world: not only pure counterfeiting, but even the more damaging phenomena of supply chain infiltrations and factory overruns.

This is why, the company started a strong campaign against illegitimate trade in order to protect the originality of its brand and to avoid the involvement of its customers in deceptive counterfeiting. In addition to this, the company is

participating to a large-scale offensive which has the goal of protecting Design and Creativity of branded products.

The company is countering counterfeiters on internet channel too: in fact, it advises its customers that its internet site is the only official site where customer can purchase its products or find information about which are and where are the authorized sales channels. Company D has been using Certilogo solution for brand protection since the Spring Summer 2009 collection.

The solution has made it possible to alert a huge number of consumers that have bought counterfeit product D garments worldwide. The company decided to adopt the same level of protection for internet sales. The anti-counterfeiting e-commerce solution allows consumers to check the product authenticity twice: first before buying the product, directly on the internet site, through a "special button" that the sellers can insert directly into their advertisement or auction, and a second time once they have the product in their hands.

By giving to customers easy tools to distinguish fake goods from the original ones, the company thinks that the online deceptive counterfeiting will decrease significantly. Company D's legal department collaborates with customs and authorities of the countries in which it operates and, thanks to continuous monitoring, the company is achieving significant results in its war against counterfeiting and was able to seize thousands of fake jackets in the last years.

8.5 Company E

Company E was founded in Italy in 1910 and nowadays is one the world's leading luxury men's suit maker. It recorded total sales for more than €1 billion in 2012, of which more than 90% from exports, producing fabrics, men suits and accessories.

Differently from many companies operating in this industry, Company E is very vertically integrated and is able to control every phase of the production process, from the sourcing of raw materials to the final sale of fabrics. It creates its fabrics from the high quality wools and collaborates with Australian, South

Africans and Mongolians breeders in order to guarantee its supply of the best cashmere and merino wool.

Avoiding the "mass market" approach of some competitors, Company E has adopted an exclusive distribution strategy throughout the world.

The majority of company E's sales is achieved through the company's Directly Operated Stores, Company E considers counterfeiting and parallel/ gray market relevant problems, but, thanks to its vertical integration, and the product positioning at the top of the luxury pyramid, has never experienced cases of factory overruns or supply chain infiltrations.

8.6 Additional interviews

In addition to the company cases, I've had the opportunity to discuss about illegitimate trade and counterfeiting with other executives such as: ing. Giovanni De Sanctis, who was in charge of the IPR Desk in China for the Italian Ministry of Economic Development, two lawyers experts in IPR and anti-counterfeiting issues in China. First of all, these interviews allowed me to get information about other two cases of illegitimate trade in China, briefly described below.

Italian shoe company "X" outsourced its production in China and created along with a Chinese partner a network of 100 mono-brand stores to distribute its shoes. After a while, the company realized that the number of its stores had increased to 114, with the 14 "new" ones entirely out of its control. In addition, it also found out these "new" stores were selling not only legitimately designed models, but also "new" models that were not designed by it but still baring its logo. Apparently, its contracted manufacturer was making these "new" models also. Hence while Another Italian company operating in the furniture and design sector estimated that only 1 out of 30 of its products on sale in a specific town in China, via either legitimate or illegitimate channels, was original .

According to the executives interviewed, overall, in China, the most common family is pure counterfeiting, followed by the sale of factory overruns, and the opening of "retail service copycat", finally we can't exclude the existence of infiltrations in the legitimate supply chain. The last three illegitimate trade

families mentioned represent a higher threat for customers and companies because they are cases of deceptive counterfeiting, where basically the customer is willing and actually assumes to buy an original good, paying the full price.

One example of a supply chain infiltration is represented by the so-called "Da Vinci" case. DaVinci Furniture Ltd, founded in Singapore, is a luxury furniture distributor and retailer which distributes in China sofas and furniture for several important Italian brands, such as Armani Casa, Blumarine, Cerruti, Versace Home, Fendi Casa, as we can see from the screen-shot above of one page of its internet site.
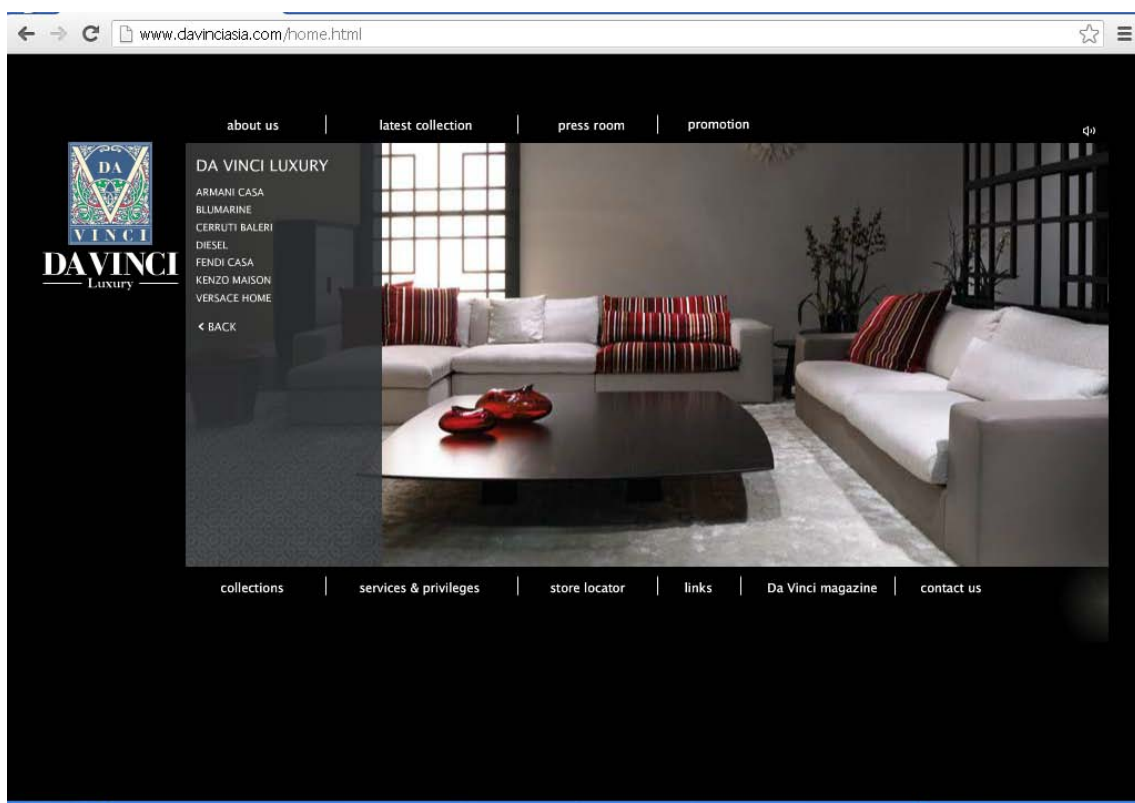
FIGURE 7 - DAVINCI FURNITURE LTD

It promotes itself as "a heaven for premium products" and sells luxury bedroom sets for $100,000 (BARBOZA, 2011). The company has been involved in a scandal last July 2011, when one Chinese important media reported that some of DaVinci's furniture, which was sold as "imported from Italy", was manufactured in southern China.

Besides the loss of reputation for the distributor, the scandal raised questions about the level of the end-to-end supply chain control from European furniture makers, especially in a complex market such as China.

Although the country is known for a "tolerance attitude" towards counterfeiting, this is not the case when the fakes are priced as the originals. DaVinci had been accused of mixing original and fake goods together in order to deceive the customers and, on the web, several customers have demanded refunds: the complaints were related to goods of a retail price between 20,000 yuan (US$2,850) and 3 million yuan (BARBOZA, 2011).

In the meanwhile, customs officials declared that DaVinci was temporarily storing Chinese-made goods in a Shanghai warehouse: after 24 hours spent in Shanghai's Free Trade Zone, the products were imported back into the country, with the paperwork duly filed. In this way, remaining in the "Free Trade Zone" for one day, the products "status" changed from domestically produced ones to imported ones.

In particular, the Shanghai's official consumer agency seized almost 200 items of Cappelletti furniture in a company's warehouse and ordered the company to stop selling items labeled with the Italian brand "Cappelletti". (BARBOZA, 2011),

The labels on the furniture were misleading about what the furniture was made of or where it was produced. (Daily, 2011), (BARBOZA, 2011).

8.7 Case-study Summary

The evidences from five cases analyzed and the interviews with the three IPR experts provided elements to validate the first research proposition*:*

The different illegitimate trade phenomena can be described in an end-to-end supply chain perspective and to validate the design of the LISC model which has been presented before.

In particular, the five companies have all mentioned both phenomena external to the firms and caused by exogenous factors, such as pure counterfeiting or

retail service copycat, and phenomena which involve the supply chain of the firms such as parallel and grey market.

Counterfeiting and parallel/ grey market were the first concerns of five companies, regardless of their dimension, of their level of supply chain integration and of the product category managed. Company C explicitly declared during the interview that, when they are approaching illegitimate trade issues, they divide the topic in two categories: external issues and issues originated by their own supply chain.

The countering strategies mentioned refer to the main categories defined during the previous literature review: Company B is very focused on "Legal tools" and believes in the implementation of a robust trademark program, Company C and E underline that a strong vertical integration along the supply chain can reduce significantly the risks of infiltrations and other illegitimate trade issues, Company A and D, which have a network based supply chain, are investing on systems such as Certilogo or other track and trace systems in order to better control and coordinate the multiple actors involved in their supply chain and operations.

Finally, although some authentication systems are used in a marketing perspective too, in order to communicate with the final customers, adding value with data and information about the product history and origin, the majority of actions aimed at "decrease the demand for fake goods", creating awareness about the risk of buying counterfeits in the final consumers, are generally undertaken at the association level (for instance Fondazione Altagamma or Sistema Moda) or through the collaboration of different companies. Table 8 below summarized the main outcomes from the cases study analyses in terms of illegitimate trade phenomena mainly discussed and the main countering strategies already adopted or to be implemented in the future.

Company	Illegitimate Trade Categories discussed	Countering strategies in place
Company A	- pure counterfeiting - gray/ parallel market - shop-lifting	- PIC "Prevention, Involvement, Control" - Authenticity check given to the customers through Certilogo system - Test of RFID solution for anti-counterfeiting - Suppliers certification and monitoring
Company B	- pure counterfeiting - gray/ parallel market - retail service copycat - supply chain infiltrations	- Legal tools, robust trademark protection program - Continuous innovation in terms of materials and design - Exclusive distribution
Company C	- pure counterfeiting - gray/ parallel market - factory overruns	- Supply chain integration and collaboration - Supplier certification and monitoring - Traceability and authenticity controls
Company D	- pure counterfeiting - gray/ parallel market - supply chain infiltrations - factory overruns	- Authenticity check given to the customers through Certilogo system - Store Locator and Internet sales monitoring - Suppliers certification and monitoring - Tight cooperation with authorities
Company E	- pure counterfeiting - parallel/ grey market	- Vertical integration - Legal protection

TABLE 8 - CASE STUDY OUTCOMES

9. Using LISC to Assess Illegitimate Trade in the Luxury Industry

As mentioned earlier, I had the opportunity to discuss the model with the members of the MI-FIDO, with the managers of the five companies involved in the first research phase and with other three industry experts.

Overall, these interviews helped us verify the existence and relevance of the super-families I proposed and also brought to my attention some additional cases to consider, such as, for example, the "Da Vinci" case, which has already been presented in detail above.

Table 9 presents the main examples and cases that I was able to find for each of the illegitimate trade super-families.

I found in total 12 examples, listed below, it's important to note that I derived these using secondary sources or using the data and information gathered during the interviews, this is the case of the "Italian Shoe company" case that was recounted by a primary source.

Super-family code	Super-family Description	Examples
1	Demand for original goods fulfilled with original goods by a legitimate retailer	- Normal situation without illegitimate trade events
2	Demand for counterfeited goods fulfilled with counterfeited product by a illegitimate retailer	- "Pure counterfeiting", widely documented in the press. Street markets, etc - Police raid "Veronica", 2000 high-brands bags of high-quality, probably going to be sold through legitimate shops (XIV Legislature - Camera dei deputati n.4001, 2003) - 300,000 counterfeit handbags falsely carrying the brand names of Burberry, Louis Vuitton, Gucci, Coach, Fendi, and Chanel (Boyd, 2010).
3	Demand for original good fulfilled with counterfeited goods by a legitimate retailer (SC infiltrations)	- Chanel and LVMH against a mall shop owner in California, 2011 ((U.S. Immigrations & Customs Enforcement, 2011) - Fendi vs Burlington Coat Factory Warehouse Corp, Retail Ventures Inc, Big M Inc., Sam's Club (WalMart) US, (Socha, 2010) - Da Vinci Case in China (Sisci, 2011)
4	Demand for counterfeiting fulfilled with legitimate goods by a illegitimate retailer (legitimate product diverted)	- Sale of stolen and smuggled goods, widely documented in the press - Parallel/ Gray markets, widely documented in the press - Versace six theft in 1996 (Pollo, 1996)

5	Factory overruns sold by legitimate or illegitimate retailer	- Ferragamo in 2003 (Hopkins, 2003) - Ralph Lauren vs TC Fashion (Tucker, 2006)
6	Demand for original goods fulfilled by illegitimate retailer, unbeknown to the legitimate customer, with different type of products (original, factory overruns, counterfeited)	- LVMH and Burberry against Singga Enterprises Inc., and Carnation Fashion Company, Canada, (Elliott, 2011) - Richemont vs Concept Designs Unlimited Inc (STEIGRAD, 2011) - Versace case in South Italy (D'Amato, 2012) - Versace against Tres Hermanos Inc., US 2010 (D'Amato, 2012) - Fake boutique Cartier in Mexico (Harvey & Ronkainen, 1985). - Italian shoe company in China
7	Demand for original goods fulfilled through shop-lifting at a legitimate retailer with different type of products (original, factory overruns, counterfeited	- Shop-lifting, widely documented in the press

TABLE 9 – LISC PATH FAMILIES CASES

Super-Family 1 - Legitimate Trade

Super-Family 1 represents the "legitimate supply chain"; it means that the original product has passed through the defined supply chain without any interference from the "illegitimate actors". There are several ways in which companies can protect their supply chains at each stage. At the design stage they can record their trademarks and new models in order to acquire the legal rights to fight eventual counterfeiters. The can also add particular elements to the product in order to make it more difficult to be copied. Upstream and downstream they can implement controls and adopt contracts in order to ensure the legitimacy of their suppliers, distributors, and final retailers. Several companies, including Louis Vuitton, are now publishing the list of "authorized retailers" on their internet site in order to communicate to their customers the places where they can be sure to buy original goods. Other companies, including Moncler, provide a product serial number that the customer can check on an Internet site to ensure authenticity.

Super-Family 2 - Pure counterfeiting

In a 2002 police raid in Italy named "Veronica", approximately 2,000 high-visibility brand bags were seized. In 2010, in one of the largest counterfeit goods prosecutions in U.S. history, two importers were convicted for importing more than 300,000 counterfeit handbags falsely carrying the brand names of Burberry, Louis Vuitton, Gucci, Coach, Fendi, and Chanel, and unveiled in the process a sophisticated supply chain composed of 13 companies and 8 factories (Boyd, 2010).

Super-Family 3 - Supply Chain Infiltrations

In 2011 a mall shop owner in California was indicted for selling counterfeiting Chanel and Louis Vuitton products (U.S. Immigrations & Customs Enforcement, 2011).

Fendi won some litigations against US legitimate retailers accusing them of selling counterfeited Fendi handbags. The accused retailers were Burlington Coat Factory, Retail Ventures Inc, Big M Inc., and Sam's Club, a division of WalMart stores (Socha, 2010).

In 2011, Da Vinci, a retailer of expensive imported furniture such as Armani Casa and Versace Home, was accused of deceiving the customers about the origin of its goods. The retailer was selling "imported" goods that were manufactured in China (Sisci, 2011).

Super-Family 4 - Product diversion

This category includes both the sale of legitimate goods diverted through grey or parallel markets and the sale of stolen and smuggled goods if the diversion from the legitimate supply chain to the illegitimate one occurred through a theft. When an authorized retailer cannot sell all of its inventory to consumers, it may move the leftover items to an unauthorized dealer. On the Magnificent Mile in Chicago, buyers from a venerable department store saw the same high-end branded shirt carried by the store appear in the displays of a discount retailer directly across the street. (Antia, 2004)

Super-Family 5 - Factory overruns

In 2006 Polo Ralph Lauren discovered an illegitimate distributor (TC Fashion) that was sourcing overproductions from an actual Polo outsourcer manufacturer in the Philippines. The manufacturer was running unauthorized night shifts and sold them to legitimate US Polo Ralph Lauren retailers (Tucker, 2006). In this case the illegitimate traders succeeded in inserting again the factory overruns into the legitimate Polo Ralph Lauren supply chain.

Super-Family 6 - Retail service copycatting

In 1985, Fernando Pelletier, a Mexican entrepreneur, opened 14 Mexican retail copycat Cartier boutiques and he even attempted to sell his stores to the Paris firm (Harvey & Ronkainen, 1985) (alter parens).

LMVH and Burberry won a case in Canada against Singga Enterprises Inc. and Carnation Fashion Company. Both were accused of having orchestrated large-scale and sophisticated counterfeit manufacturing operations in China and to have imported vast amounts of counterfeit products into Canada with the intent of selling them nationwide in stores and online (Elliott, 2011). Richemont also won a similar case against Concept Designs Unlimited Inc. which was selling fake jewels for $30,000 (Steigrad, 2011).

Versace won a case against an established retailer in southern Italy that, even though it was not authorized to sell Versace goods, was nevertheless selling genuine and counterfeit Versace items to its unsuspecting customers, engaging in deceptive illegitimate trade (D'Amato, Papadimitriou, & Baglieri, 2012). Versace won another case against Los Angeles-based manufacturer Tres Hermanos Inc., accused of selling fake Versace t-shirts and other items like jeans and sweatshirts to at least 72 stores in the Los Angeles area, involving almost 110 people in the trafficking operation (Sacchi, 2010).

Italian shoe company "X" outsourced its production to China and created, along with a Chinese partner, a network of 100 mono-brand stores to distribute its shoes. The Italian company eventually realized that its number of stores had increased to 114, with the 14 "new" ones being entirely out of its control (De Sanctis, 2012).

Super-Family 7 – Shop-lifting

This category includes the crime of shoplifting. Although this is usually considered an act conducted by an individual, in the U.S. investigations have also revealed the existence of illegal organizations that organized thefts in luxury department stores with the goal of selling them to illegitimate and legitimate retailers (Prabhakar, 2012).

9.1 Discussion

The first research phase allowed myself to validate the first research proposition:

P1: The different illegitimate trade phenomena can be described in an end-to-end supply chain perspective

The LISC model itself, defined through the combination of the coding process and the case-study research, describes and presents the different illegitimate trade phenomena in an end-to-end supply chain perspectives through the interrelations existent between two supply chains: the legitimate one and its doppelganger.

I have introduced and defined the composite phenomenon of illegitimate trade that is growing both in terms of size and complexity.

Illegitimate trade is particularly important in the fashion and luxury industries that rely on long and complex supply chains where a number of actors are involved and control is limited. The LISC model and the illegitimate trade classifications paths are the main original contributions of the first research phase to a topic that is usually approached in an isolated case manner and without taking into account a holistic supply chain perspective.

It is due to this supply chain perspective that I was able to clearly capture all the phenomena included in the illegitimate trade definition and their interconnections, drawing examples from primary and secondary sources.

The LISC model not only fills a literature gap regarding counterfeiting and illegitimate trade in general but, compared to previous attempts, offers some

marked advantages. In particular, LISC is grounded in graph theory, includes a design stage (that is central in the fashion and luxury industries).

It is also semantically rich providing classification and definitions for illegitimate trade arcs, families, super-families, and, finally, explicitly captures the interactions between the legitimate and illegitimate actors.

LISC provides a foundation to capture illegitimate trade-related supply chain risks from activities such as production outsourcing: A company that intensively outsources production without implementing effective control procedures will likely experience a highest volume of factory overruns than a company producing internally.

In addition to this, during the course of the MI-FIDO project the model and the selection rules identified for illegitimate trade family classification were used as a basis for defining the rules for anomaly detection to be included in a "track and trace" system developed by the project team with a major Italian fashion brand.

10. The Survey

10.1 Motivation and goals

The second part of the research, as mentioned above, consisted in an empirical investigation, conducted through the survey methodology, with the aim of testing the following research hypotheses:

Hypothesis 1: Different types of illegitimate trade phenomena are positively correlated with each other

Hypothesis 2: The effectiveness of each strategy varies depending on the illegitimate trade typology to be contrasted

More in details, the goals are to understanding which of the illegitimate trade phenomena are the most common and the most damaging to the fashion and luxury companies, if these phenomena are correlated between themselves, and which strategies can be the most effective in countering them.

The survey proposed was based on the illegitimate trade super-families defined through the LISC model (Table 7) and the four categories of countering strategies, as classified in the literature review (Table 4) and includes 40 statements to be assessed on a 1 (very low) to 7 (very high) Likert scale, which aim at describing the following statements:

- Frequency of the six illegitimate trade super-families, as described in the LISC model;
- Economic impact generated by the six illegitimate trade super-families;
- Investment of the company in each of the four countering strategies;
- Degree of effectiveness of each strategy for each illegitimate trade super-families.

The questionnaire is available at the following link: https://unibocconi.qualtrics.com/SE/?SID=SV_1X0sUDZYEMqirnn and the complete text and questions are reported in the Annexes.

