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Mauro Fracarolli Nunes

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SUPPLY CHAIN CONTAMINATION, THE INERTIAL EFFECT, AND THE COLLATERAL
EFFECTS OF NEGATIVE CORPORATE EVENTS: AN INCIDENTAL STAKEHOLDER
PERSPECTIVE

THESE

En vue de l'obtention du
DOCTORAT ÈS SCIENCES DE GESTION

Par

« **Mauro FRACAROLLI NUNES** »

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Supply Chain Contamination, the Inertial Effect, and the Collateral Effects of Negative Corporate Events: An Incidental Stakeholder Perspective

Abstract

The association of firms to crimes, condemnable management practices, operational difficulties and / or fails carried out by their partners suggests that negative events occurred in a firm (i.e. source firm) hold the potential to negatively affect others. As firms' direct and indirect relationships with their partners become less obvious, supply chain risks (March and Shapira, 1987) must be reconsidered to account for this contemporary and possibly hazardous prospect. In addressing this issue, the present dissertation investigates the impacts of negative corporate events to supply chain partners. Throughout three individual but interconnected articles, empirical evidence suggest that beyond the interruption of physical flows, unfavorable circumstances may not be restricted to firms originating them, spreading across their networks. More specifically, based on the premises of the Efficient Market Hypothesis (Fama, Fisher, Jensen and Roll, 1969; Fama, 1970; Jensen, 1978), the utilization of the event study method (Fama, 1970; Brown and Warner, 1980) allowed the demonstration of negative reactions from investors of supply chain partners upon the disclosure of adverse news. In referring to these outcomes, the concept of *supply chain contamination* is here defined as “the dissemination of negative events through supply chains, negatively affecting not only the market value of customers and suppliers (possibly that of customers of customers and suppliers of suppliers and so on), as well as potentially other dimensions such as corporate reputations, for instance” (Fracarolli Nunes, 2018: 581).

Initial theorization of this process is also proposed. The mechanics leading a company to be affected by events originated out of its organizational borders is portrayed in the concept of the *inertial effect*, illustrated in the image of “the waves caused by a stone that hits the water previously rested” (Fracarolli Nunes and Lee Park, 2016: 292). Within the reasoning of unintended or unanticipated consequences (Merton, 1936), the occurrence of *supply chain contamination* through the *inertial effect* is considered a *collateral effect*. From the intersection of the literatures on supply chain management and the Stakeholder Theory, a new conceptual model is developed. Building on the idea that stakeholders stand for any individual, entity or group that shall either affect or be affected by the operations of a company (Freeman, 1984), the empirical demonstration that investors of a supply chain partner must be affected (i.e. *collateral effect*) by negative events occurred in or caused by a source firm (i.e. *supply chain contamination* through the *inertial effect*), allows the proposition of the concept of *incidental stakeholders*, here defined as “stakeholders of stakeholders, which, as such, may not be aware of their links with other companies, or even not consciously willing to take the risks associated with such a subsidiary connection” (Fracarolli Nunes, 2019: 4). In this sense, the investigation of 30 cases classified in 5 distinct categories (environmental disaster, corporate social and environmental irresponsibilities, operational failure, corporate fraud and corruption) is expected to offer new perspectives on the structural risks associated to supply chains. Along with the theoretical discussions, practical utilizations are approached, as well as avenues for future inquiries.

Contamination de la Chaîne d'Approvisionnement, l'Effet Inertiel et les Effets Collatéraux d'Événements d'Entreprise Négatifs : Une Perspective des Parties Prenantes Incidentes