10.2 Data collection process

As mentioned above, the questionnaire has been mailed to 200 companies working in fashion and luxury companies operating in Italy, including 74 companies which are members of Fondazione Altagamma (the association of the Italian high-end companies) and several companies members of "Sistema Moda Italia". It has been proposed in a paper-format to several managers interested in counterfeiting and illegitimate trade issues who participated to a round-table and a seminar during which I presented and discussed the LISC model. In total, I got a response rate of 40%, receiving 112 answers from 81 different companies.

Considering that firms, often, don't have a structured division to manage illegitimate trade issues at 360° and that the responsibilities on these topics are often fragmented in different division, we sent the questionnaire targeting four professional roles, who are the most consistent with the strategies that can be undertaken: marketing manager, legal service manager, IT manager, supply chain manager. As a consequence, depending on the way in which the

company is organized and on the actions already taken to address the problem of counterfeiting, up to four questionnaires per company have been received.

Although several companies involved in the survey operate in more than one industry between apparel, shoes, accessories and perfumes, I classify the company accordingly to the product category which represents the most important business for the company.

Figure 8 describes the breakdown of the answers by industry: 51% of the answers come from managers operating in apparel and clothing industry, 18% from accessories and leather goods and 7% jewelry and watches. The category "Other" includes companies operating in fashion & design, accessories such as luxury pens or hats, etc. "N.A." refers to those surveys that have been completed in a total anonymous way.

In terms of functional role and responsibility of the respondents, according to the assignment of brand protection responsibility within the companies, I received answers from different departments:

- 14% of the respondents are directly the Chief Executive Officer, this has occurred in case of small medium firms, where these kind of responsibilities are faced and centralized at CEO level
- 29% of the respondents come from the legal department, the organization function which usually is in charge of countering counterfeiting and IPR crimes
- 28% comes from Supply Chain and 20% from marketing department.

The managers who answered to the survey work in large organization which sell products with famous and widely known brands: the 63% of the respondents work in companies with more than 250 employees and the 64% in companies which sell their product with famous and well known brands.

In particular, 24 answers come from 20 companies which are members of Fondazione Altagamma, 13 companies, although they are not members of Fondazione Altagamma, have very top brands and compete in the high-end

market segment, and the other 13 companies have famous brand for competing in the premium and mass market, the remaining 34 companies have brand unknown to the majority of consumers.
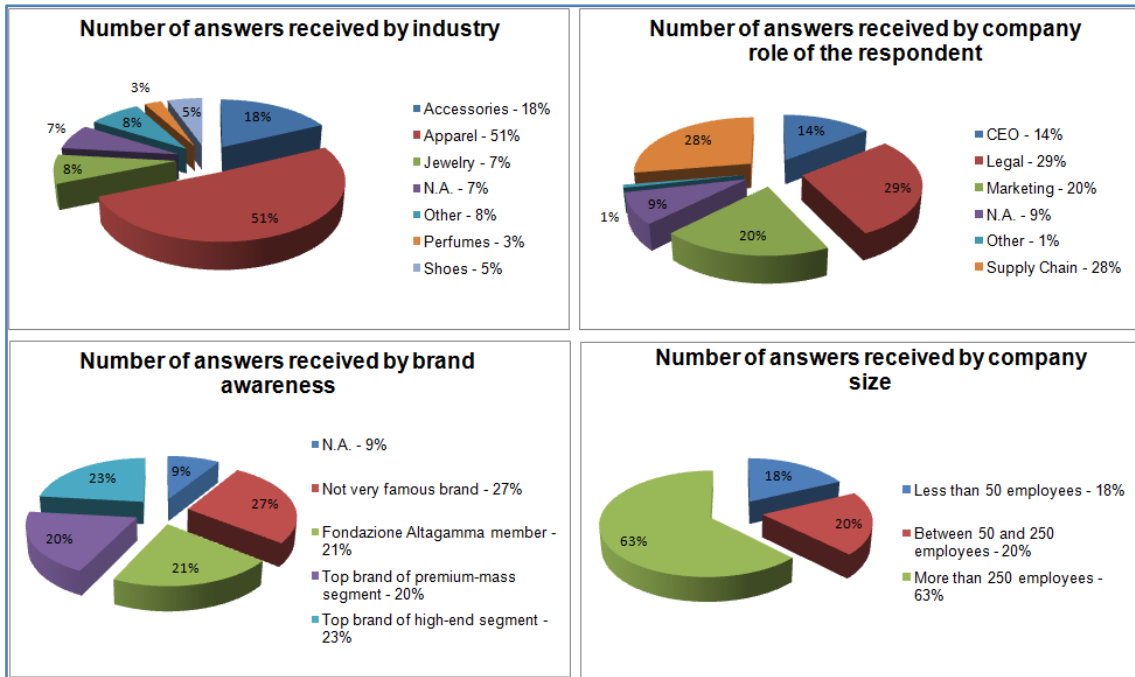
FIGURE 8 - BREAKDOWN OF ANSWERS RECEIVED

10.3 Evidences from the survey

The first hypothesis of this study concerns the positive correlation between the different types of illegitimate trade.

In order to test this assumption, first I have computed the means concerning the relevance of each type, both in terms of frequency of occurrence and of economic impact for the company (see Table 10). Then, we have computed the correlations (see Table 11 and Table 12).

First of all, I performed a Cronbach's Alpha test on the first section of the survey, the one related to the assessment of frequency and economic impacts of the various illegitimate trade phenomena. As shown below, the test result is positive.

Reliability Statistics

Cronbach's Alpha	N of Items
.810	12

As it can be observed from Table 10, the rankings of the various types of illegitimate trade stemming out from the means are the same. Furthermore, it is worthwhile noticing that the difference among means is highly significant for both variables. Looking at these results it can be claimed that the most harmful phenomenon for companies is pure counterfeiting, followed by grey trade, and shop-lifting, while the other three types show a lower degree of relevance.

In addition to this, if pure counterfeiting is the most frequent phenomena, its economic impact is very similar to that one of parallel and grey market. It's interesting to note how two very different phenomena: one almost completely exogenous and the other almost completely endogenous can be considered to have the same economic impact.

	Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.	P-value
Frequency	5,28	3,11	4,44	3,16	2,59	3,19	0,000***
Economic Impact	4,58	3,28	4,53	3,28	3,11	3,48	0,000***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 10 - FREQUENCY AND ECONOMIC IMPACT OF COUNTERFEITING PHENOMENA: MEANS

However, looking at Table 11 and Table 12, it can be seen that the various types of illegitimate trade are actually correlated with each other, regardless of their frequency of occurrence and economic impact.

Concerning the first variable, Table 11 highlights positive correlations, all of them being significant but two, and their values seem to show the existence of at least one evident cluster of phenomena.

Indeed, correlations between infiltrations, factory overruns and retail problems are much higher than the correlations between these variables and the other three types of illegitimate trade super-families. Similar evidence stems out from the analysis of Table 12.

Thus, on the basis of these outcomes, it can be claimed that the first research hypothesis is confirmed, in that all types of illegitimate trade have at least three positive correlations with the others.

		Pure counter	SC Infiltrat.	Grey trade	Factory Overruns	Retail Copycat	Shop-lift.
Pure counterfeits	Pearson Correlation	1	0,171°	0,245*	0,041	0,322***	-0,039
	Sig. (2-tailed)		0,080	0,011	0,677	0,001	0,689
SC Infiltrat.	Pearson Correlation		1	0,174°	0,454***	0,541***	0,181°
	Sig. (2-tailed)			0,075	0,000	0,000	0,063
Grey trade	Pearson Correlation			1	0,306***	0,256**	0,219*
	Sig. (2-tailed)				0,001	0,008	0,024
Overruns	Pearson Correlation				1	0,474***	0,184°
	Sig. (2-tailed)					0,000	0,059
Retail	Pearson Correlation					1	0,282**
	Sig. (2-tailed)						0,003
Shop-lift.	Pearson Correlation						1
	Sig. (2-tailed)						

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 11 - PEARSON CORRELATIONS BETWEEN COUNTERFEITING PHENOMENA (FREQUENCY OF OCCURRENCE)

		Pure counterf	SC Infiltrat.	Grey trade	Factory Overruns	Retail copycat	Shop-lift.
Pure counter	Pearson Correlation	1	0,308***	0,278**	-0,064	0,178°	-0,172°
	Sig. (2-tailed)		0,001	0,004	0,514	0,068	0,077
Infiltrat.	Pearson Correlation		1	0,416***	0,626**	0,697***	0,244*
	Sig. (2-tailed)			0,000	0,000	0,000	0,012
Grey trade	Pearson Correlation			1	0,482**	0,428***	0,259**
	Sig. (2-tailed)				0,000	0,000	0,007
Overruns	Pearson Correlation				1	0,683**	0,520***
	Sig. (2-tailed)					0,000	0,000
Retail	Pearson Correlation					1	0,551***
	Sig. (2-tailed)						0,000
Shop-lift.	Pearson Correlation						1
	Sig. (2-tailed)						

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 12 - PEARSON CORRELATIONS BETWEEN COUNTERFEITING PHENOMENA (ECONOMIC IMPACT)

In terms of managerial implications, this is a very interesting result because it links illegitimate trade phenomena that are usually considered completely separated by companies such as counterfeiting and parallel and gray market. The existence and the company tolerance towards grey market can create the condition for counterfeiting and other form of illegitimate trade to flourish.

To test the second hypothesis, which claims that the effectiveness of each strategy varies depending on the counterfeiting phenomenon to be contrasted, first of all we have measured the extent to which companies invest in the different countering strategies. Evidence is provided in Table 13.

	Marketing	Technology	SC integration	Legal	P-value
Mean	3,41	4,21	4,37	5,37	***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 13 - INVESTMENT IN THE COUNTERING STRATEGIES (MEAN)

As it can be seen, the major source of expenditure for companies that want to cope with counterfeiting is the legal activity, which is obviously necessary not only to prevent this problem, but especially to address it once it has occurred.

The second strategy in terms of investment is supply chain integration, followed by innovation and technology, while marketing seems to be rather overlooked. This can be motivated by the circumstances that campaigns aimed at create awareness in the final customer related to the dangers and the crimes associated with counterfeits are normally implemented at the industry association level and not by the single firms.

Before checking the effectiveness of the countering strategies, I ran the Cronbach's alpha test for the set of questions related to the second section of the survey, having a positive result.

The analysis of the countering strategies effectiveness leads to a counter-intuitive results: the countering strategies in which companies are investing more resources are not those considered most effective. Companies invest mainly in legal activities but they achieve more results in their war against counterfeiters when they react through technology, product development, insertion of specific characteristics in order to make the product more difficult to replicate.

	Marketing	Technology	SC integration	Legal	P-value
Mean	3,39	5,14	4,58	4,73	***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 14 – EFFECTIVENESS OF COUNTERING STRATEGIES (MEAN)

In addition to this, we can measure the effectiveness of the functional strategies for each of the illegitimate super-families to be fought.

With this aim, looking at Table 15, it can be claimed that the second hypothesis is supported. As a matter of facts, the degree of effectiveness of each strategy changes very much depending on the illegitimate trade phenomenon.

	Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.	P-value
Marketing	3,83	2,69	3,68	2,84	4,46	2,86	0,000***
Technology	4,93	5,15	5,43	5,42	5,09	4,82	0,063°
SC integration	4,54	4,87	4,99	5,50	4,09	3,47	0,000***
Legal	5,36	4,42	4,63	4,74	5,13	4,08	0,000***
P-value	0,000***	0,000***	0,000***	0,000***	0,000***	0,000***	

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 15 - EFFECTIVENESS OF THE COUNTERING STRATEGIES FOR EACH COUNTERFEITING TYPOLOGY

Furthermore, it is rather apparent that some strategies report on average much higher values that the others in all cases. This evidence is highly significant from a statistical viewpoint, as it can be seen looking at the p-values obtained testing the difference among means both by type of strategy and by type of counterfeiting.

The means reported in Table 14 show that Marketing is the least effective strategy but for Retail problems, where it is followed only by Supply Chain integration. On the opposite, Technology reaches values above 5 in four out of six types of illegitimate trade types, namely Infiltrations, Grey trade, Overruns and Shop-lifting, where it is considered on average the most effective strategy. Also Legal activities and SC integration seem to show a rather high degree of effectiveness in several cases. In particular, the Legal strategy is considered the most effective to address problems concerning Pure counterfeiting and Retail.

Finally, from Table 15 it can be seen that there seem to be two clusters of cases. The first concerns counterfeiting problems that can be effectively addressed through a bundle of two strategies, namely the Legal and the Technology ones and this cluster includes Pure counterfeiting, Retail and Shop-

lifting. The second encompasses infiltrations, Grey Trade and Overruns, that seem to require a different bundle of strategies, in particular the Legal and SC integration ones. This evidence seems to be consistent with the most recurrent course of actions undertaken by companies to face these problems.

Finally in order to further check this evidence, we have computed the correlations between these pairs of strategies. The outcomes of this analysis, reported in Table 7, witness the relevance of such correlations which reach high values especially when the bundle includes Technology and SC Integration strategies.

Counterfeiting Types	Bundle of strategies	Pearson Correlation	P-value
Pure	Technology & Legal	0,230	0,018*
Infiltrat.	Technology & SC Int.	0,689	0,000***
Grey trade	Technology & SC Int.	0,442	0,000***
Overruns	Technology & SC Int.	0,792	0,000***
Retail	Technology & Legal	0,356	0,000***
Shop-lift.	Technology & Legal	0,305	0,000***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 16 - CORRELATIONS BETWEEN EFFECTIVENESS OF STRATEGIES

11. Conclusions

I defined, discussed and graphically represented the composite phenomenon of illegitimate trade, that is growing both in terms of size and complexity, harming brands, retailers, governments, and consumers alike.

Illegitimate trade is particularly important in the fashion and luxury industries that on one hand rely on long and complex supply chains, and on the other are only weakly protected by existing copyright and patents laws.

I assessed which illegitimate trade typologies are the most frequent and the most damaging to fashion companies, namely "pure counterfeiting" and "gray market", detailing the countering strategies considered most effective against them.

As discussed, the illegitimate trade phenomena is particularly complex because it includes very different events: some of them external to the firms, such as pure counterfeiting, which is, in some case, the result of brand awareness and, some of them very "internal" to the firm supply chain such as gray and parallel market, which strongly depend on the company marketing decision in terms of price discrimination or distribution strategy. The complexity of the phenomena is enriched by the correlation existent between the different phenomena: the correlations analyzed between the defined illegitimate trade phenomena help us to understand to what extent, for example, gray market activities can create the conditions that will cause counterfeiting to flourish.

The evidence that all the phenomena are correlated is very important for firms in order to define and implement the right countering strategies.

The co-existence of the different illegitimate trade phenomena make the traditional functional approach unable to counter efficiently the complex phenomena as a whole: it becomes crucial for companies to take into account a holistic supply chain perspective, addressing the problem with a cross-functional team which is able to approach the problem considering its legal, marketing, supply chain and technology implications.

In addition to this, each illegitimate trade phenomena requires a different bundle of countering strategies so it will be relevant for companies to assess their illegitimate trade weakness in order to implement the most suitable countering strategies.

I believe that LISC can provide the foundation for any future effort that wishes to deal with illegitimate trade. Additionally, there are opportunities for future researchers to improve on the model itself. For example, a natural extension could be transforming the LISC graph into a network where arc values would

represent illegitimate trade-related metrics such as likelihood to occur, difficulty to combat, and cost.

12. Limitations

Our work suffers from three main limitations due to the origin of our data and the scope of the analysis. The first limitation is related to the survey data which include one questionnaire from some companies, the smaller or the less structured ones, where the responsibility related to anti-counterfeiting initiatives are concentrated in only one person, and more than one questionnaires from larger organizations, where there are different divisions and managers involved in the topic. Although it represents a limitation for the study, an analysis addressing this limitation is provided in the annexes, showing that the final results are similar to the one presented in paragraph 9. The second limitation is that a specific focus on the high-end fashion industry was employed throughout this work; further analysis for evaluating the applicability and the significance of the illegitimate trade families and super-families in other industries is still pending. In addition to this, it will be necessary to investigate the implications and the applicability of the model to the illegitimate *on-line* trade that, for the moment, has been excluded from our analysis.

13. Annexes

13.1 Survey questionnaire

We are conducting a survey on illegitimate trade, a phenomenon that all of us have encountered in one form or another, whether this was a counterfeit bag on the street, or a high-tech item that not covered by warranty because of its origin. Illegitimate trade has grown immensely over the last few years and is affecting firms and us consumers.

We kindly ask you to take some of your time answering the following questions solely based on your personal experiences.

If you encounter a term that you feel uncertain about please refer to the legend below the survey or contact Iolanda D'Amato at iolanda.damato@sdabocconi.it

Question 1: On a scale from 1 (never happen) to 7 (happen very often), in your experience, what is the frequency with which the following phenomena occur?

	1	2	3	4	5	6	7
Pure counterfeiting (1)	○	○	○	○	○	○	○
Supply Chain Infiltrations (2)	○	○	○	○	○	○	○
Gray/ Parallel market (3)	○	○	○	○	○	○	○
Factory overruns sold on legitimate or illegitimate channels (4)	○	○	○	○	○	○	○
Retail service copycat (5)	○	○	○	○	○	○	○
Shop-lifting (6)	○	○	○	○	○	○	○

Question 2: On a scale from 1 (null economic impact) to 7 (very high economic impact), in your experience, what is the economic impact on affected firms of the following phenomena?

	1	2	3	4	5	6	7
Pure counterfeiting (1)	○	○	○	○	○	○	○
Supply Chain Infiltrations (2)	○	○	○	○	○	○	○
Gray/ Parallel market (3)	○	○	○	○	○	○	○
Factory overruns sold on legitimate or illegitimate channels (4)	○	○	○	○	○	○	○
Retail service copycat (5)	○	○	○	○	○	○	○
Shop-lifting (6)	○	○	○	○	○	○	○

Question 3: On a scale from 1 (practically none) to 7 (a great deal) how much money is allocated to the following strategies to contrast illegitimate trade?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

Question 4: On a scale from 1 (not useful) to 7 (very useful), in your experience, how useful are the following strategies to counter the phenomenon of pure counterfeiting?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

Question 5: On a scale from 1 (not useful) to 7 (very useful), how are the following strategies useful to counter the phenomenon of supply chain infiltrations?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

Question 6: On a scale from 1 (not useful) to 7 (very useful), how are the following strategies useful to counter the phenomenon of parallel/gray market or sale of stolen and smuggled goods?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

Question 7: On a scale from 1 (not useful) to 7 (very useful) how are the following strategies useful to counter the phenomenon of production and distribution of factory overruns?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

Question 8: On a scale from 1 (not useful) to 7 (very useful), how are the following strategies useful to counter the phenomenon of retail service counterfeiting?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

Question 9: On a scale from 1 (not useful) to 7 (very useful), how are the following strategies useful to counter the phenomenon of shop-lifting?

	1	2	3	4	5	6	7
Marketing and communication strategies (1)	○	○	○	○	○	○	○
Technologies and end-to-end traceability (2)	○	○	○	○	○	○	○
Supply chain integration and control (3)	○	○	○	○	○	○	○
Legal tools (4)	○	○	○	○	○	○	○

The luxury goods industry in Italy is in a state of shock by the explosion of illegitimate trade. The majority of the affected firms are urgently developing brand protection practices.

Our research has shown that one can group these strategies into four categories:

- Marketing and communication strategies are used to reduce the demand for counterfeited or illegitimate goods through awareness campaigns with the aim to inform and educate consumers and other involved actors (among which the same producers) on potential risks these products represent for the society. There are also included practices of monitoring the use of brand name and sales on the Internet;

- Technologies and end-to-end traceability refer to the use of "track and trace" mechanisms along the entire supply chain with the purpose to verify goods authenticity at each stage and detect their path, thus blocking any possibility of counterfeits intrusions and technological improvements developed directly on the product and packaging to make them more difficult to replicate (rfid labels, etc);

- Supply chain integration and control include vertical integration strategies, collaboration with suppliers and distributors in order to have a greater control on end to end supply chain. They include security and certification practices of suppliers and retailers, verifying raw materials

source and final products destination markets, as well as routine inspections of manufacturing plants and storage warehouses.

- Legal tools finally aim at discouraging any counterfeiting initiatives through patents and trademarks registration and protection, and defending intellectual property rights. Collaborations with governments, local authorities, and Customs, law enforcement, activation of investigations over suspicious operations.

To properly model all of the above, we have introduced the "Legitimate-Illegitimate Supply Chain" (LISC) model, in particular we ask you to measure and assess the following phenomena:

1. Pure counterfeiting - Example: Tom is looking for an Alpha counterfeited product. Tom finds and buys the product in a street market. The demand for counterfeited goods is fulfilled with fake products by an illegitimate retailer, the customer knows that he's buying a counterfeit

2. Supply chain infiltrations - Example: Tom looks for an Alpha original product. Tom goes to an authorized store but he buys a fake unbeknown to him. The demand for original goods is satisfied by a legitimate retailer, but with counterfeited products. Case of deceptive counterfeiting

3. Gray/ Parallel market - Example: Tom looks for an Alpha product, goes to an illegitimate store and he buys an original product coming from a parallel/grey channel. The demand for counterfeited goods is fulfilled by a fake retailer with authentic products coming from the parallel/grey market.

4. Production and sale of factory overruns - Example: Tom wants a product of Alpha and he finds on the market factory overruns, which has been produced by the same manufacturer, unbeknown of the brand Alpha The demand for counterfeited goods is fulfilled by factory overruns (goods illegally produced unbeknown to the brand by its supplier) by an

illegitimate retailer, or the demand for original goods is fulfilled with factory overruns by a legitimate retailer.

5. Retail service counterfeiting - Example: Tom searches for an Alpha original product. He goes to a shop that looks like an Alpha store due to the use of logos, design and other typical signs of the brand, but the point of sale itself is counterfeited (recent case Ikea or Apple in China) The demand for original goods is fulfilled by an illegitimate retailer with different types of counterfeits (stolen, parallel, overruns, pure counterfeits, etc.).

6. Shop-lifting - Example: Tom wants an Alpha authentic product, he goes to an official store of the brand, and steals from shelves or warehouses the desired product.

The following data are requested only for internal purposes such as results analysis/ validation and in order to send you the research report. We will not disclose any data regarding the companies or the people who participated to the survey. Thank you for your contribution!

The additional requested data are: Name & Surname, Email address, Company Role, Company, Company size in terms of employees (divided in three classes: less than 50 employees, between 50 and 250 employees and finally more than 250 employees.

13.2 Additional analysis

The following analysis has been conducted with the aim of confirming the results previously discussed in paragraph 9, considering only one answer from each company: I have considered the mean of the answers received from those companies which sent more than one questionnaire.

First of all, the reliability results of Cronbach's Alpha test were confirmed as detailed below:

Reliability Statistics

Cronbach's Alpha	N of Items
.859	12
.865	28

For what it concerns the first analysis, related to the assessment of frequency and economic impacts of illegitimate trade phenomena and their correlations, the results are quite similar to those previously discussed as we can see from Table below.

	Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.	P-value
Frequency	5.40	3.14	4.53	3.17	2.74	3.18	0,000***
Economic Impact	4.71	3.28	4.54	3.37	3.22	3.44	0,000***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

The same results arises from the correlation analysis:

Correlations

		freq-pure	freq-infil	freq_grey	freq_over	freq_reta	freq_lift
freq-pure	Pearson Correlation	1	.272[*]	.300[**]	.180	.380[**]	-.106
	Sig. (2-tailed)		.014	.006	.107	.000	.348
	N	81	81	81	81	81	81
freq-infil	Pearson Correlation	.272[*]	1	.131	.560[**]	.614[**]	.254[*]
	Sig. (2-tailed)	.014		.242	.000	.000	.022
	N	81	81	81	81	81	81
freq_grey	Pearson Correlation	.300[**]	.131	1	.327[**]	.283[*]	.234[*]
	Sig. (2-tailed)	.006	.242		.003	.010	.036
	N	81	81	81	81	81	81
freq_over	Pearson Correlation	.180	.560[**]	.327[**]	1	.531[**]	.335[**]
	Sig. (2-tailed)	.107	.000	.003		.000	.002
	N	81	81	81	81	81	81
freq_reta	Pearson Correlation	.380[**]	.614[**]	.283[*]	.531[**]	1	.369[**]
	Sig. (2-tailed)	.000	.000	.010	.000		.001
	N	81	81	81	81	81	81
freq_lift	Pearson Correlation	-.106	.254[*]	.234[*]	.335[**]	.369[**]	1
	Sig. (2-tailed)	.348	.022	.036	.002	.001	
	N	81	81	81	81	81	81

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		imp_grey	imp_over	imp_reta	imp_lift	imp_pure	imp_infil
imp_grey	Pearson Correlation	1	.504**	.371**	.153	.344**	.378**
	Sig. (2-tailed)		.000	.001	.171	.002	.001
imp_over	Pearson Correlation	.504**	1	.770**	.436**	.071	.663**
	Sig. (2-tailed)	.000		.000	.000	.529	.000
imp_reta	Pearson Correlation	.371**	.770**	1	.465**	.251*	.789**
	Sig. (2-tailed)	.001	.000		.000	.024	.000
imp_lift	Pearson Correlation	.153	.436**	.465**	1	-.213	.255*
	Sig. (2-tailed)	.171	.000	.000		.056	.021
imp_pure	Pearson Correlation	.344**	.071	.251*	-.213	1	.361**
	Sig. (2-tailed)	.002	.529	.024	.056		.001
imp_infil	Pearson Correlation	.378**	.663**	.789**	.255*	.361**	1
	Sig. (2-tailed)	.001	.000	.000	.021	.001	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

For what it concerns the declared investments in the different countering strategies, the results confirm to be the same as above in paragraph 9:

	Marketing	Technology	SC integration	Legal	P-value
Mean	3.4	4.35	4.48	5.56	***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

For what it concerns the declared investments in the different countering

	Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.	P-value
Marketing	3.79	2.71	3.69	2.85	4.47	2.85	0,000***
Technology	4.95	5.2	5.39	5.36	5.03	4.76	0,000***
SC integration	4.62	4.84	4.95	5.51	4.00	3.51	0,000***
Legal	5.37	4.38	4.44	4.66	4.97	4.08	0,000***
P-value	0,000***	0,000***	0,000***	0,000***	0,000***	0,000***	

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

TABLE 17 - EFFECTIVENESS OF THE COUNTERING STRATEGIES FOR EACH COUNTERFEITING TYPOLOGY

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Publications

Papers

- *Iolanda D'Amato, Thanos Papadimitriou, (2013) "Legitimate vs illegitimate: the luxury supply chain and its doppelganger", International Journal of Retail & Distribution Management, Vol. 41 Iss: 11/12, pp.986 – 1007*

Conference Proceedings

- *Measuring and responding to counterfeiting in the fashion and luxury business: evidence from a survey, I. D'Amato, V. Belvedere, T. Papadimitriou, 18th International Working Seminar on Production Economics, February 24-28, 2014, Innsbruck, Austria*

- *A systemic approach to counterfeiting, factory overruns, and other types of illegitimate trade in the fashion supply chain, I. D'Amato, T. Papadimitriou, Euroma, Dublin, June 2013*

- *The anti-counterfeiting potential of RFID Technologies in the fashion Supply Chain, I. D'Amato, T. Papadimitriou, E. Baglieri, 17th International Working Seminar on Production Economics, February 20-24, 2012, Innsbruck, Austria*

Legitimate vs illegitimate: the luxury supply chain and its doppelganger

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Abstract

Purpose – The increase in international trade, the advances in technology, the growing importance of the emerging markets are the main factors that have contributed to the explosion of counterfeiting experienced in recent years, estimated to be valued at about 5-7 per cent of the world trade. The luxury industry in Italy has been particularly hard hit and most brands nowadays are urgently looking for demand-side and supply-side strategies to track and control the phenomenon. The aim of this paper is to provide a supply chain view of counterfeiting and illegitimate trade phenomena, in a supply chain risk management perspective, to define and illuminate the interaction of the legitimate and the illegitimate supply chains.

Design/methodology/approach – The paper introduces the LISC model to represent and include all the illegitimate trade phenomena under analysis such as pure counterfeiting, factory overruns, grey and parallel market, supply chain infiltrations, product diversion and sale of stolen goods

Findings – The interrelations between legitimate and illegitimate supply chains are crucial to approach counterfeiting issue and define which illegitimate trade paths are more harmful to companies and customers.

Research limitations/implications – The first limitation of the work is that the illegitimate trade categories defined in this paper mainly rely on data and phenomena collected from secondary sources that have not yet been directly observed by the authors. The second one is that a specific focus on high-end fashion industry was employed throughout this work: further analysis for evaluating the applicability and the significance of the illegitimate trade in other industries is still pending. The final limitation stems from the fact that it will be necessary to investigate the implications and the applicability of the model to the illegitimate on-line trade.

Practical implications – During the course of the MI-FIDO project, the model and the selection rules identified for illegitimate trade family classification were used as a basis for defining the rules for anomalies detection to be included in a "track and trace" system developed the project team currently under with a major Italian fashion brand.

Originality/value – To the authors' knowledge, this is the first work that attempts to present a concise and systematic approach to luxury illegitimate trade from a supply chain perspective. Understanding which legitimate-illegitimate supply chain interactions are the most damaging will help fashion luxury and other industries to battle the counterfeiting phenomenon more effectively

Keywords Luxury, Supply chain, Counterfeiting, Grey markets, Illegitimate trade, Parallel trade

Paper type Research paper

1. Introduction

Counterfeiting and other illegitimate trade activities, such as unauthorized factory overruns, and grey imports[1], are running rampant in the high-end fashion industry (HEF)[2], a €142[3] billion business worldwide in 2011 (Bain & Company, 2012). During the same year, the value of the growing counterfeited goods trade alone was around €7 billion[4]. In this industry, where reputation is everything, the days when the illegitimate trade issue was dealt in a taboo manner are over: the top-ten luxury brands in the world (KPMG International, 2011) own seven of the most counterfeited brands in the UK (Davenport Lyons, 2007) and most probably elsewhere.

The aim of this paper is to treat counterfeiting as a part of a broader set of "illegitimate trade" phenomena by utilizing a supply chain perspective. This will go beyond the traditional "genuine-counterfeit" binary classification and show the different illegitimate trade problems that can occur along the supply chain.

The roots of counterfeiting and illegitimate trade are many (Nunes, 2010). Yet, one that clearly stands out in the context of this journal's and the authors' interests is the emergence of complex, geographically dispersed, and – ultimately – vulnerable supply chains (Trott and Hoecht, 2007) (Christopher *et al.*, 2004) (Bruce *et al.*, 2004). Indeed, for about 25 years the main preoccupation of many high-end fashion firms was to gain efficiency in production-related activities, via delocalisation and outsourcing, eventually retaining direct control only of design and brand-related activities (Prahalad and Hamel, 1990).

The illegitimate trade problem in the fashion and luxury industries is particularly important for one of the most important suppliers of HEF[5] and personal luxury goods: Italy. This problem is further accentuated by the fact that Italian fashion firms are often quite different from each other, ranging from totally integrated vertical firms to firms that entirely outsource the manufacturing processes. In addition, while some firms copiously collect and maintain supply chain data, others appear to be still entirely unaware in this respect (Brun *et al.*, 2008).

Caniato *et al.* (2011) discuss how manufacturing outsourcing is a common practice across the clusters related to fashionable products, with recorded cases of off-shoring, at least for entry-level products, and some accessories. In particular, they point out the need for a brand owner to coordinate and control its partners in order to guarantee its brand's reputation.

Product, brand, and retail channels are mentioned as the main drivers affecting supply chain management choices in the fashion industry (Brun and Castelli, 2008) and supply chain strategies must be selected in order to be consistent with luxury critical success factors (Caniato *et al.*, 2011).

Finally, although counterfeiting is mentioned as one of the possible risk factors in the supply chain management risk literature, it has not been studied in great detail (Christopher and Peck, 2004). We think that this oversight presents an interesting research opportunity.

1.1 Motivation and objectives

The aim of this paper is to draw attention to illegitimate trade, with a particular focus on the HEF segment, and elevate its status from an issue that is currently awkwardly and disjointedly treated on a divisional level, to one of strategic importance. As such, we hope to lay the foundation for an all-inclusive approach to the problem, which will

take into account all relevant issues and parties and help a CEO in the future to clearly see the trade-offs involved, while pursuing an optimal strategy for his or her company.

Hence, we will treat illegitimate trade in an end-to-end fashion and luxury supply chain manner and attempt to capture all of the actors involved and their interactions. Along the way, we will also try to identify and classify the various types of luxury illegitimate trade by means of the LISC model – an earlier version of which was discussed by D'Amato *et al.* (2012). Ultimately, we wish to identify all possible illegitimate supply chain paths and their main characteristics.

The rest of this paper is structured as follows: in section 2 we present a brief literature review of recent research related to illegitimate trade. In section 3 we present our methodology. In section 4 we formally present the LISC model, while in section 5 we take a look at its application. In section 6 we present LISC's impact and possible uses, future research opportunities, our model's limitations, and our overall conclusions.

1.2 Illegitimate trade: definition

As we mentioned already, illegitimate trade is a lot more than counterfeiting alone and includes a variety of non-authorized types of activities that can harm a brand. Although most of these activities are already established both in practice and in the literature, we will provide brief term definitions here for the purpose of clarity.

Counterfeiting is defined as "any manufacturing of a product which so closely imitates the appearance of the product of another to mislead a consumer that it is the product of another" (OECD, 1998).

Factory overrun describes "unauthorized production and exploitation of goods by otherwise legitimate suppliers" (OECD, 1998).

Parallel trading or grey market refers to the situation "where products are legitimately bought in one territory and diverted for sale to another territory without the consent of the right holder in the receiving territory" (OECD, 1998).

Retail copycatting describes the case where the retail experience of a genuine brand store is being imitated unbeknownst to customers (Harvey and Ronkainen, 1985).

Supply chain infiltration is when an unauthorized actor succeeds in inserting stolen or counterfeit products into a legitimate supply chain.

Finally, shoplifting is the act when an individual steals from a retailer.

In the literature the closest concept that could come close to our needs is that of illicit trade. This stands for a wide variety of illegal or non-contractual activities, including trafficking in controlled substances, stolen and smuggled goods, and trade of all kinds with products infringing intellectual property rights and even parallel imports (Staake *et al.*, 2009).

Trafficking controlled substances is outside our scope but we do include factory overruns, retail copycatting and supply chain infiltrations. The phenomena included in "illegitimate trade" are strictly interconnected and we will illustrate exactly how while presenting our model.

We are now ready to formally define illegitimate trade, illegitimate actors, and illegitimate goods.

Illegitimate trade collectively describes deceptive and non-deceptive counterfeiting (OECD, 1998; Grossman and Shapiro, 1988), grey market trade (OECD, 1998), unauthorized or overrun production, smuggling, theft, supply chain infiltrations and

other types of activities that bring to the market goods in violation of intellectual property or commercial laws and agreements (Hilton, 2004; Phau and Teah, 2009; Grossman and Shapiro, 1988; Staake *et al.*, 2009). An illegitimate actor is one that performs one or more illegitimate trade activities.

Once a good has been handled by an illegitimate actor, it becomes and remains illegitimate, even if it successfully (re)enters the legitimate supply chain. This is an important distinction that we make and that will hopefully assist the reader in circumventing the confusion that arises from trying to distinguish goods as simply "genuine" or "fake". For example, overrun goods are illegitimate even if they are identical to those legitimately distributed by the brand and distributed by an otherwise legitimate retailer.

2. Literature review

In the context of illicit trade, Staake *et al.* (2009) classify the main works relevant to the issue into six main categories: general description of the phenomenon, impact analysis, supply-side investigations, demand-side investigations, managerial guidelines to avert counterfeits, legal issues and legislative concerns. For the purposes of our work, we focus on the luxury and fashion industries and, in particular, the interplay of supply chain management with the more general concept of illegitimate trade, paying special attention to the luxury and HEF industries. We track the type of illegitimate trade implicated (as defined in the previous section) as well as the supply chain stage during which it occurs (upstream, downstream, and customer). We decided to classify the papers according to these three supply chain stages in order to be coherent with the LISC model that will be introduced later. In particular, upstream level will include "design and factory", downstream includes "warehouse, distribution and retailer" and the last one is related to the final customer. Our findings are summarised in Table I.

The main literature gap we aim to address is related to the fact that the papers we reviewed generally treated the different phenomena that we include in the definition of illegitimate trade in an isolated manner. As a result, with very few notable exceptions, previous works have overlooked the fact that illegitimate trade phenomena share some important common features. These include the fact they can all harm a brand and that they exhibit clear interconnections from a supply chain perspective.

Of the literature that actually attempts to weave a common thread on illegitimate trade, some provide only definitions and limited examples of illegitimate trade events (McDonald and Roberts, 1994; Hilton *et al.*, 2004; Kaikati and LaGarce, 1980). Others (Bamossy and Scammon, 1985) partly address the issue by exploring how counterfeit products can enter the market, be distributed through authorised or non-authorised channels, and generate both not-deceptive and deceptive counterfeiting. An important exception is the work by Staake (2008) that introduces the "licit-illicit" framework where he presents the "licit supply chain", composed by actors with lawful intents, and its parasite, the "illicit supply chain", composed by actors with illicit intents who want to free-ride on the activities of the "licit supply chain".

2.1 Counterfeiting

Few studies investigate the upstream activities of the illegitimate supply chain and describe the main characteristics of the possible actors and the ways used to get the design and production information for producing counterfeits.

Supply chain stage	Counterfeiting	Grey imports	Illegitimate trade activity Supply chain infiltrations	Retail service copycatting	Factory overruns
Upstream: design and factory	Harvey and Ronkainen (1985); Ben-Shahar and Assaf (2004); Trott and Hoecht (2007); Staake et al. (2011)	Cespedes et al. (1988); Weingrand (1991); Thomas and Okleshen (2006); Raff and Schmitt (2007)	Green and Smith (2002); Berman (2008); Cooper (2008); CAPC – Accenture (2006)	Not applicable	McDonald and Roberts (1994); Simone et al. (2009); Song et al. (2007)
Downstream: warehouse, distribution and retailer	Thomas and Okleshen (2006)	Thomas and Okleshen (2006)	Green and Smith (2002); Liu et al. (2005); Olsen and Kent (1992, 1993); Kaikati and LaGarce (1980); Wang et al. (2010)	Harvey and Ronkainen (1985); Kaikati and LaGarce (1980); Branigan (2012); Flock (2011)	Not applicable
Customer	Poddar et al. (2011); Perez et al. (2010); Romani et al. (2012); Han et al. (2010); Jiang and Cova (2012); Bloch et al. (1993); Green and Smith (2002); Commuri (2009)	Thomas and Okleshen (2006); Chen (2007); Swee Hoon Ang (2000)	Wang et al. (2010)	Mavlanova and Benbunan-Fich (2010)	Not applicable

Table I.
Classification of main papers relevant to "illegitimate trade" and "HEF" industry

Staake *et al.* (2011) define five different groups of counterfeiters, investigating their strategic profiles and the main industries in which they operate. Harvey and Ronkainen (1985) describe possible ways for counterfeiters to acquire the necessary knowledge from legitimate manufacturers. Ben-Shahar and Assaf (2004) state that the manufacturer could be interested in promoting copyright infringements to have the possibility to apply predatory pricing. Trott and Hoecht (2007) suggest that, while some companies contributed themselves to the problem of counterfeiting by outsourcing or off-shoring certain activities without ensuring supply chain control, the counterfeiting companies demonstrated an ability to reverse engineer, imitate and learn, and can make a significant contribution to their economy if they succeed in becoming part of the formal economic sector.

In the case of pure counterfeiting, the wholesalers are often linked to a criminal organisation (Green and Smith, 2002), while the retailers are usually a street vendor or the sale takes place in street markets (Simone, 2006). The "retailer level" and "point of sale" perspectives are both crucial for a customer that wishes to assess the legitimacy of the point of sale, especially when the customer is not able to assess the product's authenticity (Mavlanova and Benbunan-Fich, 2010).

The most researched area is that of non-deceptive counterfeiting at the customer level. There are two main debates regarding this area.

The first one is about understanding whether counterfeiting in certain cases may actually benefit luxury brands (Romani *et al.*, 2012). This is due to the "high visibility" and "inspirational value" effects and not due to sales losses, damaged brand reputation (Bloch *et al.*, 1993; Green and Smith, 2002) and loss of exclusivity (Commuri, 2009).

The second debate is about determining the characteristics of the consumer of a counterfeit product. While traditionally customers who buy counterfeits have been considered "low-income customers" in need of "status recognition" (Han *et al.*, 2010), several recent studies underline how they may actually be the same customers who buy original goods. Perez *et al.* (2010) show the existence of a new trend, that we call "fake chic". This is where consumers who can afford the price of luxury goods prefer to buy counterfeit ones because they build and express their identity through the consumption of counterfeits and discover "high quality" counterfeits. Or they buy counterfeits because they find the process of purchasing and consuming counterfeit goods fun (Jiang and Cova, 2012). Poddar *et al.* (2011) show that when a legitimate brand has a negative image in terms of its perceived corporate citizenship, higher price differentials trigger significantly greater intentions to purchase the counterfeit product.

We suggest that, first of all, the presence of significant volumes of counterfeits in the market and the lack of control along the supply chain (both upstream and downstream) contribute to the development of illegitimate trade that can definitely harm the brand.

Secondly, we think that in an industry where the product quality difference between original products and counterfeits is constantly decreasing, luxury companies need to differentiate themselves on the basis of the processes that created the product. In other words, they should be able to sell and guarantee not only the product but also the whole supply chain the product has passed through.

2.2 Parallel imports/grey markets

Although parallel imports and the grey markets are legal, the main studies in the field have been developed around the issues of unfair competition, conflicts with trademark

laws, free riding, price discrimination and market characteristics (Chen, 2007). We will mention here only a few papers that are relevant for our analysis in terms of the supply chain stage and luxury industry.

On the upstream-side of parallel imports several papers explain the reasons for the existence of parallel imports. Typically they need three conditions: a source of supply, easy access from one market to another, and price differentials. These are characteristics that are easy to find in HEF industries (Cespedes *et al.*, 1988; Weingand, 1991; Thomas and Okleshen, 2006).

Raff and Schmitt (2007) explain why manufacturers may be interested in allowing parallel trade for certain categories of products, including clothes, cosmetics and perfumes.

On the downstream-side, in their study about the "underground mall" – a specific grey market retail format which is emerging in the US – (Thomas and Okleshen, 2006) underline how consumers prefer this formula, not only for price reasons but also for socialisation benefits, and how they are not concerned about the lack of product warranty or the absence of a formal return policy. In our opinion this and the other forms of grey markets can create confusion in the distribution channel and the conditions that counterfeiters use to infiltrate their products.