Résumé

L'association d'entreprises à des crimes, de pratiques de gestion condamnables, de difficultés opérationnelles et / ou de défaillances de leurs partenaires suggère que des événements négatifs survenus dans une entreprise (i.e. entreprise source) pourraient avoir des effets négatifs sur d'autres. À mesure que les relations directes et indirectes des entreprises avec leurs partenaires devenant de moins en moins évidentes, les risques liés à la chaîne d'approvisionnement (March et Shapira, 1987) doivent être réexaminés pour tenir compte de cette perspective contemporaine, voire dangereuse. En abordant ce problème, la présente dissertation examine les impacts d'événements d'entreprise négatifs sur les partenaires de la chaîne logistique. Des preuves empiriques suggèrent que, au-delà de l'interruption des flux physiques, les circonstances défavorables ne se limitent pas aux entreprises qui les ont créées et qui s'étalent sur leurs réseaux. Plus précisément, sur la base de l'hypothèse d'efficience du marché (Fama, Fisher, Jensen et Roll, 1969; Fama, 1970; Jensen, 1978), l'utilisation de la méthode de l'étude d'événement (Fama, 1970; Brown et Warner, 1980) a permis la démonstration de réactions négatives de la part des investisseurs des partenaires de la chaîne d'approvisionnement lors de la divulgation de nouvelles défavorables. En se référant à ces résultats, le concept de contamination de la chaîne d'approvisionnement (*supply chain contamination*) est défini ici comme «la dissémination d'événements négatifs par des chaînes d'approvisionnement, affectant négativement non seulement la valeur marchande des clients et des fournisseurs (éventuellement celle des clients des clients et des fournisseurs des fournisseurs, et ainsi de

suite), ainsi que potentiellement d'autres dimensions telles que la réputation des entreprises, par exemple »(Fracarolli Nunes, 2018: 581).

Une théorisation initiale de ce processus est également proposée. La mécanique qui conduit une entreprise à être affectée par des événements issus au-delà de ses frontières organisationnelles est décrite dans le concept de l'effet inertiel (*inertial effect*), illustré à l'image des "vagues provoquées par une pierre qui frappe l'eau auparavant reposé " (Fracarolli Nunes et Lee Park, 2016: 292). Dans le raisonnement de conséquences involontaire ou imprévues (Merton, 1936), la survenue d'une contamination de la chaîne d'approvisionnement par l'effet inertiel est considérée comme un effet collatéral (*collateral effect*). À partir de l'intersection des littératures sur la gestion de la chaîne d'approvisionnement et de la théorie des parties prenantes, un nouveau modèle conceptuel est développé. En s'appuyant sur l'idée que les parties prenantes représentent toute personne, entité ou groupe qui peuvent affecter ou être affecté par les activités d'une entreprise (Freeman, 1984), la démonstration empirique que les investisseurs d'un partenaire de la chaîne logistique peuvent être affectés (effet collatéral)) par des événements négatifs survenus dans une entreprise source ou provoqués par celle-ci (contamination de la chaîne logistique due à l' effet inertiel), permet de proposer le concept de parties prenantes accessoires (*incidental stakeholders*), définies ici comme «parties prenantes de parties prenantes, qui, en tant que telles, peuvent ne pas être conscientes de leurs liens avec d'autres entreprises, ou même pas consciemment disposés à prendre les risques associés à une telle connexion subsidiaire »(Fracarolli Nunes, 2019: 4). En ce sens, l'enquête sur 30 cas classés en 5 catégories distinctes (catastrophe environnementale, irresponsabilités sociale et environnementale des entreprises, défaillance opérationnelle, fraude d'entreprise et corruption) devrait offrir de nouvelles perspectives sur les risques structurels associés aux chaînes d'approvisionnement. Parallèlement aux discussions théoriques, des utilisations pratiques sont approché, ainsi que des pistes pour des enquêtes futures.

Contaminação em Cadeias de Suprimentos, o Efeito Inercial, e os Efeitos Colaterais de Eventos Corporativos Negativos: Uma Perspectiva de Stakeholders Incidentes