On the demand-side, Ang (2000) investigates the customer perception of parallel imports and how beneficial and image properties for each product category can influence purchase intention and expected discount. The author underlines how, especially in the emerging markets, parallel imports can be confused with counterfeiting, and how the perceived legality of a parallel imported product is a critical decision factor in purchasing intention. Finally, (Chen, 2007) demonstrates that the source channel (grey goods vs authorized goods) has a significant impact on brand equity.

2.3 Supply chain infiltrations

Papers about supply chain infiltrations usually describe possible strategies to secure the end to end legitimate supply chain, in order to eliminate the possibility of counterfeiters infiltrating it from the design stage to the final sale when its bought by the customer (Cooper and Eckstein, 2008; CAPC – Accenture, 2006).

Green and Smith (2002) propose an interesting study where they introduce counterfeiting risk, present a case of "Supply Chain infiltrations," and underline how collusion between counterfeiters and channel members was the main cause of counterfeiting problems experienced by a major brand owner in Thailand. Smaller retailers and bars were especially lured by the higher profits that they could gain from selling counterfeits, which could be obtained for a mere fraction of the original price from local criminals.

Deceptive counterfeiting and the problem of supply chain infiltrations at retail level is studied by (Olsen and Granzin, 1992) who stress the importance of controlling and gaining the collaboration of the retailers. They propose a model that would help manufacturers to establish a relationship with their distributors and gain support in fighting counterfeiting.

While investigating the propensity of Chinese consumer to shop abroad, Wang *et al.* (2010) find that one of the main reasons why the Chinese prefer to shop in western countries is the potential risk of buying counterfeit products in Chinese marketplaces.

2.4 Retail service copycatting
Recently, counterfeit IKEA and Apple stores (Branigan, 2012; Flock, 2011) have been
detected in China. They are both examples of "retail services copycatting" a
phenomenon already discussed by Kaikati and LaGarce (1980) and Harvey and
Ronkainen (1985).

Considering the customers' side of things (Mavlanova and Benbunan-Fich, 2010),
explores the role that seller-level and product-level information has on online sales, in
order to find ways to prevent sellers from deceiving their buyers with counterfeited
products.

2.5 Factory overruns
Factory overruns are mentioned in a few papers (McDonald and Roberts, 1994; Hilton
et al., 2004) but only in a descriptive way. Simone *et al.* (2009) presents some
suggestions on how to deal with the suspicion of backdoor production in a
manufacturing factory and (Song *et al.*, 2007) include both counterfeiting and possible
factory overruns in the risks that should be considering while evaluating
counterfeiting.

3. Methodology
To serve the motivation and objectives that we stated in section 1, we started our
research effort using an exploratory methodology (Zikmund, 2012) with the aim to
unveil evidence that illegitimate trade can be viewed as a cohesive set of
interdisciplinary phenomena (Buckley *et al.*, 1976).

At this initial stage our participation to the MI-FIDO project was instrumental[6].

To achieve our goal, we searched for the following keywords and their variants:
"counterfeit", "counterfeiting", "grey market", "parallel market", "supply chain
infiltrations", "factory overruns", "fashion", "luxury" across the literature using a host
of on-line databases such Emerald and Science Direct. Once a preliminary list of works
had been identified, we sieved through references to find additional works that could
be added to our pool. In the process we observed that the great bulk of relevant
references came from the three major streams of literature: international trade,
counterfeiting, and supply chain management.

Using a coding process (Karlsson, 2009) we identified the LISC model and its path
categorisation, that we will describe below. We then discussed our model with the
participants of the "MI-FIDO" project and with three industry experts, including, a
veteran executive working on intellectual property rights (IPR) and counterfeiting on
behalf of the Italian government in China, two managers of legal firms working on IPR
protection in China.

Finally, we talked with executives of six Italian companies operating in the luxury
industry that were selected as representative examples of the "Made in Italy" label and
with turnover ranging from 100€ to more than 1€ billion and employing extensive
supply chains[7].

We recorded all such phenomena using an end-to-end supply chain perspective and
detected common patterns and opportunities for simplification and further
generalisation. At the end we arrived at a dual 5-stage supply chain design
descriptive model founded on graph theory. We validated this design with our

interviewees and identified 7 groups of illegitimate trade paths out of the initial 32 paths presented during the interviews.

4. The legitimate-illegitimate supply chain model (LISC)

We now introduce the "legitimate-illegitimate supply chain" model (LISC) that tracks activities along an extended supply chain that consists of design, factory, warehousing (distribution), retail, and customer stages.

LISC accounts for two types of actors at each stage of the supply chain. These are:

(1) "Legitimate actors" that act in response to a direct or indirect relationship with the brand. A product designed by the in-house design studio of the brand, a supplier factory fulfilling a brand order to specification, a third party logistics provider contracted by the brand to distribute its goods, a brand-authorized dealer, and a customer willing to buy an original good are all examples of the functions that can be performed by legitimate actors.

(2) "Illegitimate actors" that shadow the activities of the legitimate actors without permission or knowledge from the brand and almost invariably harming its interests. A grey import, a shoplifted item, and a knocked-off design are all cases of illegitimate actors in play.

The five-level supply chain is a simplified model meant to capture a great variety of situations on each stage without resorting to unnecessary complexity. Some clarifications follow.

As we have already mentioned, we started off our supply chain model with a "design" stage for two reasons. Firstly, because it is very relevant in fashion and luxury industries; secondly, one just cannot meaningfully talk about counterfeiting (which is a violation of intellectual property rights) without it.

The second stage, which we call "factory", includes both sourcing and manufacturing activities. We decided to collapse the two because while our model accounts for the flow of the "product concept" between the design and factory stage, as well as the flow of the "finished product" after the factory stage, it does not account for the flow of its components and raw materials. We are aware that illegitimate trade events can also occur during sourcing and manufacturing. For the sake of model simplicity, we assume that a "legitimate factory" carries out both sourcing and manufacturing in a legitimate fashion, while an "illegitimate factory" is carrying out at least one of the two in an illegitimate manner.

The third stage, which we call "warehouse and distribution", includes the whole distribution process occurring between the production phase and the delivering of the goods in the final point of sale. It includes warehousing, quality check, packing, transportation, wholesale, and final delivery to the shops.

The main goals of LISC are to:

· Capture exhaustively all the phenomena that we refer to as "illegitimate trade" (as defined in section 1).

· Highlight all possible interactions between the legitimate and illegitimate actors.

· Provide a systematic way in which illegitimate trade phenomena can be grouped.

· Deliver a tool for companies to better assess their illegitimate trade risk.

As previously mentioned, there are two models in literature that attempt to describe licit and illicit supply chains and their relationships. The first one is the model proposed by Bamossy and Scammon (1985) and the other is the licit-illicit framework proposed by Staake *et al.* (2009). We have presented an early version of this model during the 17th Working Seminar on Production Economics (D'Amato *et al.*, 2012). Since then our model has evolved considerably expanding from three to five stages and, as a result, it now captures a lot more illegitimate trade phenomena.

4.1 Definition and properties

The LISC model consists of ten vertices connected by 16 feasible arcs, representing the interactions between the stages of the legitimate and illegitimate supply chains, as depicted in Figure 1.

We make the following working hypothesis:

- A product must follow top-down from all the five stages of at least one of the supply chains. It should be designed, manufactured, managed in a warehouse, delivered to a retailer, and finally bought by a customer. It is not possible to circumvent a stage (even if that stage is degenerate).
- At each stage a product can be handed by only one of the actors (i.e. manufacturing activities can be performed by the legitimate factory or by the illegitimate one, but not by both).

Supply stages are sets of actors, i.e. when we say that an actor x participates in a stage X, this implies that $x \in X$.

We can now formally define LISC as an acyclic digraph $S = (V, A)$[8], where the set of vertices V represents the stages of the legitimate and illegitimate supply chains:

$$V = \{LD, ID, LF, IF, LW, IW, LR, IR, LC, IC\} \tag{1}$$

and the set of arcs A represents all the possible direct transitions between the stages of the legitimate and illegitimate supply chains:
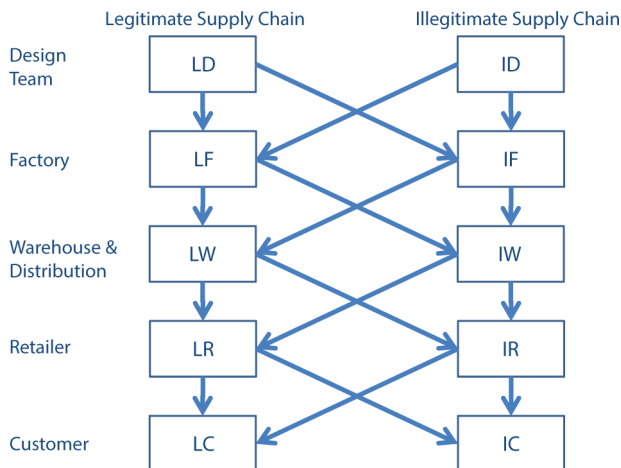
Figure 1.
The LISC model

$$A = \{(LD, LF), (ID, IF), (LD, IF), (ID, LF), (LF, IW), (LF, LW),$$
$$(IF, IW), (IF, LW), (LW, LR), (LW, IR), (IW, IR), (IW, LR), \quad (2)$$
$$(LR, LC), (IR, IC), (IR, LC), (LR, IC)\}$$

$L = \{LD, LF, LW, LR, LC\}$ is the set of legitimate chain stages, whereas $I = \{ID, IF, IW, IR, IC\}$ is the set of the illegitimate ones.

We use the * symbol as a vertex wildcard for the purpose of capturing flow families. For example, $(LD, ^*, LW) = \{(LD, LF, LW), (LD, IF, LW)\}$. We can also use the wildcard to indicate any stage of the illegitimate chain (I^*), or the legitimate one (L^*). Finally, we can use it to signify either chain stage, for example, $(^*W)$ for the warehouse stage.

Considering these constraints, we can categorise the 16 possible arcs into three main categories, as described below and summarised in Table II:

(1) Standard interactions: all the interactions that occur between actors of the same supply chain represent respectively the "legitimate supply chain" and the "illegitimate supply chain".

(2) Diversion from legitimate supply chain: all the interactions that begin from an actor of the legitimate supply chain and end in an actor of the illegitimate one. They can represent the diversion of an ideas, components, final products, parallel and grey markets as well as factory overruns.

(3) Infiltrations into the legitimate supply chain: all interactions that begin from an actor of the illegitimate supply chain and end in an actor of the legitimate supply chain.

After the interactions analysis and definition, we continued analysing the possible paths a product can pass through considering the different possibilities for moving from the initial "design" stage to the "customer" stage.

As we have seen above, there are 32 complete (end-to-end) flows. In Figure 2 we defined seven families of trade, according to their main characteristics, the selection rules and the results of the discussions with the executives we interviewed.

Our model is different from the models proposed by Bamossy and Scammon (1985) and Staake (2008) in the following ways:

· It is a formal model grounded in graph theory that focuses on overlapping but not identical types of harmful activities (as explained in the definition of illegitimate trade).

· Includes a design stage which in the fashion and luxury industries is very critical, and, some would argue, is the business itself. A design can be carried in-house or be outsourced and – of course – can be copied.

· Our model excludes three stages included in the "Licit-Illicit" framework such as "part suppliers", "component suppliers", and the activities related to waste management and refurbishing, since it specifically focuses on the supply chain activities via which legitimate and illegitimate actors bring products to the market.

Category	LISC edge	Description
Standard	(LD, LF)	Base flow of legitimate supply chain from design to production
Standard	(LF, LW)	Base flow of legitimate supply chain from production to warehouse/distribution
Standard	(LF, LR)	Base flow of legitimate supply chain from warehouse/distribution to the final retailer
Standard	(LR, CR)	Base flow of legitimate supply chain from the retailer to the final customer
Standard	(ID, IF)	Standard flow of illegitimate supply chain from design to production
Standard	(IF, IW)	Standard flow of illegitimate supply chain from production to warehouse/distribution
Standard	(IW, IR)	Standard flow of illegitimate supply chain from warehouse/distribution to the final retailer
Standard	(IR, IC)	Standard flow of illegitimate supply chain from the retailer to the final customer
Diversion	(LD, IF)	Copy of models, design, formulas protected by intellectual property laws or theft of prototypes
Diversion	(LF, IW)	Unauthorized factory overruns, defective products that did not pass quality control but were not mangled, or stolen products diverted to the illegitimate distribution process
Diversion	(LW, IR)	Finished product theft and diversion to illegitimate retailers
Diversion	(LR, IC)	Shop-lifting. A customer enters in a legitimate retailer shop and successfully steal goods without paying for them
Infiltrations	(ID, LF)	No examples have been documented thus far, but there are some cases in literature that don't exclude the legitimate company copying idea from the "counterfeiters" and including it in their products
Infiltrations	(IF, LW)	Infiltrations into the legitimate supply chain at the warehouse/distribution level
Infiltrations	(IW, LR)	Infiltrations into the legitimate supply chain at the retailer level
Infiltrations	(IR, LC)	Infiltrations into the legitimate supply chain at the moment of purchase: the customer thinks that he's dealing with a legitimate retailer but actually he's dealing with an illegitimate one

Table II.
LISC Interactions

- In addition to this, the originality of our model lies in the possibility of classifying the different illegitimate trade arcs, families, and super-families, analysing the interrelations between the legitimate and illegitimate actors.

In particular, while the model proposed by Staake introduced the idea of presenting two parallel supply chains (licit and illicit), its author does not consider possible connections and paths between them, suggesting this analysis as a future research topic. Also, while Bamossy and Scammon consider the phenomena of counterfeiting

Family code	Family Title	Family Description	# of Flows	Flow Families Selection criteria	Picture
1	Legitimate Trade	Demand for original goods fulfilled with original goods by a legitimate retailer	1	(LD, LF, LW, LR, LC)	
2	Pure counterfeiting	Demand for counterfeited goods fulfilled with counterfeited product by a illegitimate retailer	1	(ID, IF, IW, IR, IC)	
3	Supply Chain Infiltrations	Demand for original good fulfilled with counterfeited goods by a legitimate retailer (SC infiltrations)	4	$(*, IF, *, LR, LC)$	
4	Product diversion	Demand for counterfeiting fulfilled with legitimate goods by a illegitimate retailer (legitimate product diverted)	2	$(*, LF, LW, IR, IC)$	
5	Factory overruns	Demand for counterfeiting goods fulfilled with factory overruns by an illegitimate or a legitimate retailer	4	$(*, LF, IW, IR, IC)$ (illegitimate retailer) $(*, LF, IW, LR, LC)$ (legitimate retailer)	
6	Retail service copycatting	Demand for original goods fulfilled by illegitimate retailer with goods that can be original, counterfeited or factory overruns	8	$(*, LF, LW, IR, LC)$ (original goods) $(*, LF, IW, IR, LC)$ (factory overruns) $(*, IF, *, IR, LC)$ (counterfeited goods)	
7	Shop-lifting	Demand for original goods fulfilled through shop-lifting at a legitimate retailer, stealing goods that can be original, counterfeited or factory overruns	8	$(*, LF, LW, LR, IC)$ (original goods) $(*, LF, IW, LR, IC)$ (factory overruns) $(*, IF, *, LR, IC)$ (counterfeited goods)	

Figure 2.
LISC paths families

and grey markets, they do not include in their analysis the remaining of the illegitimate trade phenomena.

5. Using LISC to assess illegitimate trade in the luxury industry

As mentioned earlier, we had the opportunity to discuss our model with the members of the MI-FIDO (Made in Italy Fashion Identity and Originality), a project financed by the Italian government in which we have been involved and we were also able to identify and interview in-depth nine industry experts.

Overall, these interviews helped us verify the existence and relevance of the super-families we propose and also brought to our attention some additional cases to consider, such as, for example, the "Da Vinci" case (later discussed).

Table III presents the main examples and cases that we were able to find for each of the illegitimate trade super-families. We found in total 12 examples, it is important to note that we derived these using secondary sources, the only exception being the "Italian Shoe company" case that was recounted by a primary source.

5.1 Super-family 1 – legitimate trade

Super-family 1 represents the "legitimate supply chain"; it means that the original product has passed through the defined supply chain without any interference from the "illegitimate actors". There are several ways in which companies can protect their supply chains at each stage. At the design stage they can record their trademarks and new models in order to acquire the legal rights to fight eventual counterfeiters. The can also add particular elements to the product in order to make it more difficult to be copied. Upstream and downstream they can implement controls and adopt contracts in order to ensure the legitimacy of their suppliers, distributors, and final retailers. Several companies, including Louis Vuitton, are now publishing the list of "authorized retailers" on their internet site in order to communicate to their customers the places where they can be sure to buy original goods. Other companies, including Moncler, provide a product serial number that the customer can check on an Internet site to ensure authenticity.

5.2 Super-family 2 – pure counterfeiting

In a 2002 police raid in Italy named "Veronica", approximately 2,000 high-visibility brand bags were seized. In 2010, in one of the largest counterfeit goods prosecutions in US history, two importers were convicted for importing more than 300,000 counterfeit handbags falsely carrying the brand names of Burberry, Louis Vuitton, Gucci, Coach, Fendi, and Chanel, and unveiled in the process a sophisticated supply chain composed of 13 companies and eight factories (Boyd, 2010).

5.3 Super-family 3 – supply chain infiltrations

In 2011 a mall shop owner in California was indicted for selling counterfeiting Chanel and Louis Vuitton products (US Immigrations & Customs Enforcement, 2011).

Fendi won some litigations against US legitimate retailers accusing them of selling counterfeited Fendi handbags. The accused retailers were Burlington Coat Factory, Retail Ventures Inc, Big M Inc., and Sam's Club, a division of WalMart stores (Socha, 2010).

Super-family code	Super-family Description	Examples
1	Demand for original goods fulfilled with original goods by a legitimate retailer	Normal situation without illegitimate trade events
2	Demand for counterfeited goods fulfilled with counterfeited product by a illegitimate retailer	"Pure counterfeiting", widely documented in the press. Street markets, etc. Police raid "Veronica", 2000 high-brands bags of high-quality, probably going to be sold through legitimate shops (XIV Legislature - Camera dei deputati n.4001, 2003) 300,000 counterfeit handbags falsely carrying the brand names of Burberry, Louis Vuitton, Gucci, Coach, Fendi, and Chanel (Boyd, 2010)
3	Demand for original good fulfilled with counterfeited goods by a legitimate retailer (SC infiltrations)	Chanel and LVMH against a mall shop owner in California, 2011 (US Immigrations & Customs Enforcement, 2011) Fendi vs Burlington Coat Factory Warehouse Corp, Retail Ventures Inc, Big M Inc., Sam's Club (WalMart) US, (Socha, 2010) Da Vinci Case in China (Sisci, 2011)
4	Demand for counterfeiting fulfilled with legitimate goods by a illegitimate retailer (legitimate product diverted)	Sale of stolen and smuggled goods, widely documented in the press Parallel/Gray markets, widely documented in the press Versace six theft in 1996 (Pollo, 1996)
5	Factory overruns sold by legitimate or illegitimate retailer	Ferragamo in 2003 (Hopkins, 2003) Ralph Lauren vs TC Fashion (Tucker, 2006)
6	Demand for original goods fulfilled by illegitimate retailer, unbeknown to the legitimate customer, with different type of products (original, factory overruns, counterfeited)	LVMH and Burberry against Singga Enterprises Inc., and Carnation Fashion Company, Canada, (Elliott, 2011) Richemont vs Concept Designs Unlimited Inc (Steigrad, 2011) Versace case in South Italy (D'Amato, 2012) Versace against Tres Hermanos Inc., US 2010 (Sacchi, 2012) Fake boutique Cartier in Mexico (Harvey and Ronkainen, 1985) Italian shoe company in China (primary source – interview with F. De Sanctis)
7	Demand for original goods fulfilled through shop-lifting at a legitimate retailer with different type of products (original, factory overruns, counterfeited	Shop-lifting, widely documented in the press

Table III.
LISC families examples

In 2011, Da Vinci, a retailer of expensive imported furniture such as Armani Casa and Versace Home, was accused of deceiving the customers about the origin of its goods. The retailer was selling "imported" goods that were manufactured in China (Sisci, 2011).

5.4 Super-family 4 – product diversion

This category includes both the sale of legitimate goods diverted through grey or parallel markets and the sale of stolen and smuggled goods if the diversion from the legitimate supply chain to the illegitimate one occurred through a theft. When an authorized retailer cannot sell all of its inventory to consumers, it may move the leftover items to an unauthorized dealer. On the Magnificent Mile in Chicago, buyers from a venerable department store saw the same high-end branded shirt carried by the store appear in the displays of a discount retailer directly across the street (Antia *et al.*, 2004).

5.5 Super-family 5 – factory overruns

In 2006 Polo Ralph Lauren discovered an illegitimate distributor (TC Fashion) that was sourcing overproductions from an actual Polo outsourcer manufacturer in the Philippines. The manufacturer was running unauthorized night shifts and sold them to legitimate US Polo Ralph Lauren retailers (Tucker, 2006). In this case the illegitimate traders succeeded in inserting again the factory overruns into the legitimate Polo Ralph Lauren supply chain.

5.6 Super-family 6 – retail service copycatting

In 1985, Fernando Pelletier, a Mexican entrepreneur, opened 14 Mexican retail copycat Cartier boutiques and he even attempted to sell his stores to the Paris firm (Harvey and Ronkainen, 1985) (alter parens).

LMVH and Burberry won a case in Canada against Singga Enterprises Inc. and Carnation Fashion Company. Both were accused of having orchestrated large-scale and sophisticated counterfeit manufacturing operations in China and to have imported vast amounts of counterfeit products into Canada with the intent of selling them nationwide in stores and online (Elliott, 2011). Richemont also won a similar case against Concept Designs Unlimited Inc. which was selling fake jewels for $30,000 (Steigrad, 2011).

Versace won a case against an established retailer in southern Italy that, even though it was not authorized to sell Versace goods, was nevertheless selling genuine and counterfeit Versace items to its unsuspecting customers, engaging in deceptive illegitimate trade (D'Amato *et al.*, 2012). Versace won another case against Los Angeles-based manufacturer Tres Hermanos Inc., accused of selling fake Versace t-shirts and other items like jeans and sweatshirts to at least 72 stores in the Los Angeles area, involving almost 110 people in the trafficking operation (Sacchi, 2010).

Italian shoe company "X" outsourced its production to China and created, along with a Chinese partner, a network of 100 mono-brand stores to distribute its shoes. The Italian company eventually realized that its number of stores had increased to 114, with the 14 "new" ones being entirely out of its control (De Sanctis, 2012).

5.7 Super-family 7 – shop-lifting

This category includes the crime of shoplifting. Although this is usually considered an act conducted by an individual, in the US investigations have also revealed the existence of illegal organisations that organised thefts in luxury department stores with the goal of selling them to illegitimate and legitimate retailers (Prabhakar, 2012).

6. Conclusions

We have introduced and defined the composite phenomenon of illegitimate trade that is growing both in terms of size and complexity. Illegitimate trade is particularly important in the fashion and luxury industries that rely on long and complex supply chains where a number of actors are involved and control is limited.

6.1 Contributions

The LISC model and the illegitimate trade classifications paths are the main original contributions of our paper to a topic that is usually approached in an isolated case manner and without taking into account a holistic supply chain perspective. It is due to this supply chain perspective that we were able to clearly capture all the phenomena included in the illegitimate trade definition and their interconnections, drawing examples from primary and secondary sources.

The LISC model not only fills a literature gap regarding counterfeiting and illegitimate trade in general but, compared to previous attempts, offers some marked advantages. In particular, LISC is grounded in graph theory, includes a design stage (that is central in the fashion and luxury industries). It is also semantically rich providing classification and definitions for illegitimate trade arcs, families, super-families, and, finally, explicitly captures the interactions between the legitimate and illegitimate actors.

LISC provides a foundation to capture illegitimate trade-related supply chain risks from activities such as production outsourcing: a company that intensively outsources production without implementing effective control procedures will likely experience a highest volume of factory overruns than a company producing internally.

The analysis of the occurrence and the value of each illegitimate trade super-families can help companies in identifying the most vulnerable areas of their supply chain and where they should dedicate their energies to address the problem. In addition to this, the model can be used to investigate the correlations between the defined illegitimate trade super-families and help understand to what extent, for example, grey market activities can create the conditions that will cause counterfeiting to flourish.

6.2 Impact

During the course of the MI-FIDO project the model and the selection rules identified for illegitimate trade family classification were used as a basis for defining the rules for anomaly detection to be included in a "track and trace" system developed by the project team with a major Italian fashion brand.

6.3 Future work

We believe that LISC can provide the foundation for any future effort that wishes to deal with illegitimate trade. Additionally, there are opportunities for future researchers to improve on the model itself. For example, a natural extension could be transforming

the LISC graph into a network where arc values would represent illegitimate trade-related metrics such as likelihood to occur, difficulty to combat, and cost.

However, we believe that the most important next step for LISC is to take it to the field and verify its applicability and potential, not only as a descriptive model but also as a prescriptive one that can be used to formulate anti-illegitimate trade strategies. Towards this end we are currently conducting interviews with managers from the luxury and high-end fashion sectors.

6.4 Limitations
Our work suffers from three main limitations due to the origin of our data and the scope of the analysis. The first limitation is that the illegitimate trade categories we have defined mainly rely on data and phenomena collected from secondary sources that have not yet been directly observed by the authors. The second limitation is that a specific focus on the high-end fashion industry was employed throughout this work; further analysis for evaluating the applicability and the significance of the illegitimate trade families and super-families in other industries is still pending. The final limitation stems from the fact that it will be necessary to investigate the implications and the applicability of the model to the illegitimate online trade that, for the moment, has been excluded from our analysis.

Notes
1. A formal definition of the illegitimate trade will follow.

2. The term "fashion industry" encompasses the sourcing, production, distribution, and marketing activities of apparel, leather goods, accessories, and jewelry (Brun and Castelli, 2008) and, typically, describe those industries characterized by short-life cycles, high volatility, low predictability and high impulse purchasing (Martin *et al.*, 2004). The term "luxury industry" refers to the high-end segment of the industrial sector (Caniato *et al.*, 2011). HEF is the luxury segment of the fashion industry.

3. The turnover of HEF can be calculated in a straightforward fashion as 74 per cent (apparel, accessories and jewelry segments) of 192€ billion which is the "personal luxury goods" according to Bain & Company.

4. Our estimate using available data on counterfeiting (OECD, 2008) and HEF segment (Bain & Company, 2012).

5. Given the scope of our work, hereafter we use HEF and "fashion" interchangeably.

6. "MI-FIDO" was financed by the Italian government as one of a group of research and proof-of-concept projects aiming to investigate, develop, test, and implement innovative solutions to track product legitimacy, thwart counterfeiting, and to protect the integrity of the "Made in Italy" label (an initiative that has been deemed as a national priority). The basic idea behind MI-FIDO, whose acronym in Italian means "I trust", is to protect the authenticity of "Made in Italy" products by tracking and certifying their flow stage-by-stage through the supply chain using encrypted RFID technology, effectively handling a "Fashion passport" for each such product.

7. A precondition set forth to us to conduct these interviews was anonymity.

8. In graph theory (Brandstädt *et al.*, 1999), a digraph is defined as an ordered pair of sets $G = (V,A)$ where V is a set of vertices and A is a set of ordered pairs (called arcs) of vertices of V. A directed walk $w = (v_1, v_2...,v_k)$ of G is a sequence of nodes in V such that $(v_j, v_{j+1}) \in A$ for $j = 1,...,k\text{-}1$.

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MEASURING AND RESPONDING TO COUNTERFEITING IN THE FASHION AND LUXURY BUSINESS: EVIDENCE FROM A SURVEY

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Abstract

Counterfeiting is affecting most industries around the world no more so than in Fashion and Luxury industries and it's estimated to be valued at about 5-7% of the world trade.

From a supply chain perspective, counterfeiting is only part of a wider phenomenon that we have defined as "illegitimate trade" that includes supply chain infiltrations, factory overruns, grey and parallel market, retail service counterfeiting, and shop-lifting.

Companies often address these issues by means of isolated legal actions without taking into consideration that a cross-divisional approach that would involve supply chain, technology and marketing actions could be in fact far more effective.

The aim of this paper is to understand which of the illegitimate trade phenomena are i) the most common and ii) the most damaging to the fashion and luxury companies, and which strategies can be the most effective in countering them.

We present the preliminary results of a survey conducted on a sample of 106 managers working in Italian fashion and luxury firms. This empirical evidence shows that the most frequent events are of the pure counterfeiting and parallel and grey market types. Furthermore, the survey results demonstrate that various forms of illegitimate trade can co-exist, but each of them calls for a targeted strategy. This evidence leads to important managerial implications concerning the quantification of the economic impact of counterfeiting and the necessity for companies to be prepared with an inter-functional group devoted to counterfeiting.

Keywords: Counterfeiting, Gray Market, Luxury, Supply chain, Counterfeiting, Grey markets, Illegitimate trade, Parallel trade, Factory Overruns

1.   Introduction

Founded in 1951, the Museum of Counterfeiting in Paris displays counterfeit products side-by-side with originals for visitors to first-hand assess the difference between "reals" and "fakes" and to create awareness on counterfeiting (i.e., the fraudulent imitation of a good).

Yet, , at least in the conventional sense, counterfeiting is becoming less meaningful to brands and consumers alike that are increasingly confronted with implausible phenomena such as the case of unauthorized Apple and IKEA stores operating in China unbeknown of the brand owners (Branigan, 2012) (Flock, 2011) or a factory overrun produced by the very same contract manufacturer authorized to produce the original good (Tucker, 2006) or a stolen good sold that was re-inserted in the market. In this

brave new world of long supply chains and extensive outsourcing, one may find a bag sold at a high-street store that was made without the permission or knowledge of its brand owner by one its established suppliers.

The aforementioned bag (in technical terms a factory overrun that infiltrated the legitimate supply chain (D'Amato & Papadimitriou, 2013)), even if it were subjected to the most stringent examination, would not be classified as a "fake" and, as such, would not be eligible

as an exhibit in the Museum of Counterfeiting. In other words, counterfeiting is only one of the many types of illegitimate trade.

1.1 Illegitimate Trade and the High-end Fashion Industry

Illegitimate trade issue is particularly important in the high-end fashion industry (HEF), a 142€ billion business worldwide in 2011 (Bain & Company, 2012). In fact, of the top-10 luxury brands in the world (KPMG International, 2011), seven of them are the most counterfeited brands in the UK (Davenport Lyons, 2007).

The ultimate causes of this problem are various and their interplay complex but one that stands out is the prevalance of long supply chains and outsourcing as the de facto mode of HEF manufacturing.

Indeed, until recently, the main preoccupation of many fashion firms was to gain efficiency in production-related activities via delocalization and outsourcing, eventually retaining direct control only of design and brand-related activities. The side-effect of this strategy has been the global proliferation of unwarranted manufacturing and distribution activities that have seriously eroded legitimate supply chains and their brands (Bruce, Daly, & Towers, 2004). Loosely speaking, these activities constitute "counterfeiting", but, actually, they have outgrown this term.

We have recently defined "illegitimate trade" (and its counterpart, "legitimate" trade) (D'Amato & Papadimitriou, 2013) as a phenomenon that collectively describes deceptive and non-deceptive counterfeiting (OECD, 1998), (Grossman & Shapiro, 1988), grey market trade (OECD, 1998), unauthorized or overrun production, theft, supply chain infiltrations, retail service counterfeiting and other types of activities that bring to the market goods in violation of intellectual property or commercial laws and agreements (Phau & Teah, 2009), (Grossman & Shapiro, 1988), (Staake, Thiesse, & Fleisch, 2009), (Hilton, Choi, & Chen, 2004), "illegitimate actor" as the actor that performs one or more illegitimate trade activities. , The model makes headway towards a more comprehensive view of what constitutes an undesirable (illegitimate) activity since once a good has been handled by an illegitimate actor, it becomes and remains illegitimate, even if it successfully (re)enters the legitimate supply chain. For example, the bag described in the opening paragraph of this article will be detected as being 'illegitimate' even if it's not acounterfeit per se. This is an important distinction that will hopefully assist us to clarify the confusion resulting from trying to describe good as "fake" or "real".

Through the formal "Legitimate Illegitimate Supply Chain" (LISC) model, we have identified seven possible "illegitimate trade families", which represent the paths that a product may pass through before its final sale to end an customer, assuming the existence of two parallel supply chains, one legitimate and one illegitimate.

1.2 Motivations and Objectives

The aim of this paper is to understand which of the illegitimate trade phenomena are the most common and the most damaging to the fashion and luxury companies, if these phenomena are correlated between themselves, and which strategies can be the most effective in countering them. We present the preliminary results of a survey conducted on a sample of 106 managers working in Italian fashion and luxury firms.

Given this context, we are particularly interested in underustading which illegitimate trade phenomenacause the most harm to brands and to identify which supply chain strategies and technology-driven methods could be more effective in response.

The rest of this paper is structured as follows: In section 2, we present a brief literature review of recent research the fields of illegitimate trade. In section 3 we formally present the methodology and in section 4 the preliminary results of the survey. Finally, in section 5 we present the conclusions and the managerial implications.

2.   Literature Review

2.1   Illegitimate Trade

The increase in international trade, advances in technology, and the growing importance of the emerging markets are some the main factors behind the rapid increase of illegitimate trade as experienced during the last years (Nunes, 2010).

As mentioned before, illegitimate trade includes a series of different phenomena that can be described through the LISC Model (Legitimate – Illegitimate Supply Chain) that we introduced in a previous work (D'Amato & Papadimitriou, 2013).
We provide below the list of the possible "illegitimate trade" families previously identified and that we will compare in terms of frequency, economic impacts and countering strategies through the survey results.

Illegitimate trade includes the following phenomena:
- **Pure counterfeiting**: "counterfeiting" that is defined by OECD as "any manufacturing of a product which so closely imitates the appearance of the product of another to mislead a consumer that it is the product of another" (OECD, 1998). This includes copying of packaging, labeling and trademarks done with the explicit purpose of intentionally make a counterfeited product be considered as the original one. In the case of "non-deceptive counterfeiting", or "piracy", no effort is taken to deceive the consumer, but on the contrary the consumer is aware that the product he is buying is pirated (Grossman & Shapiro, 1988).
- **Supply Chain infiltrations** is when an unauthorized actor succeeds in inserting stolen or counterfeit products into a legitimate supply chain (D'Amato & Papadimitriou, 2013).
- **Product diversion** occur when there are practices of "Parallel trading" or "grey-market trade", which refer to situations where products are legitimately bought in one territory and diverted for sale to another territory without the consent of the legitimate stakeholder in the receiving territory.
- **Factory overruns** refer to the unauthorized production and exploitation of goods by otherwise legitimate suppliers (OECD, 1998).
- **Retail service copycatting** describes the case where the retail experience of a genuine brand store is being imitated unbeknownst to customers (Harvey & Ronkainen, 1985).
- **Shop-lifting** is the act when an individual steals from a retailer.

Due to its clandestine nature, estimating the precise magnitude of illegitimate trade is difficult: most of it probably goes undetected. However, the evidence from what we know is impressive on its own right.

In 2009, in the US alone, there have been 14.841 intellectual property rights (IPR) seizures with a domestic value of 260 million USD, and seizure of products related to fashion industry

such as footwear, handbags, wallets and wearing apparels representing the 54% of the total value (U.S. Customs & Border Protection, 2009). Across the pond, the total value of the seizures made by European customs during 2010 is about 1 billion euro, 35,62% of which was footwear, clothing, bags, and wallets (European Commission - Taxation and customs union, 2010). During the same year, in Italy alone, 200 million worth of fashion goods were intercepted and seized (Ministero dello Sviluppo Economico - Ufficio Italiano Brevetti e Marchi, 2012).

The illegitimate trade problem in the fashion and luxury industry is particularly important for one of the most important suppliers of HEF and personal luxury goods in general: Italy. Several sectors of the Italian economy depend on the protection of the "Made in Italy" label and on the difficult task of preventing, intercepting, and identifying illegitimate trade goods – in that order.

This problem is further accentuated by the fact that Italian fashion firms are often quite different from each other, ranging from entirely integrated vertical firms to complete outsourcing of manufacturing processes. In addition, while some firms copiously collect and maintain supply chain data, others appear to be still entirely agnostic in this respect. (Brun & Castelli, 2008). Complex situations are often also interesting and, as a result, fashion and luxury firms have been increasingly receiving attention from the research community. A number of recent studies underline the importance and the relevance of supply chain management in the luxury industry and investigate the role of operation and supply chain management choices in the success of luxury companies.

Caniato, et. Al (2011) discuss how manufacturing outsourcing is a common practice across the clusters related to fashionable products, with some cases of off-shoring at least for the entry-level products and some accessories. In particular, they point out the need for the focal company of coordinating and controlling its partners to guarantee the firm's performance and preventing counterfeiting risks as well as the importance of building trust-based relationships. Product, brand and retail channels are mentioned as the main drivers affecting supply chain management choices in the fashion industry (Brun & Castelli, 2008) and supply chain strategies must be selected in order to be consistent with luxury critical success factors (Caniato, Caridi, Castelli, & Golini, 2011).

Finally, although counterfeiting is mentioned as one the possible risk factors in the supply chain management risk literature, it has not been studied in great detail (Christopher & Peck, 2004).

2.2   Countering strategies

Several authors have tried to classify the main actions that a company can do to counter counterfeiting, focusing especially on supply chain management. In table 1 we summarize the existent literature, classifying and comparing the different aspects that each author underlined as main actions to contrast and reduce counterfeiting events.

A report published by the U.S. Chamber of Commerce Coalition Against Counterfeiting and Piracy and Accenture proposes the following best practices to minimize the risks of counterfeiting (CACP & Accenture, 2006) adopting an end to end supply chain approach: Secure Legitimate Inputs, Verify Legitimacy of Customers and Distributors, Manage Production Waste and Damaged or Unusable Inventory, Ensure Legitimacy of Purchased

Products at Retail Level, Monitor Brand Integrity, Outreach to Law Enforcement and Regulatory Officials.

Lybecker (2008) underlined the importance of the cooperation along the supply chain and with the external stakeholders, the author classifies the anti-counterfeiting strategies into the following three categories: technological changes to product and packaging, principally made to make replication more difficult and costly; cooperation across the supply chain, in order to raise the costs of distributing counterfeit drugs and inserting them into the supply chain and, finally, cooperation in enforcement, in order to increase the likelihood of detection and the probability of prosecution.

D. Nunes (2010) suggests an approach that targets both sellers and buyers of counterfeit goods with a strategy that mixes offensive and defensive measures and previews the following steps: "Defend" with the goal of fortifying the supply chain; "Detect" in order to help victims spot fakes; "Doubt" in order to make customers think twice, "Discourage" with the goal of increasing the business and legal risks for counterfeiters and reduce their profits.

According to the literature review analyzed, the practices mentioned by the different authors can be classified in the following four functional areas:

- **Marketing and communication strategies** are used to reduce the demand for counterfeited or illegitimate goods through awareness campaigns with the aim to inform and educate consumers and other involved actors (among which the same producers) on potential risks these products represent for the society. There are also included practices of monitoring the use of brand name and sales on the Internet.
- **Innovation, Technologies and end-to-end traceability** refer to the use of "track and trace" mechanisms along the entire supply chain with the purpose to verify goods authenticity at each stage and detect their path, thus blocking any possibility of counterfeits intrusions and technological improvements developed directly on the product and packaging to make them more difficult to replicate (rfid labels, etc) and activities in order to distinguish and secure product features, making it more and more difficult to be counterfeited
- **Supply chain integration and collaboration** include vertical integration strategies, collaboration with suppliers and distributors in order to have a greater control on end to end supply chain. They include security and certification practices of suppliers and retailers, verifying raw materials source and final products destination markets, as well as routine inspections of manufacturing plants and storage warehouses. It means tightening, monitoring and cooperation activities along the end to end supply chain in order to avoid that counterfeited products or counterfeiting companies enter in a sane supply chain.
- **Legal tools** finally aim at discouraging any counterfeiting initiatives through patents and trademarks registration and protection, and defending intellectual property rights. Collaborations with governments, local authorities, and Customs, law enforcement, activation of investigations over suspicious operations. All the activities needed to ensure complete and successful litigations procedures

Tablebelow contains the best practices listed by the different authors, classified according with the four functional areas defined.

Functional areas	Practices to fight counterfeiting
Marketing and communication	Utilize risk management procedures to verify legitimacy of

strategies	customers (track customer history, develop guidance for the sales force on how to assess the legitimacy of customers)
Marketing and communication strategies	Enhance market intelligence
Marketing and communication strategies	Monitor sales of brand name products on the Internet
Marketing and communication strategies	Develop informational materials that explain the harm that counterfeit products cause businesses, consumers, and governments
Innovation, technologies and traceability	Verify product authenticity
Innovation, technologies and traceability	Consider using technology to ensure product security
Innovation, technologies and traceability	Employ track and trace methodologies with bar codes or RFID
Supply chain integration	Ensure the authenticity of raw materials and component parts (authorized suppliers, qualify vendors, agreement on spot audit/ controls)
Supply chain integration	Employ the concept of "strict liability" for failure to deliver authentic components and parts in contracts with suppliers
Supply chain integration	Institute shipping policies to protect the integrity of raw materials and component parts
Supply chain integration	Ensure that subcontractors only produce authorized merchandise (spot audit, strict contracts, etc)
Supply chain integration	Institute policies to certify that production waste and damaged and unusable products are destroyed or appropriately disposed of
Supply chain integration	Authenticate distribution partners
Supply chain integration	Partner with retailers (Certified retailers programs)
Legal tools	Collaborate with local customs authorities
Legal tools	Vigorously pursue legal remedies to deter trademark infringements
Legal tools	Meet with key federal, state, and local officials and customs authorities to personally brief them and learn more about their priorities
Legal tools	Establish procedures for sharing information that can be used in law enforcement investigations and offer to provide legitimate products, under appropriate conditions, to assist in investigations

Table 1. Main anti-counterfeiting practices classified by functional area

3. The methodology

Building on the above literature review, we have carried out an empirical investigation aimed at identifying the most effective strategies for the various typologies of illegitimate trade phenomena.

Indeed, even though illegitimate trade is considered a critical issue for a number of industries by both academicians and practitioners, few studies have investigated about the actual magnitude and seriousness of the problem and, in particular, about the effectiveness of the countering strategies.

Furthermore, existing literature on illegitimate trade presents this phenomenon in a rather fragmented way, focusing just on single typologies, while it is apparent that companies have to cope jointly with all of them at the same time. To effectively address this issue it is necessary to understand which typology of illegitimate trade is the most critical for the company and what countering strategy is the most appropriate to contrast it.
Thus, in our empirical investigation we test the following research hypotheses:

Hypothesis 1: Different types of illegitimate trade phenomena are positively correlated with each other

Hypothesis 2: The effectiveness of each strategy varies depending on the illegitimate trade typology to be contrasted

To carry out our empirical investigation, we have conducted a survey (Forza, 2002), which involves the collection of a questionnaire from companies engaged in the fashion and design industries.