Resumo

A associação de empresas a crimes, práticas de gestão condenáveis, dificuldades operacionais e / ou falhas advindas de seus parceiros sugere que eventos negativos ocorridos em uma empresa (empresa de origem) têm o potencial de afetar negativamente outras. À medida que as relações diretas e indiretas das empresas com seus parceiros se tornam menos óbvias, os riscos associados às cadeia de suprimentos (March e Shapira, 1987) devem ser reconsiderados de forma a tratar essa perspectiva contemporânea e possivelmente perigosa. Ao abordar essa questão, a presente dissertação investiga os impactos de eventos corporativos negativos para os parceiros da cadeia de suprimentos. Ao longo de três artigos individuais, porém interconectados, evidências empíricas sugerem que além da interrupção dos fluxos físicos, circunstâncias desfavoráveis podem não se restringir às empresas que as originam, disseminando-se por suas redes. Mais especificamente, com base nas premissas da Hipótese de Mercado Eficiente (Fama, Fisher, Jensen e Roll, 1969; Fama, 1970; Jensen, 1978), a utilização do método de estudo de eventos (Fama, 1970; Brown e Warner, 1980) permitiu a demonstração de reações negativas de investidores de parceiros da cadeia de suprimentos quando da divulgação de notícias adversas. Em referência a esses resultados, o conceito de contaminação da cadeia de suprimentos (*supply chain contamination*) é definido como “a disseminação de eventos negativos nas cadeias de suprimento, afetando negativamente não apenas o valor de mercado de clientes e fornecedores (possivelmente de clientes de clientes e fornecedores de

fornecedores e assim por diante) assim como outras dimensões, como a reputação corporativa, por exemplo ”(Fracarolli Nunes, 2018: 581).

Uma inicial teorização deste processo também é proposta. A mecânica que leva uma empresa a ser afetada por eventos originados fora de suas fronteiras organizacionais é retratada no conceito de efeito inercial (*inertial effect*), ilustrado na imagem “das ondas causadas por uma pedra que atinge a água previamente repousada” (Fracarolli Nunes e Lee Parque, 2016: 292). Dentro do raciocínio de conseqüências não intencionais ou imprevistas (Merton, 1936), a ocorrência de contaminação da cadeia de suprimento através do efeito inercial é considerada um efeito collateral (*collateral effect*). A partir do intersecção das literaturas sobre gestão de cadeia de suprimentos e da Teoria dos Stakeholders, um novo modelo conceitual é desenvolvido. Com base na ideia de que as partes interessadas representam qualquer indivíduo, entidade ou grupo que pode afetar ou ser afetado pelas operações de uma empresa (Freeman, 1984), a demonstração empírica de que os investidores de um parceiro da cadeia de suprimentos pode ser afetados (efeito colateral) por eventos negativos ocorridos ou causados por uma empresa de origem (contaminação da cadeia de fornecimento através do efeito inercial), permite a proposição do conceito de stakeholders incidentais, aqui definidos como “stakeholders de stakeholders, que, como tal, podem não estar cientes de suas ligações com outras empresas, ou mesmo não estarem conscientemente dispostos a assumir os riscos associados a tal conexão subsidiária” (Fracarolli Nunes, 2019: 4). Nesse sentido, espera-se que a investigação de 30 casos classificados em 5 categorias distintas (desastre ambiental, irresponsabilidades sociais e ambientais corporativas, falhas operacionais, fraudes corporativas e corrupção) ofereça novas perspectivas sobre os riscos estruturais associados às cadeias de suprimentos. Juntamente com as discussões teóricas, abordam-se as utilizações práticas, bem como os caminhos para futuras investigações.

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Part I - Introduction

1.1. Preface

Although embedded in risk and uncertainty (Alchian, 1950; Bachmann, Elstner and Sims, 2013), economic activity counts on diverse techniques that might improve efficiency (Fried, Schmidt and Lovell, 1993) and control (Vollmann, Berry and Whybark, 1997). Depending on the objective(s) of each organization, specific strategies may be formulated and adopted, as firms attempt to survive (Huber, 1984) and / or to stand out in competitive environments (Porter, 1980). Management, however, does not always work properly or as planned (Bamford and Forrester, 2003; Nightingale, 2008). In face of fails, misconducts, and setbacks, companies may find themselves in critical situations that shall not only compromise the good functioning of their operations, but actually destroy value (Grundy, 1995; Caprio and Klingebiel, 1996). Unfavorable circumstances such as product recalls, oil spills and cases of corporate fraud and corruption, for instance, have been linked to harsh penalizations in stock markets (Jarrell and Peltzman, 1985), losses of reputational capital (Rhee and Valdez, 2009), diminished customers' trust (Xie and Peng, 2009), and the disqualification and downgrading of firms by rating agencies (Sloat, 2015; Standard and Poor, 2015). Not surprisingly, in the attempt to avoid or, at least, minimize such risks, enterprises invest in the implementation and execution of elaborated corporate compliance programs (Haugh, 2017), as well as on routine internal and external auditing processes (Spira and Page, 2003; Knechel and Willekens, 2006).