The questionnaire builds on the LISC model (D'Amato & Papadimitriou, 2013) and consists of 40 statements to be assessed on a 1 (very low) to 7 (very high) Likert scale, which aim at describing the following constructs:

- Frequency of the six illegitimate trade typologies, as described in the LISC model;
- Cost generated by the six illegitimate trade typologies;
- Investment of the company in each of the four countering strategies;
- Degree of effectiveness of each strategy for each illegitimate trade typology.

The questionnaire has been mailed to the companies of Altagamma (the association of the Italian high-end companies) that operate in the fashion industry or in the design one. Furthermore, we have contacted also other companies not enrolled in Altagamma, which however are consistent with the aim of our study.

After an initial call aimed at checking the interest of the firm in our survey, we sent the questionnaire targeting four professional roles, who are the most consistent with the strategies that can be undertaken: marketing manager, legal service manager, IT manager, supply chain manager. As a consequence, depending on the way in which the company is organized and on the actions already taken to address the problem of counterfeiting, up to four questionnaires per company have been received. Insofar, 106 questionnaires have been collected. In the following sections we outline the preliminary findings stemming out from this sample.

4.   Evidence from the survey
The first hypothesis of this study concerns the positive correlation between the different types of illegitimate trade.

In order to test this assumption, first we have computed the means concerning the relevance of each type, both in terms of frequency of occurrence and of economic impact for the company (see Table 2). Then, we have computed the correlations (see Tables 3 and 4).

As it can be observed from Table 2, the rankings of the various types of illegitimate trade stemming out from the means are the same. Furthermore, it is worthwhile noticing that the difference among means is highly significant for both variables. Looking at these results it can be claimed that the most harmful phenomenon for companies is pure counterfeiting, followed by grey trade, and shop-lifting, while the other three types show a lower degree of relevance.

	Pure	*Infiltrat.*	*Grey trade*	*Overruns*	*Retail*	*Shop-lift.*	*P-value*
Frequency	5,28	3,11	4,44	3,16	2,59	3,19	0,000***
Economic Impact	4,58	3,28	4,53	3,28	3,11	3,48	0,000***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

Table 2. Frequency and Economic Impact of Counterfeiting Phenomena: Means

However, looking at Tables 3 and 4, it can be seen that the various types of illegitimate trade are actually very correlated with each other, regardless of their frequency of occurrence and economic impact.

Concerning the first variable, Table 3 highlights positive significant correlations, all of them being significant but two, and their values seem to show the existence of at least one evident cluster of phenomena.

Indeed, correlations between infiltrations, factory overruns and retail problems are much higher than the correlations between these variables and the other three types of illegitimate trade typologies. Similar evidence stems out from the analysis of Table 4. Thus, on the basis of these outcomes, it can be claimed that the first research hypothesis is confirmed, in that all types of illegitimate trade have at least three significant positive correlations with the others.

		Pure	*Infiltrat.*	*Grey trade*	*Overruns*	*Retail*	*Shop-lift.*
Pure	*Pearson Correlation*	1	0,171°	0,245*	0,041	0,322***	-0,039
	Sig. (2-tailed)		0,080	0,011	0,677	0,001	0,689
Infiltrat.	*Pearson Correlation*		1	0,174°	0,454***	0,541***	0,181°
	Sig. (2-tailed)			0,075	0,000	0,000	0,063
Grey trade	*Pearson Correlation*			1	0,306***	0,256**	0,219*
	Sig. (2-tailed)				0,001	0,008	0,024
Overruns	*Pearson Correlation*				1	0,474***	0,184°
	Sig. (2-tailed)					0,000	0,059

		Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.
Retail	Pearson Correlation					1	0,282**
	Sig. (2-tailed)						0,003
Shop-lift.	Pearson Correlation						1
	Sig. (2-tailed)						

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

Table 3. Pearson Correlations between Counterfeiting Phenomena (frequency of occurrence)

		Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.
Pure	Pearson Correlation	1	0,308***	0,278**	-0,064	0,178°	-0,172°
	Sig. (2-tailed)		0,001	0,004	0,514	0,068	0,077
Infiltrat.	Pearson Correlation		1	0,416***	0,626***	0,697***	0,244*
	Sig. (2-tailed)			0,000	0,000	0,000	0,012
Grey trade	Pearson Correlation			1	0,482***	0,428***	0,259**
	Sig. (2-tailed)				0,000	0,000	0,007
Overruns	Pearson Correlation				1	0,683***	0,520***
	Sig. (2-tailed)					0,000	0,000
Retail	Pearson Correlation					1	0,551***
	Sig. (2-tailed)						0,000
Shop-lift.	Pearson Correlation						1
	Sig. (2-tailed)						

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

Table 4. Pearson Correlations between Counterfeiting Phenomena (economic impact)

To test the second hypothesis, which claims that the effectiveness of each strategy varies depending on the counterfeiting phenomenon to be contrasted, first of all we have measured the extent to which companies invest in the different countering strategies. Evidence is provided in Table 5.

	Marketing	Technology	SC integration	Legal	P-value
Mean	3,41	4,21	4,37	5,37	***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

Table 5. Investment in the countering strategies (mean)

As it can be seen, the major source of expenditure for companies that want to cope with counterfeiting is the legal activity, which is obviously necessary not only to prevent this problem, but especially to address it once it has occurred.

The second strategy in terms of investment is supply chain integration, followed by technology, while marketing seems to be rather overlooked.

Looking at Table 6, it can be claimed that the second hypothesis is fully supported. As a matter of facts, the degree of effectiveness of each strategy changes very much depending on the counterfeiting phenomenon.

Furthermore, it is rather apparent that some strategies report on average much higher values that the others in all cases. This evidence is highly significant from a statistical viewpoint, as it can be seen looking at the p-values obtained testing the difference among means both by type of strategy and by type of counterfeiting.

	Pure	Infiltrat.	Grey trade	Overruns	Retail	Shop-lift.	P-value
Marketing	3,83	2,69	3,68	2,84	4,46	2,86	0,000***
Technology	**4,93**	**5,15**	**5,43**	**5,42**	**5,09**	**4,82**	0,063°
SC integration	4,54	**4,87**	**4,99**	**5,50**	4,09	3,47	0,000***
Legal	**5,36**	4,42	4,63	4,74	**5,13**	**4,08**	0,000***
P-value	0,000***	0,000***	0,000***	0,000***	0,000***	0,000***	

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

Table 6. Effectiveness of the Countering strategies for each counterfeiting typology

The means reported in Table 6 show that Marketing is the least effective strategy but for Retail problems, where it is followed only by Supply Chain integration. On the opposite, Technology reaches values above 5 in four out of six types of illegitimate trade types, namely Infiltrations, Grey trade, Overruns and Shop-lifting, where it is considered on average the most effective strategy. Also Legal activities and SC integration seem to show a rather high degree of effectiveness in several cases. In particular, the Legal strategy is considered the most effective to address problems concerning Pure counterfeiting and Retail.

Finally, from Table 6 it can be seen that there seem to be two clusters of cases. The first concerns counterfeiting problems that can be effectively addressed through a bundle of two strategies, namely the Legal and the Technology ones and this cluster includes Pure counterfeiting, Retail and Shop-lifting. The second encompasses infiltrations, Grey Trade and Overruns, that seem to require a different bundle of strategies, in particular the Legal and SC integration ones. This evidence seems to be consistent with the most recurrent course of actions undertaken by companies to face these problems. Finally in order to further check this evidence, we have computed the correlations between these pairs of strategies. The outcomes of this analysis, reported in Table 7, witness the relevance of such correlations (all of them

being statistically significant), which reach high values especially when the bundle includes Technology and SC Integration strategies.

Counterfeiting Types	Bundle of strategies	Pearson Correlation	P-value
Pure	Technology & Legal	0,230	0,018*
Infiltrat.	Technology & SC Int.	0,689	0,000***
Grey trade	Technology & SC Int.	0,442	0,000***
Overruns	Technology & SC Int.	0,792	0,000***
Retail	Technology & Legal	0,356	0,000***
Shop-lift.	Technology & Legal	0,305	0,000***

°p-value<0,1; *p-value<0,05; **p-value<0,01; *** p-value<0,001

Table 7. Correlations between effectiveness of strategies

5. Conclusions and managerial implications

We discussed the composite phenomenon of illegitimate trade, that is growing both in terms of size and complexity, harming brands, retailers, governments, and consumers alike. Illegitimate trade is particularly important in the fashion and luxury industries that on one hand rely on long and complex supply chains, and on the other are only weakly protected by existing copyright and patents laws.

We presented the preliminary results aimed at assessing which illegitimate trade typologies are the most frequent and the most damaging to fashion companies, namely "pure counterfeiting" and "gray market" and we assessed the possible strategies against them.

The illegitimate trade phenomena is particularly complex because it includes very different events: some of them external to the firms, such as pure counterfeiting, which is, in some case, the result of brand awareness and, some of them very "internal" to the firm supply chain such as gray and parallel market, which strongly depend on the company marketing decision in terms of price discrimination or distribution strategy.

The complexity of the phenomena is enriched by the correlation existent between the different phenomena: the correlations analyzed between the defined illegitimate trade phenomena help us to understand to what extent, for example, gray market activities can create the conditions that will cause counterfeiting to flourish.

The evidence that all the phenomena are strongly correlated is very important for firms in order to define and implement the right countering strategies.
The co-existence of the different illegitimate trade phenomena make the traditional functional approach unable to counter efficiently the complex phenomena as a whole: it becomes crucial for companies to take into account a holistic supply chain perspective, addressing the problem with a cross-functional team which is able to approach the problem considering its legal, marketing, supply chain and technology implications.

In addition to this, each illegitimate trade phenomena requires a different bundle of countering strategies so it will be relevant for companies to assess their illegitimate trade weakness in order to implement the most suitable countering strategies.

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A systemic approach to counterfeiting, factory overruns, and other types of illegitimate trade in the fashion supply chain

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Abstract:

The aim of this paper is to provide a supply chain view of counterfeiting and illegitimate trade phenomena, such as factory overruns, gray market, supply chain infiltrations, product diversion, retail service counterfeiting and sale of stolen goods, to define and illuminate the interaction of the legitimate and the illegitimate supply chains in the fashion industry. We reviewed the literature on illegitimate trade and we used the LISC model to represent and include all the illegitimate trade phenomena under analysis, introducing the notion of perspective. We present preliminary findings from several companies that we have gathered data, using a case study research approach.

Keywords: counterfeit, fashion, supply chain

Introduction

Founded in 1951, the Museum of Counterfeiting in Paris displays counterfeit products side-by-side with originals for visitors to firsthand assess the difference between "reals" and "fakes" and to create awareness on counterfeiting (i.e., the fraudulent imitation of a good).

Yet, counterfeiting, at least conventional sense, is becoming less meaningful to brands and consumers alike that are increasingly confronted with implausible phenomena such as the case of unauthorized Apple and IKEA stores operating in China unbeknown of the brand owners (Branigan, 2012) (Flock, 2011) or a factory overrun produced by the very same contract manufacturer authorized to produce the original good (Tucker, 2006)

or a stolen good sold re-inserted in the market. In this new brave world, we can find a bag at sold at high-street store that was made without the permission or knowledge of its brand owner, yet, at the very same facility as an authorized one. This bag would not be classified as a "fake" even after the most stringent examination and as such, probably, it would not be eligible for the Museum of Counterfeiting. Let this be an alert that counterfeiting is only one of the many faces of "illegitimate trade" (more about this term shortly).

Illegitimate Trade and the High-End Fashion Industry

Illegitimate trade issue is particularly important in the high-end fashion industry (HEF)[1], a 142€[2] billion business worldwide in 2011 (Bain & Company, 2012). In fact, of the top-10 luxury brands in the world (KPMG International, 2011), seven of them are the most counterfeited brands in the UK (Davenport Lyons, 2007). The ultimate causes of this problem are various and their interplay complex but one that stands out is the emergence of long, complex, distributed supply chains.

Indeed, until recently, the main preoccupation of many fashion firms was to gain efficiency in production-related activities via delocalization and outsourcing, eventually retaining direct control only of design and brand-related activities (Hamel, 1990). The side-effect of this strategy has been the global proliferation of unwarranted manufacturing and distribution activities that have seriously eroded legitimate supply chains and their brands (Bruce, Daly, & Towers, 2004). Loosely speaking, these activities constitute "counterfeiting", but, actually, they have outgrown this term. That's why we defined respectively "illegitimate trade", "illegitimate actors" and "illegitimate goods" in a previous work (D'Amato, Papadimitriou, & Baglieri, 2012).

In particular, we defined "illegitimate trade" as a phenomena that collectively describes deceptive and non-deceptive counterfeiting (OECD, 1998) (Grossman & Shapiro, 1988), grey market trade (OECD, 1998), unauthorized or overrun production, smuggling, theft, supply chain infiltrations and other types of activities that bring to the market goods in violation of intellectual property or commercial laws and agreements (Phau & Teah, 2009) (Grossman & Shapiro, 1988) (Staake, Thiesse, & Fleisch, 2009) (Hilton, Choi, & Chen, 2004), "illegitimate actor" as the actor that performs one or more illegitimate trade activities.

Finally, once a good has been handled by an illegitimate actor, it becomes and remains illegitimate, even if it successfully (re)enters the legitimate supply chain. This is an important distinction that will assist the reader circumvent the confusion resulting from trying to differentiate the nature of "fake" vs. "real" goods.

Motivation and Objectives

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[1] The term "fashion industry" encompasses the sourcing, production, distribution, and marketing activities of apparel, leather goods, accessories, and jewelry (Brun & Castelli, 2008). The term "luxury industry" refers to the high-end segment of the industrial sector (Caniato, Caridi, Castelli, & Golini, 2011). HEF is the luxury segment of the fashion industry.

[2] The turnover of HEF can be calculated in a straightforward fashion as 74% (apparel, accessories and jewelry segments) of 192€billion which is the "personal luxury goods" according to Bain & Company.

The aim of this paper is twofold. First, we present an evolution of the LISC model, an earlier version of which was discussed in (D'Amato, Papadimitriou, & Baglieri, 2012) where we introduce and define mathematically the notion of "perspective".

Figuring out which are a) the possible illegitimate supply chain paths, b) which are their main characteristics, and then c) which of them cause the most harm to brands will help us to identify which supply chain strategies and technologies based methods could be more effective as a response.

We believe that this model is particularly suitable for use in the fashion industry and, especially, in HEF. In the second part of the paper, we present the preliminary results of interviews with the executives of two fashion companies and one government agency we have directly interviewed, using a case-study research approach.

The rest of this paper is structured as follows: In section 2, we present a brief literature review of recent research the fields of illegitimate trade. In section 3 we formally present the LISC Model and in section 4 the preliminary results of the interviews. Finally, in section 5 we present our research conclusions and in section 6 the limitations.

2. Literature Review

In the context of illicit trade Staake, Thiesse, & Fleisch, (2009) classify the main the works relevant of the issue in six main categories: general description of the phenomenon, impact analysis, supply-side investigations, demand-side investigations, managerial guidelines to avert counterfeits, legal issues and legislative concerns. For the purposes of our work we focus on the luxury and fashion industries and in particular the interplay of supply chain management with the more general concept of illegitimate trade.

Hence, to serve the motivation and objectives that we stated in Section 1, our literature review particularly aimed to identify parallels between supply chain management constructs and illegitimate trade, with specific regard to HEF industry.

In particular, we took note of the type of illegitimate trade involved (counterfeiting, grey imports, supply chain infiltrations, retail service counterfeiting, factory overruns) and the supply chain stage during which it occurs (upstream, downstream, and customer). Most of the papers we have reviewed treat the different types of illegitimate in an isolated manner without considering the fact that they may be part of a more general phenomenon.

Of the studies that actually try to identify a common thread, some limit their contribution to definitions and examples of only select illegitimate trade events (Mc Donald & Roberts, 1994), (Hilton, Choi, & Chen, 2004), (Kaikati & LaGarce, 1980). Bamossy & Scammon (1985) introduced a first model to describe how counterfeit products can enter the market, be distributed through authorized or non-authorized channels, and generate both not-deceptive and deceptive counterfeiting and Staake (2008) proposes the "Licit-Illicit" framework where he presents the "Licit Supply Chain", composed by actors with lawful intents, and its parasite "Illicit Supply Chain", composed by actors with illicit intents and who want to free-ride on the activities of the "Licit Supply Chain".

Concerning "Counterfeiting", the most investigated area is the demand-side, especially the not-deceptive counterfeiting at the customer level; on the contrary only few studies investigate the upstream and downstream activities of the illegitimate supply chain (Staake, Thiesse, & Fleisch, 2011), (Trott & Hoecht, 2007), (Green & Smith, 2002).

Moving to the "Grey Market" area, although parallel imports and gray market are legal, the main studies in the field have been developed around the issues of unfair competition, conflicts with trademark laws, free riding, price discrimination and market characteristics (Chen, 2007). In our opinion, gray markets can create confusion in the distribution channel and the conditions for counterfeiters for infiltrating their products: only few papers highlight the possible interconnections between counterfeiting and gray market: (Hoon Ang, 2000) underlines how, especially in the emerging markets, parallel imports can be confused with counterfeiting and how the perceived legality of a parallel imported product is a critical decision factor to purchase intention.

Very few papers treat the other "illegitimate trade" events such as supply chain infiltrations (Green & Smith, 2002), factory overruns (Mc Donald & Roberts, 1994) and "retail services counterfeit" (Kaikati & LaGarce, 1980).

3. The Legitimate-Illegitimate Supply Chain Model (LISC)

We now present the HEF "Legitimate-Illegitimate Supply Chain" model (LISC) that tracks activities along an extended supply chain that consists of design, factory, warehousing (distribution), retail, and customer stages[3].

LISC accounts for two types of actors at each stage of the supply chain:

- "Legitimate actors" that act in response to a direct or indirect relationship with the brand. A product designed by the in-house design studio of the brand, a supplier factory fulfilling a brand order to specification, a 3rd party logistics provider contracted by the brand to distribute its good, a brand-authorized dealer, and a customer willing to buy an original good are all examples of the functions that can be performed by legitimate actors.
- "Illegitimate actors" that shadow the activities of the legitimate actors without permission or knowledge from the brand and almost invariably harming its interests. A grey import, a shoplifted item, and a knocked-off design are all cases of illegitimate actors in play.

The main goals of LISC are to:

- Capture exhaustively all the phenomena that we refer to as "illegitimate trade" (as defined in section 1).
- Highlight all possible interactions between the legitimate and illegitimate actors.
- Provide a systematic way in which illegitimate trade phenomena can be grouped.
- Deliver a tool for companies to better assess their illegitimate trade risk

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[3] We believe that LISC will find application to other Illegitimate-trade prone supply chains such as the pharmaceutical one. In this work we focus only on the high-end fashion industry and we refer to the HEF-specific version of LISC simply as LISC.

In reference to what we believe is a gap in the supply chain risk literature, LISC addresses two type of risk, which are external to the firm but internal to the supply chain network, such as demand risk and supply one (Christopher & Peck, 2004).

Definition and Properties

The LISC model consists of 10 vertices connected by 16 feasible arcs, representing the interactions between the stages of the legitimate and illegitimate supply chains, as depicted on the figure below.
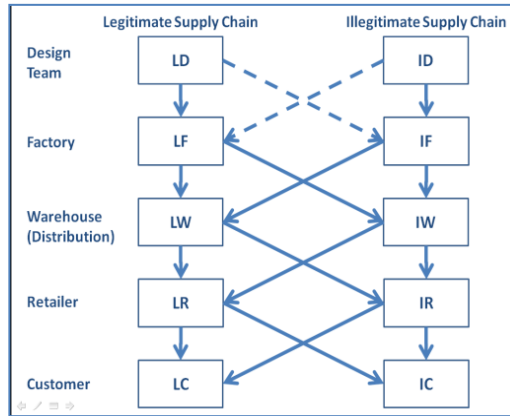
FIGURE 1- LISC MODEL

We make the following assumptions:

- A product must follow top-down from all the five stages of at least one of the supply chains: it should be designed, manufactured, managed in a warehouse, delivered to a retailer and finally bought by a customer. It's not possible to circumvent a stage (even if degenerate in practice).
- At each stage, a product can be handed by only one of the actors (i.e. manufacturing activities can be performed or by the legitimate factory or by the illegitimate one both not by both of them).

Supply stages are sets of actors, i.e., when we say that an *actor*   participates in a *stage* , this implies that   .

We can now formally define LISC as an *acyclic digraph*   [4] where the set of vertices   represents the stages of the legitimate and illegitimate supply chains:

$$\tag{1}$$

and the set of arcs   represents all the possible direct transitions between the stages of the legitimate and illegitimate supply chains:

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[4] In graph theory (Brandstädt, Le, & Spinrad, 1999), a *digraph* is defined as an ordered pair of sets   where   is a set of *vertices* and   is a set of ordered pairs (called *arcs*) of vertices of   . A *directed walk*   of   is a sequence of nodes in   such that   for   .

is the set of legitimate chain stages whereas
is the set of the illegitimate ones.

 A (supply chain) *flow* represents any feasible movement of goods in LISC. Since is acyclic, the set of flows really represents the set of *open walks* (or *chains)* of L. A *complete flow* (or *complete chain*) is the set of flows (v1, v2, v3, v4, v5) where v1= LD or v1=ID and v5=LC or v5=IC.

The fully legitimate complete flow of LISC is (LD, LF, LW, LR, LC), or a walk over L. Equivalently, the fully illegitimate complete flow is (ID, IF, IW, IR, IC) or a walk over I. A good that has flowed down the fully illegitimate complete flow (a "counterfeit") is a good which is the copy of an original "legitimate" good.

We use the   symbol as a vertex wildcard for the purpose of capturing *flow families.* For example,   =   . We can also use the wildcard to indicate any stage of the illegitimate chain   , or the legitimate one   . Finally, we can use it to signify either chain stage, for example,   for the warehouse stage.

An illegitimate *flow*   is a flow where   . In other words, an illegitimate flow involves at least one vertex (stage) of the illegitimate supply chain. We define   to be the set of all complete illegitimate flows and   to be the set of all complete legitimate flows.

An important concept of LISC is *perspective*. We recognize that in real life the actual state of the world and the one perceived by somebody may be different. The obvious ill-fated point in case is that of the oblivious buyer of an *illegitimate good* (a good that has flowed down an illegitimate flow) believing that he has actually bought a legitimate one.

We will use subscripts to indicate different flow perspectives. For example, for an (actual) flow   of some good,   can represent the flow of a good as perceived by a certain customer and   that of the brand. In world free of counterfeiting   ,   , would be identical, but unfortunately this is always not the case.

This distinction also allows us to better explain the difference between   and   : A legitimate customer   is confronted with a good that he believes has flowed down fully legitimate flow   . In other words,   . Instead, the reality may be that Since   , this particular customer was deceived. If, however, some other customer   is confronted with the same good she may actually be comfortable with the fact that   .

Once defined the model, we analyzed the possible illegitimate trade flows a product can pass through considering the different possibilities for moving from the initial "design" stage to the "customer" stage. There are 32 complete flows, that we classified into 7 families according with their main characteristics and selection rules.

Code	Family Description
1	Demand for original goods fulfilled with original goods by a legitimate retailer
2	Demand for counterfeited goods fulfilled with counterfeited product by a illegitimate retailer
3	Demand for original good fulfilled with counterfeited goods by a legitimate retailer (SC infiltrations)
4	Demand for counterfeiting fulfilled with legitimate goods by a illegitimate retailer (legitimate product diverted)
5	Factory overruns sold by legitimate or illegitimate retailer
6	Demand for original goods fulfilled by illegitimate retailer, unbeknown to the legitimate customer, with different type of products (original, factory overruns, counterfeited)
7	Demand for original goods fulfilled through shop-lifting at a legitimate retailer with different type of products (original, factory overruns, counterfeited)

4. Using LISC to Assess Illegitimate Trade in the Luxury Industry

As a prescriptive tool, LISC can be used to help firms and the authorities to clearly classify illegitimate trade threats and help them direct their efforts accordingly.

To preliminary assess its potential, we have completed structured interviews with a veteran executive working on IPR and counterfeiting on behalf of the Italian government and with the executives of two Italian companies operating in the luxury industry. For the time being, and for the benefit of having full access, we have agreed to maintain the anonymity of these sources.

All three sources have confirmed the existence of the illegitimate trade path families as we defined them earlier and, even, of more complex situations than those described in our previous examples.

Illegitimate Trade in China: Notable Cases
Italian shoe company "X" outsourced its production in China and created along with a Chinese partner a network of 100 mono-brand stores to distribute its shoes. After a while, the company realized that the number of its stores had increased to 114, with the 14 "new" ones entirely out of its control. In addition, it also found out these "new" stores were selling not only legitimately designed models, but also "new" models that were not designed by it but still baring its logo. Apparently, its contracted manufacturer was making these "new" models also. Hence while the reality (at least with respect to the "new" stores selling "new" models) was and the complete picture involving legitimate and illegitimate designs as well as legitimate and illegitimate retail locations all at once being tantalizingly complex!

Another Italian company operating in the furniture and design sector estimated that only 1 out of 30 of its products on sale in a specific town in China, via either legitimate or illegitimate channels, was original .

Overall, in China, the most common family is 2 (pure counterfeiting), followed by 5 (sale of factory overruns), and 6 (the deception at the retailer level when the customer assumes a retailer is legitimate but actually it isn't), and, finally 3 (infiltrations in the legitimate supply chain).

The last three illegitimate trade families mentioned (families 3 and 6) represent a higher threat for customers and companies because they are cases of deceptive counterfeiting, where basically the customer is willing and actually assumes to buy an original good, paying the full price.

Company A Case
Company A recorded total sales of 300 million euro in 2011 and is one of the main Italian players of high-end luxury apparel and accessories.

Company A considers that all of the main illegitimate trade families discussed above are significant. Furthermore, they present a risk for the companies and, being caused by different events, should be individually addressed through targeted supply and demand-side actions.

The paramount illegitimate trade threat comes from "pure counterfeiting" of lower-end products, such as Jeans and T-shirts, that are more easy to imitate and that adequately meet the needs of a wider segment of "potential counterfeited-items consumers". High-end luxury products, by virtue of being more esoteric in terms of both characters and target audience, are less vulnerable.

Company A considers "pure counterfeiting" (family 2) more difficult to deal with because it's linked to "exogenous" factors, such as consumer preferences, while the other analyzed paths, that imply some interactions with the legitimate supply chain, could be better secured through an attentive program of supply chain controls and counterfeiting prevention measures.

The second issue, especially in global market, is the control of the illegitimate retailers which pretend to be "legitimate" at customer's eyes (code 6).

Company A has never had issues with unauthorized "factory overruns". The company and its suppliers enjoy a strong and positive relation. Besides, stick contractual covenants forcibly deter factory overruns of any sort. Hence, for the moment, the production of the first line is entirely executed in Italy and there isn't any outsourcing of a "full line production" outside of the country. In any case, the company monitors and actively keeps its guard to prevent and control this type of risk.

Regarding infiltrations of the legitimate supply chain and parallel market imports, retailers and distributors are discouraged by contract conditions and penalties, especially after the implementation of the "anti-counterfeiting" program.

Company B case

Company B is an Italian company operating in jewelry, watches, leather accessories and perfumes, with 1€billion net revenues in 2010.

For company B, counterfeiting is an issue for all its product categories and for all its type of products, it didn't observe specific product categories in which the problem is

weaker or stronger than in others. Especially for jewels and watches, they found on the market counterfeited versions with low cost material or where the appearance of the watch was the same but without its complex and precious mechanisms.

The quality of counterfeited they have had the opportunity to seize is variable and range from low-quality replica to goods really similar to the original ones.

The more common illegitimate trade families for Company B are the following: 2 (pure counterfeiting), followed by 4 and 6(demand for counterfeited or original goods fulfilled with legitimate goods by a illegitimate retailer) and finally 5 which refer to the presence on the market of factory overruns. The other illegitimate trade families are considered irrelevant for company B.

Considering the fact that the occurrence of factory overruns so strongly contributed to insert in the illegitimate market high quality copies that can be confused with the original one, Company B considers illegitimate families 5 and 6 as those that can more threaten the company, cause the higher economic damage and are more difficult to contrast.

5. Conclusions

We have introduced and defined the composite phenomenon of illegitimate trade that is growing both in terms of size and complexity, harming brands, retailers, governments, and consumers alike. Illegitimate trade is particularly important in the fashion and luxury industries that rely on long and complex supply chains where a number of actors are involved and control is limited. We have used the Legitimate-Illegitimate Supply Chain (LISC) model to describe and classify the possible paths that a product may pass through before its final sale to end customers, assuming the existence of two parallel supply chains, one legitimate and one illegitimate. We preliminary verified the applicability LISC with a government agency and two major companies in Italy, trying to assess the importance of the various illegitimate families and discusses the supply chain strategies they are enacting to protect themselves against their illegitimate trade problems.

6. Limitations

The main limitations of our study pertain to the scope of the LISC model, its accompanying illegitimate trade family classification, and the limited number of companies that have so far provided us with feedback on the model.

Regarding the last limitation, we must note that we have just validated our model and its paths with two luxury companies as well as with an executive working for the Italian government in China handling intellectual properly issues. We are currently under the process of expanding our analysis and model validation to other companies of the HEF industry first, and, then, to other industries.

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The Anti-Counterfeiting Potential of RFID Technologies in the Fashion Supply Chain

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Abstract

The aim of this paper is to explore the potential of RFID technology in identifying and preventing illegitimate trade throughout the fashion supply chain via item-level traceability in the context of the Made-in-Italy Fashion Identity and Originality (MI-FIDO) project. We review the literature on illegitimate trade, fashion supply chain management, and RFID anti-counterfeiting. We introduce LISC, a supply chain-based illegitimate trade classification model that enables us to track counterfeiting, factory overruns, parallel trading, and the sale of stolen goods and to assess the impact of each such event on companies, as well as to assess the potential of RFID technology in thwarting these events. Finally, we present the case of Versace Group: the Firm recently launched an anti-counterfeiting initiative with the ultimate goal of creating a "Fashion Passport" to track and certify the authenticity their garments. The results show significant potential for RFID technology to fight illegitimate trade in the fashion industry especially for high ticket value items.

Keywords: Counterfeiting, Supply Chain, RFID, Fashion, Grey Markets, Illegitimate Trade.

1. Introduction

Many firms in the textile, apparel, fashion, and luxury industries (hereafter collectively referred to as the "fashion industry") have decided to delocalize their procurement and production activities to countries such as Vietnam, Turkey, India, United Emirates, and, of course, China (Christopher, Lowson, & Peck, 2004) (Brun, et al., 2008).

The rationale for those that adopted this strategy, that effectively de-verticalized the fashion industry, was to concentrate resources around core competencies (Hamel, 1990) and, in particular, on design, creativity, and brand management activities, while simultaneously gaining efficiency in the production-related activities. The success stories of GAP and Nike on the brand and design side and Li & Fung on the sourcing and manufacturing side of the supply chain have been well documented and have served as models for many other firms (Papson, 1998) (Victor K. Fung, 2007). Significant production cost savings, responsiveness, flexibility, and reduced capital expenditures were some of the benefits for the adopters of delocalization.

Delocalization did come with its own set problems for the brands that adopted it also. In this paper, we will explore one such problem, namely, "illegitimate trade", a term that we use to collectively describe counterfeiting, grey market trade, unauthorized or overrun production, theft, and other forms of activities that bring to the market goods in violation of intellectual property or commercial laws and agreements. Although illegitimate trade has existed long

before the proliferation of delocalization, diminished control over the manufacturing and distribution processes has made these problems a lot worse. This is especially true for Italian fashion firms, our focus for this work.

At first, illegitimate trade in the fashion industry was not perceived as outright damaging as it was in other industries such as pharmaceuticals, or food and beverage (OECD, 1998). However, this is not so anymore as illegitimate trade is threatening not only the bottom-line of Italian fashion houses, but the very value of the "Made in Italy" label (Italian Trade Commission). In addition, the distribution channels of counterfeit and pirated products are changing: if, in the past years, counterfeit and pirated products were mainly distributed through informal markets, now the infiltrations in legitimate supply chain are increasing and the risks of counterfeited products appearing on the shelves of established retail shops is becoming significant (OECD, 2008).

Although in recent years the attitude of brands towards counterfeiting and illegitimate trade in general is radically turning negative, in the past there have been some arguments in favor of tolerating, or at least not aggressively pursuing, illegitimate actors. The main argument behind this policy of tolerance can be attributed to the belief that counterfeit products sold on the street were actually creating a positive "publicity effect" for the brand. Some even saw a certain degree of accomplishment in creating items that "others want to copy" (Hilton, 2004). The following quote attributed to Patrizio Bertelli, CEO of Prada: "Worry about who's copying you, yes, but worry more about building and maintaining a brand that others will want to copy" (Brandazza, 2008).

However most brands nowadays have a very different attitude and, as the sophistication of illegitimate trade is increasing, are urgently looking for demand-side and supply-side strategies to track and control the phenomenon and in particular the mechanisms and relationships between legitimate and illegitimate actors. Santo Versace, President of Gianni Versace Company, literally declared war to illegitimate trade by declaring "who buys counterfeiting products is financing mafia activities" (Versace, 2007). Hence, a counterfeit Gucci bag sold on the streets of Milano, or a production overrun T-shirt of Nike, (i.e., produced by the very same factory that the brand had contracted to produce a legitimate lot in the first place) that, unbeknown to Nike, is sold by a high street retailer are both examples of goods that have been handled by actors of the illegitimate supply chain (Plaintiff v. Farmer, 2004).

An important assumption that we make in our work is that once a product (or even its subassembly) has been handled by an illegitimate actor, it becomes and remains "illegitimate", even if at some point it successfully re-enters the legitimate supply chain. This is an important distinction since the Nike T-shirt of the previous example is not a counterfeit in the strict sense of the word (Staake F. , 2008) (OECD, 1998). Yet it harms Nike's interests in the form of lost sales and reputation, maybe even more so than a counterfeit that is sold on the street. We return to this issue after the literature review.

2.1 Motivation and Objectives
The aim of this paper is twofold. First, we want to draw attention and take a first stab in identifying and classifying the various types of "illegitimate trade" in end-to-end supply chain terms by introducing our LISC model. Figuring out which are a) the possible illegitimate supply chain paths, b) which are their main characteristics, and then c) which of them cause the most harm to brands will help us to specifically determine the cases where RFID technology and item-level traceability could be more effective as a response. In the second

part of the paper, we use LISC to model the case of Versace Group and present the progress of the MI-FIDO project in developing an anti-illegitimate trade solution for the iconic fashion brand using RFID technology following standard explorative case methodology (Yin, 2009).

The rest of this paper is structured as follows: In section 2, we present a brief literature review of recent research the fields of illegitimate trade, fashion, and RFID technology. In section 3 we formally present the LISC Model and in section 4 its application and the point of view of Versace Group on counterfeiting issues, its anti-counterfeiting initiative and current state of the MI-FIDO project at Versace Group. Finally is section 5 we present our research conclusions and limitations.

2. Literature Review

2.1 Illegitimate trade: Counterfeiting, Parallel trading, Factory overruns: Counterfeiting is defined by OECD as "any manufacturing of a product which so closely imitates the appearance of the product of another to mislead a consumer that it is the product of another" (OECD, 1998). This includes copying of packaging, labeling and trademarks done with the explicit purpose of intentionally make a counterfeited product be considered as the original one.

There are other forms of intellectual property infringements that should be mentioned to describe in an exhaustive manner the counterfeiting phenomena and that are included in our wider definition of "illegitimate trade" such as grey market goods, parallel trading, factory overruns (Phau, 2009) (Hilton, 2004) and the sale of stolen and smuggled goods. As defined by OECD, "Parallel trading" or "Grey-market" trade refers to situations where products are legitimately bought in one territory and diverted for sale to another territory without the consent of the right holder in the receiving territory; factory overruns are the unauthorized production by legitimate suppliers (OECD, 1998). The increase in international trade, the advances in technology and the growing importance of the emerging markets are between the main factors mentioned to motivate the rapid increase of illegitimate trade experienced in the last years (Nunes, 2010). The problem is affecting several industries worldwide and it's estimated to value about 5-7% of the world trade (OECD, 2008), for a total value of around 250 billion USD, including only the counterfeited good internationally traded.

In United States during Fiscal Year 2009, there were 14.841 intellectual property rights (IPR) seizures with a domestic value of 260 million USD, and seizure of products related to fashion industry such as footwear, handbags, wallets and wearing apparels representing the 54% of the total value (U.S. Customs & Border Protection, 2009). The total value of the detentions made by European customs during 2010 is about 1 billion euro, with 35,62% represented by footwear, clothing, bag and wallets (European Commission - Taxation and customs union, 2010). In Italy, in 2010 the estimated value of counterfeited goods is around 400 million euro, with more than 50% referring to fashion products (Direzione Generale per la lotta alla contraffazione - UIBM, 2011), (Confesercenti - Centro studi, 2006).

Traditionally, the literature on illegitimate trade treats separately the phenomena of strict counterfeiting, factory overruns, parallel markets and, of course, theft, and distinguishes between "deceptive and not deceptive counterfeiting" on the basis of the assumptions on the product authenticity made by the customers at the moment of purchase (Grossman & Shapiro, 1988), (Juggessur, 2008). In their contributed book chapter, Thorsten Staake (Staake, et al., 2007) distinguishes clearly the different concept of counterfeiting, factory overruns, grey markets and indicates counterfeiting as the main focus of its analysis but, with his coauthors,

formally present the dual concepts of the licit and illicit supply chains in the context of the EU-funded *Stop tampering of products* (SToP) project. In this context, a *licit supply chain* includes multiple companies, or *players*, who have lawful intents and do not intend to trade with counterfeit products. On the other hand, parallel to the licit supply chain, there exists an *illicit supply chain* which produces and delivers counterfeit products. Illicit and licit supply chains coexist and illicit supply chain partners seek to infiltrate the licit supply chain with counterfeit products. The assumed supply chain is industry agnostic and malicious intents of illicit players are not known to the licit players so they do not know when they are dealing with companies who sell counterfeit products.

2.2 The Fashion Industry: Approaching the illegitimate trade problem in the fashion industry is particular important because of the importance of the industry within the Italian economy and of the "Made in Italy" label, the growing complexity and variety of the related supply chain models (Alessandro Brun, 2008) that could increase the counterfeiting risks and influence the choice of the appropriate anti-counterfeiting strategies, the high exposure of the industry to counterfeiting risks, due to the "nature of the industry" and to the difficulty in defining and detecting the presence of counterfeiting in "credence goods" (Hilton, 2004).

The industry of personal luxury goods has become in 2010 a 173€ billion business worldwide (Bain & Company, 2011), with famous Italian companies such as Luxottica, Tod's, Bulgari and Safilo present in the top ten of the global luxury players (KPMG International, 2011).
In terms of supply chain management choices, a recent study on Italian fashion companies supply chain shows that it doesn't exist a "clear recipe" while each company has a different configuration ranging from vertically integrated companies to complete outsourcing of manufacturing processes; and from situations of very poor communication exchange along the supply chain to detailed flow of information from end to end of the supply chain (Brun, et al., 2008).

Concerning counterfeiting, the industry for high-end fashion goods does have some characteristics that make it atypical compared with other industries: high-end fashion goods are "credence goods": for the customers it's difficult to assess the quality of the good before and after purchase and use; the production and the copying of designs are relatively easy and, to some extent, condoned in the industry and the purchasing behaviors is influenced by social network effects (Hilton, 2004).

2.3 RFID: Radio-frequency identification (RFID) is a technology that uses communication via electromagnetic waves to exchange data between a terminal and an object such as a product, animal, or person for the purpose of identification and tracking. RFID falls under the umbrella of Automatic Identification and Data Capture (AIDC) that refers to the methods of automatically identifying objects, collecting data about them, and entering that data directly into computer systems (i.e. without human involvement).

Several studies have identified RFID as a possible technology to be used against counterfeiting enabling a "true electronic pedigree" (Koroneos, 2005) which can be uniquely associated with a product and guarantee its authenticity and the "whole process" that brought it to the shop. For example, Lehtonen (Lehtonen, 2009) explores how a supply chain can be effectively protected against counterfeits using low-cost RFID tags.

The majority of RFID studies in the fashion industry are focus on the advantages and the disadvantages of RFID regarding improvements in stock management, shelf management, customer experience (Moon, 2008). Hence, accounts of RFID such as those of Kaufhof

Warenhaus AG (Loebbecke & Huyskens, 2007), Throttleman (Azevedo, 2009), Charles Vogele Group (Edwards, 2009), Marks and Spencer, GAP (Wen, 2010), American Apparel (O'Connor, 2011), Common People (Roberti, 2011) revolve around supply chain efficiency but not anti-counterfeiting.

In Italy in particular, RFID use among fashion companies is widespread including companies such as Armani, Benetton, Bottega Veneta, Trussardi, Valentino, and Yoox (Cedites, 2010). Yet, none of these companies (or many others) really use RFID for anti-counterfeiting purposes. There is only one notablebut still limited in scope exception (Azevedo, 2009).

3. The Legitimate-Illegitimate Supply Chain Model (LISC)

In order to better capture the variety of situations that illegitimate trade involves and, in particular, is interaction with its legitimate counterparts, we introduce the "Legitimate-Illegitimate Supply Chain" model, or simply LISC. In the context of the fashion industry, LISC can be used to track activities along the factory (manufacturing), warehousing (distribution), and retail stages that a fashion product must go through in order to arrive to the consumer. LISC accounts two actors for each stage of the supply chain.
The first one is the "legitimate actor" that performs their function in response to a direct or indirect relationship with the brand and in a manner that does not harm the stated interests of the brand. A supplier factory fulfilling a brand order to specification, a 3rd party logistics provider contracted by the brand to distribute its good, and a brand-authorized dealer, are all examples of legitimate actors.

The second one is the "illegitimate actor" that - at least partially - imitates the activities of the corresponding legitimate actor without permission from the brand and most likely harming its interests. We will return to LISC in section 3.

Considering the importance of the supply chain role and, in particular, of the supply chain stages the product passes through in determining if a product is legitimate or not, we introduce the Legitimate-Illegitimate Supply Chain (LISC) digraph for classifying counterfeiting events according with the different "supply chain paths" the product can go through before arriving on the shelves of a legitimate or illegitimate retailers. LISC is similar to the Licit-Illicit Framework proposed by Staake but is different in the following ways: first, it's a formal model grounded in Graph Theory; second, we propose it with the target of including all illegitimate trade events and not only counterfeiting in the strict sense; third, the "legitimate" players, in some situations, could decide to adopt opportunistic choices such as overproduction or decision to sell "illegitimate" products as genuine ones unbeknown to the brand; fourth, we use it for the analysis of the possible interactions between the different players and for the categorization of possible illegitimate trade paths. In order to achieve this last objective, as already mentioned, the LISC model includes only three actors for each supply chain, that we consider the most important in determining illegitimate trade scenarios.

As in the work of (Staake F. , 2008), the end-to-end supply chain approach is key due to the fact that illegitimate trading has become so wide-spread to the extent that illegitimate actors now have access to a supply chain that can be as long and sophisticated as the legitimate one. Some reported cases are just mind-blowing: in 2007, for example, only 15 miles from the Genova Port in Italy, an Indian "factory ship" was caught in the act of transforming unbranded Indian-origin apparel to "made in Italy" counterfeit products (Fatiguso, 2007). This is not an exception as illegitimate trade products are manufactured in one country, assembled in another one, transported through a third country and then sold in the forth one (Izzi, 2008).

In another case, counterfeit apparel mimicking that of an Italian brand that was sent to a warehouse in the country of destination while, in parallel, labels and logos were also sent and subsequently attached to the counterfeit items on location (Centorrino, 2004)

The different stages of supply chain described are important for considering what is the "object" that is materially imitated or illegitimately traded: it's possible to copy the design, the product or to imitate the "shop experience", at retail level, as the recent cases in the news regarding Ikea in China (Kunming, 2011). The behavior of the actors along the supply chain can impact on the kind of "illegitimate trade" event that occurs: the decision of the factory to produce and put, independently, into the market unauthorized overproduction or the decision of a retailer to use the "high value brand name" to attract customers and then sell them substitute or low cost products.

The main goals of our model are:

- To include exhaustively all the phenomena that we refer as "illegitimate trade" and such as counterfeiting, gray market events , factory overruns, sale of stolen goods, and so on, being of interest of counterfeiting companies to mix "original" products with false ones.
- To concentrate on the possible interactions between the two supply chains, the legitimate and the illegitimate, proved that one of main goals of counterfeiters is, counting on weaknesses in a company's legitimate distribution chain, being able to mix counterfeited goods with legitimate ones in order to pass through customs and use regular distribution and sales channels (Cooper, 2008).
- To represent graphically which counterfeiting paths could be better reduced through the use of RFID and item-traceability.

The model described below could be considered as an evolution of the "Illicit supply chain" (Staake F. , 2008) and a tentative to develop one of the suggested issues to be addressed such as the identification of frequently used paths. It consist of two "three-stage" supply chains, the legitimate and the illegitimate one, composed by three actors each. Hence, we have two actors for each supply chain phase (factory, warehouse and retailer).

The legitimate supply chain is the one designed by the focal company which is selling the product under its brand on a particular market and includes the companies or the internal functions that have the responsibility of performing the defined activities in each stage, it included the internal operations or the contract manufacturers selected for production outsourcing, the warehouse and distribution center and the authorized retailers that can sell the product to the final customer. Each actor at each stage has the responsibility to perform the activity on the product and pass it on the following stage of the "legitimate" supply chain, without accepting interferences from the "illegitimate supply chain" and avoiding any product diversion from "legitimate" to "illegitimate" supply chain.

The "illegitimate" supply chain is the Supply Chain composed by actors with "illicit intent" (Staake F. , 2008), whose target is to bring to the market an "illegitimate" product, free riding on the activities of the "legitimate" supply chain actors, at each level: this means that the objective of this chain is the final sale of false, stolen or original products to customers, that can know or not about the nature of the products they're buying, through illegitimate or legitimate retailers.

Recall that a *digraph* is an ordered pair of sets G = (V, A), where V is a set of *vertices* and A is a set of ordered pairs (called *arcs*) of vertices of V.
Hence, the LISC is a digraph can be defined as:

$$V = \{LF, IF, LW, IW, LR, IR\};$$ (1)

and

$$A = \{ (LF, IF), (LF, IW), (LW, IW),$$ (2)
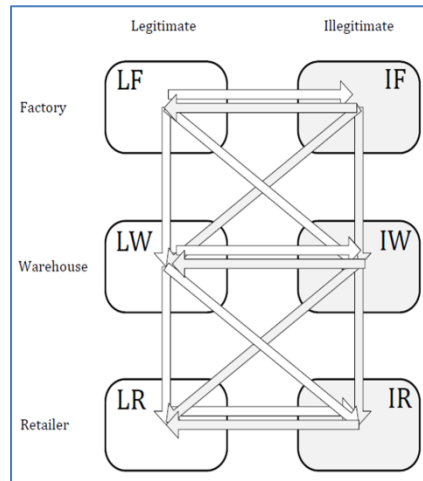$$(LW, LR), (LW, IR), (LR, IR)\}.$$

Figure 1. LISC Digraph

The LISC model includes 14 possible interactions between the three actors, as depicted on the figure below. We make the following assumptions:

- A product must follow top-down from all the four stages of at least one of the supply chains: it should be manufactured, managed in a warehouse, and finally delivered to a retailer. It's not possible to circumvent a stage (even if degenerate in practice).
- At each stage, a product can be handed by only one or by both actors in a sequence.

Considering these constraints, we categorize the 14 possible interactions as described in the following table.

Interaction From-To	Description
LF-IW	Unauthorized factory overruns, defective products that did not pass quality control but were not mangled, or stolen products diverted to the illegitimate distribution process.
LF-IF	Theft or unauthorized procurement of raw materials, subassemblies diverted to the illegitimate factory.
LR-IR, LW-IR, LW-IW	Finished product theft and diversion to illegitimate distributors or retailers.
IF-LW, IR-LR, IW-LR, IW-LW	Infiltrations into the legitimate Supply Chain
IF-IW, IW-IR	Standard flow of illegitimate supply chain
LF-LW, LW-LR	Standard flow of legitimate supply chain

| IF-LF | Transfer of raw materials for eventual replacement or exchange with original ones |

Table 1. Classification of legitimate-illegitimate supply chain interactions

After the connections analysis and definition, we continued analyzing the possible paths a product can pass through considering the different possibilities for moving from the "factory" stage to the "retailer stage".

The combinations of the different possible connections gives 432 possible complete paths, of which only 64 paths represents "possible paths", using the condition that the "ending node" of the previous segment should be the "beginning node" of the following segment.

The possible paths could be composed by only 2 segments (for example: LF-LW, LW-LR) up to 5 segments (for example: LF-IF, IF-LW, LW-IW, IW-IR, IR-LR) and, according with the rules described below, could be classified into the following nine categories of trade:

1. Legitimate: An authentic product produced by the legitimate factory, distributed by a legitimate warehouse and sold through a legitimate retailer (LF-LW, LW-LR),

2. "Pure counterfeiting": A counterfeited product is sold through unauthorized or illegitimate retailers or directly in the street (path IF-IW, IW-IR), in this situation there isn't any interactions between the legitimate and the illegitimate supply chain. This is the situation that (Hilton, 2004) defines as "Vanity counterfeits", where customer clearly know that he's buying a counterfeited products and he's intentionally doing it, this is could be classified as a case of "not deceptive counterfeiting". The differences between the authentic and counterfeited product are easily detectable by the consumers, and it could be excluded that the products contain some original components or that are original products stolen or diverted by the legitimate supply chain.

3. The "illegitimate product – legitimate channel": the counterfeited product, completely produced in a illegitimate factory, is sold through a legitimate channel. These are the cases where counterfeiters succeed in introducing the "illegitimate products" into the legitimate supply chain: the sale occurs in an authorized retailer, the customer assumes that the product is "original" but it's counterfeited, this is a situation that could be classified as "deceptive counterfeiting" (path IF-IW, IW-LR). The final retailer sells products supplied by counterfeiting company and not by the original one, using the brand, the store and the image of legitimate one, the profits are shared between the "legitimate retailer" and the "illegitimate warehouse" owner. (Coustasse, 2010) underlines in his paper how the problem of counterfeit drugs infiltrated in legitimate supply chain and sold at full price commanded by legitimate drugs in retail pharmacies and hospitals is a growing health problem in United States. In 2011, a mall shop owner in California has been indicted for selling counterfeiting Chanel and Louis Vuitton products (U.S. Immigrations & Customs Enforcement, 2011).

4. The "legitimate product – illegitimate channel": cases where "legitimate products", produced by the legitimate factory, are sold though illegitimate channels, the garments have been stolen and diverted from the legitimate supply chain to the illegitimate (path LF-LW, LW-IW, IW-IR) or have been sourced by not-authorized suppliers for example in a different geographic market. It's interest of counterfeiters to mix original products with counterfeited ones for multiple reasons such avoid control, reduce suspects and attract customers (Izzi, 2008).

5. The cases of the "factory overruns" sold through unauthorized retailers: let's suppose the contract manufacturer produces more garments than the quantity required by the legitimate focal company: the garments required by the legitimate SC flows through the "Legitimate Warehouse" whether the additional garments are sold to a third part who participates to the "illegitimate supply chain" and then sold to the customers. The

8

products are manufactured by the same companies manufacturing the "legitimate" products but are not "recognized as authentic" by the focal company (paths LF - IW, IW-IR). A Ferragamo employee has confirmed that they had caught few of their workshops producing more shoes than the quantity required by the company (Hopkins, 2003).

6. The cases of the "factory overruns" sold through authorized retailers: let's suppose the contract manufacturer produces more garments than the quantity required by the legitimate focal company: the garments required by the legitimate SC flows through the "Legitimate Warehouse" whether the additional garments are sold to a third part who participates to the "illegitimate supply chain": the illegitimate warehouse. In a second moment, the illegitimate warehouse makes an agreement with the legitimate retailers and insert again the products into the real supply chain (paths LF-IW, IW-LR). A path similar to this one was discovered by Polo Ralph Lauren in 2006, an illegitimate warehouse/ distributor (TC Fashion) sources overproductions from a real Polo outsourcer manufacturer in Philippines which was running unauthorized night shifts of production and sell them to US legitimate retailers (Tucker, 2006).

7. The cases of "almost illegitimate" products, that could contain some original components or the supply chain process has involved some legitimate actors, and that, finally, are sold through legitimate or illegitimate channels. In 2002, during a police raid named "Veronica", approximately 2000 high-brand bags have been seized. The quality of the products were so high that it was not easy to distinguish them from the original ones and probably they would have been delivered through "legitimate retailers" (XIV Legislature - Camera dei deputati n.4001, 2003)

8. The cases of "almost legitimate products – legitimate channel", that are produced by the legitimate factory, then are diverted from the legitimate supply chain, and after, through an agreement with the final retailer, are sold as legitimate products to the end customers. Stolen products sold again to the legitimate retailers configure a situation where the consumer is buying an "original product" but the margin are shared between the final retailer and his smuggler.

The table below provides the rules used for classifying the "illegitimate trade" categories and the number of paths falling in each of it.

Category	# of Paths	Rules for path selection
Absence of any illegitimate trade events	1	Exclude nodes IF, IW, IR
Pure counterfeiting	1	Exclude nodes LF, LW, LR
Illegitimate Product - Legitimate Channel	8	Include segment "IF-IW" and end in LR
Legitimate Product - Illegitimate Channel	8	Include segment "LF-LW" and end in IR
Factory overruns sold on illegitimate channel	8	Include segment "LF-IW" and end in IR
Factory overruns sold on legitimate channel	8	Include segment "LF-IW" and end in LR
Almost illegitimate product - illegitimate channel	15	Include at least one node of legitimate SC (LF, LW or LR), don't include segments "LF-LW" or "LF-IW" and end in IR

Almost illegitimate product - legitimate channel	8	Don't include segments "LF-LW" or "LF-IW" and end in LR
Almost legitimate product - legitimate canne	7	Include at least one node of illegitimate SC (IF, IW or IR), contain "LF-LW" and end in LR

There is wide agreement on the fact that the monitoring of the supply chain is one of the crucial challenges to face in order to minimize the risk of counterfeiting.
Counterfeiters count on weaknesses in a company's legitimate distribution chain for mixing counterfeited goods with legitimate ones in order to pass through customs and use regular distribution and sales channels (Cooper, 2008).

The collaboration between the different actors of the end-to-end supply chain is mentioned as one of the key points to secure each link in the supply chain (Lybecker, 2008), and the use of a technology such as RFID can play an important role to deter counterfeiters, by increasing the costs of counterfeiting, and facilitate fraud detection.

4. RFID and Illegitimate Trade: The MI-FIDO project

The Italian government has been recently promoting and financing a series of research and proof-of-concept projects with the aim to investigate, develop and implement innovative solutions to track product legitimacy, thwart counterfeiting and, more generally, illegitimate trade, and to protect the integrity of the "Made in Italy" label (Italian Trade Commission). One such project is called MI-FIDO project (Made in Italy Fashion Identity and Originality).

The basic idea behind MI-FIDO is to protect the authenticity of "Made in Italy" products by tracking and certifying their flow stage-by-stage through the supply chain using encrypted RFID technology, effectively handling a "Fashion passport" for each such product. The MI-FIDO project team consists of key stakeholders in the fields of fashion, supply chain management, RFID technology, Information Systems, and the Academia, including SDA Bocconi and Gianni Versace.

Gianni Versace Company (or simply "Versace") was founded by Gianni Versace in 1978 redefining what a fashion house could do combining fashion, the arts, and celebrity. The company recorded total sales for 268 million euro in 2009 and it's one of the main players of high-end luxury apparel and accessories. The company delivers its products using both retail and wholesale channels all around the world.

In 2010, about 300.000 counterfeited Versace items have been identified and seized by the Italian authorities and 2011 data shows increasing counterfeiting risk, the company spent in 2011 about 700.000€ in legal fees related to anti-counterfeiting issues. Versace's annual budget dedicated to intellectual property protection and anti-counterfeiting projects is around € 2 million. Versace has realized that its defensive policy against illegitimate trade had run its course and is currently shifting towards a proactive strategy that is described as "Prevention, Involvement and Control", or PIC.

- Prevention through the protection of its logo and main designs in every major market and implementation of end-to-end supply chain controls.
- Involvement through the collaboration with the contract manufacturers, retailers, customers, customs, and the police for the detection and signaling of illegitimate trade.

- Control through aggressive monitoring of the illegitimate trade activity. Illegitimate actors are becoming increasingly sophisticated constantly changing locations and techniques. Versace need to keep up and stay alert at all times.

While waiting for the RFID technology under development by the MI-FIDO team to fully track and trace the processes of its products and authenticate them with the "Fashion Passport", Versace is already working to be able, starting by the end of 2012, to track at item-level the processes of its products and identify them one by one. Meanwhile we have presented and discussed our LISC model with the Legal Department Office of the Versace Group. It emerged that all of main "illegitimate trade" category paths discussed are significant and present a risk for Versace Group and, being caused by different events, should be managed through specific supply and demand-side actions.

More in details, the main problem remains the "Pure counterfeiting" (path IF-IW, IW-IR), especially for the low-end products, such as Jeans and T-shirts, that are more easy to imitate and that meet the exigencies of a wider segment of "potential counterfeited-items consumers" while the "high-end luxury products", for their characteristics to be unknown to the majority of people, are less attacked by counterfeiters. The "pure counterfeiting" is more difficult to contrast because it's linked to "exogenous" factors, such as consumer preferences and inspirational needs, while the other analyzed paths, that imply some interactions with the legitimate supply chain, could be better secured through an attentive program of supply chain controls and counterfeiting prevention measures.

Recently, Versace won a case against an established retailer in southern Italy that even though was not authorized to sell Versace goods was nevertheless selling genuine and counterfeit Versace items to its unsuspecting customers engaging in deceptive illegitimate trade.
Similarly, Versace won a case against Los Angeles-based manufacturer Tres Hermanos Inc. and its owner Monir Awada. Thanks to the Lanham Trade-Mark Act (Lanham Trade-Mark Act), Awada was ordered to pay the brand $20 million in damages for selling fake Versace t-shirts and other items like jeans and sweatshirts to at least 72 stores in the Los Angeles area, involving almost 110 people in the traffic (Sacchi, 2010). These two cases refer to path categories "Illegitimate product – illegitimate channel" and "Legitimate product – illegitimate channel", two examples of paths could be "IF-IW; IW-IR", when the product is counterfeited, and "LF-LW; LW-IR", when the product sold is a genuine one.

In 1996, the company experienced 6 thefts in Italy and Europe, for a collective damage of about €260K. The stolen goods were sold through not-authorized retailers (Pollo, 1996). Nowadays, theft are unusual: the company has been victim of only one theft of perfumes during 2011. The case refers to path category "legitimate product – illegitimate channel" and a path example could be "LF-LW; LW-IW; IW-IR"

Versace has never had issues with unauthorized "factory overruns". Its suppliers are certified and controlled, penalties for factory overruns are previewed in their contracts and, in general, they have a strong and positive relationship with the company. In any case, for the moment, the production of first line is completely executed in Italy and there isn't any outsourcing of a "full line production" outside of Italy. In any case, the company considers and tries to prevent and control risks of occurring paths such as "LF-IW; IW-IR" or "LF-IW; IW-LR"

Regarding infiltrations of the legitimate supply chain and parallel market imports, retailers and distributors are discouraged by contract conditions and penalties, especially after the implementation of the "anti-counterfeiting" program and these actions have the goal of not

allow paths that involves at least one actor of illegitimate supply chain and end in the legitimate retailer, such as, for example, "IF-IW; IW-LR"

RFID technology that will be developed by MI-FIDO project can impact significantly on all the paths that include some interactions between "legitimate" and "illegitimate" supply chain because it supports companies both in avoiding supply chain infiltrations as well as "excluding" from the list of original products the ones that are stolen or diverted.

In particular, considering LISC categories listed above, RFID technologies could support the detection of any "illegitimate and almost illegitimate product – true channel", "factory overruns sold on legitimate channel" products infiltrating into the Supply Chain that will not have the defined unique code and that have not passed through the "correct process" as well as the detection of any "almost legitimate – legitimate" situation, recognizing the items that have been previously stolen and the cancellation from the "original product list" of the serial number of items stolen that could be sold on illegitimate channels.

On the contrary, it could not reduce the "Pure counterfeiting phenomena" and can't help significantly in the situation of "factory overruns sold on illegitimate channel" and "almost illegitimate product –illegitimate channel" situations.

The current Versace first line supply chain previews production processes outsourced to a series of selected and qualified suppliers in Italy, quality check performed through the central warehouse of Novara which serve directly all the European customers and delivers products to a second level of warehouses in USA, China and Hong Kong to serve the international markets.

MIFIDO team previews that the RFID-label will be inserted on the garment after the quality check in Novara, the activation of RFID tag will ensure that the item is a "authentic Versace item" and then each step of supply chain will be recorded up to the final sale to customer, when the tag will be deactivated. As a real "passport", the tag will contain the information of all the places where the product has been this will allow to detect eventual anomalies, such as supply chain infiltrations or product with false RFID codes, and to signal to the central system eventual "RFID code" corresponding to items that have been stolen.

7. Limitations

The main limitations of the study is related to the scope of the LISC model and its accompanying illegitimate trade category classification, the single company perspective of our work, and the effectiveness and the use of RFID technology for counterfeiting reduction goals.

First, the LISC model can be extended to include a design stage that is key in the fashion industry. Fashion design can be carried in-house or outsource and – of course – can be copied. Currently, fashion design is only halfheartedly protected by intellectual property laws: due do the technical difficulties inherent to patenting a fashion product, more robust legislative initiatives such as the United States Congress Bill proposals collectively known as the "Design Piracy Prohibition Act" (Design Piracy Prohibition Act, 2012) have not made it to laws. Nevertheless, illegitimate and necessary to track activity takes place is the shape of knock-offs marketed under the original or creatively mangled brand names.

Second, the illegitimate trade categories have been defined mainly on data and phenomena collected from secondary sources and not directly observed by the authors; third, a specific focus on fashion industry has been adopted: a further analysis for evaluating the applicability

and the significance of the categories in other industries should be done; fourth it will be necessary to investigate the implications and the applicability of the model to the "illegitimate on-line trade" that, for the moment, has been excluded from our analysis.

We discussed the LISC model and the related paths only with the Versace Group company, so, up to now, the results shown refers only to this particular reality, the analysis will be extended to other companies of fashion industry first, and, then, to other sectors. For what it concerns RFID, the use and adoption of the technology, although is significantly increasing in recent years, is still limited by three main factors: relatively high cost, RFID tag size, and privacy concerns.

8. Conclusions

During the last years, illegitimate trade has increased significantly; it affects a variety of industries worldwide and is forecasted to keep growing. The phenomenon is becoming increasingly complex and harms brand, retailers, governments, and consumers alike. Illegitimate trade is particularly important in the fashion industry that relies on long and highly de-localized supply chains and is weakly protected by existing copyright and patents laws.

RFID technology holds a lot of promise against illegitimate trade enabling item level traceability in the supply chain and data securitization and has recently attracted the attention of many fashion brands including Versace that is participating in the MI-FIDO anti-illegitimate trade project.

We have reviewed the literature and formally introduced the definition of "illegitimate trade" to capture a variety of trade infringements such as counterfeiting, gray market activity, factory overruns, sale of stolen items, and infiltrations into legitimate supply chain. We introduced the LISC model to describe and classify the possible paths that a product can pass through before the final sale to end customers, assuming the existence of two parallel supply chains, one legitimate and one illegitimate. We analyzed a variety of illegitimate trade scenarios and preliminary assessed risks and possible strategies against them.

Finally, in the context of the MI-FIDO project, we discussed how RFID technology and item-level traceability can be effective against the illegitimate problems that the Versace fashion house is facing.

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