If, on the one hand, adversities that take place within organizational borders can be troubling, the increasing complexity of the relationships among firms may extend the sources of instability. With the development of more acute outsourcing strategies (Quinn and Hilmer, 1994) and the consolidation of modern supply chains, production processes became fragmented among various actors, in a way that a clear delimitation of where the operations of individual organizations begin and where they end becomes even more challenging. Among other factors,

in face of this bureaucratic opacity and the eventual solidarity of responsibilities that follows, it is possible that a negative event originating in a particular company does not have its effects limited to it. Instead, upstream and downstream supply chain partners might be also detrimentally affected, or '*contaminated*' in a sense. In the episode known as the Rana Plaza collapse, for example, Western companies of the retail and fashion industry (e.g. Walmart, C&A, Benetton, Cato, H&M, Inditex, GAP, Sears, Tommy Hilfiger) were linked to the death and injury of more than 3,600 people due to extremely poor working conditions offered by suppliers in Bangladesh (Manik and Yardley, 2013; Wong, 2013). This collective crisis is argued to have not only damaged the reputation of these companies (Comyns and Franklin-Johnson, 2018), but also to have put their whole business models in suspicion (Motlagh, 2013; Siegle, 2014). Likewise, following serial global campaigns led by the environmentalist group Greenpeace, deforestation practices held by palm oil suppliers in Asia were associated to some of the largest multinational companies of the food industry such as Unilever (Ormsby, 2008), Nestlé (Ionescu-Somers and Enders, 2012), and Procter and Gamble (Davidson, 2014), demanding compelling answers from these companies in the addressment of the related reputational risks (Unilever, 2009). That would include the substitution of production inputs (Sonne, 2010), purchasing restriction to responsible compliant suppliers (Nestlé, 2017), the implementation of more rigid controls and reports (Procter & Gamble, 2015), among others.

In that way, more than a straightforward alignment of companies responsible for parts of a whole, supply chains would be more appropriately comprehended as complex (Wilding, 1998), dynamic (Levy, 1995), and often unstable (Vrijhoef and Koskela, 2000) organizational systems. Along with a series of challenges, such as the development of a proper functional integration (Lambert and Cooper, 2000), institutional transitions within emerging markets (Davis-Sramek, Fugate, Miller, Germain, Izyumov and Krotov, 2017), and the overcoming of cultural discrepancies (Ciliberti, Pontrandolfo and Scozzi, 2008), the coordination of distinct players

towards common objectives may be particularly demanding (Cachon, 2003). In that vein, Christopher and Lee (2004) argue that markets are embedded in uncertainty and turbulence, with supply chains being under increased vulnerability to disturbances and disruptions. As discussed by the authors, this systematic instability would reflect the constantly changing and evolving nature of business strategies, and, notably relevant to the current approach, the outcomes of exogenous events.

Particularly, global value chains (Gereffi, Humphrey and Sturgeon, 2005) of the most distinct industries have been pointed as breeding grounds for corporate unethical conducts and scandals (e.g. Barrientos, 2013; Crane, 2013). Beyond the circumstances discussed, several cases of modern slavery, child labor and extremely poor working conditions perpetrated by suppliers have been disclosed in the media, directly or indirectly linking international brands such as Apple (Garside, 2013), Zara (Antunes, 2011), and Disney (Chamberlain, 2016) to these matters. Within this reasoning, Acquier, Valiorgue and Daudigeos (2017) argue for the difficulties to define, implement, coordinate and value corporate social responsibility programs along complex value chains and Christopher (2016) alerts to a possible inadequacy of the term supply chain for designating current business schemes, as it may suggest over simplified one-to-one serial relationships among firms. Accordingly, it is possible that the term ‘network’ comes to be more suitable to translate the fact that focal firms may be at the center of an intricate web of interconnected and interrelated – but still independent – organizations. As a result of this enhanced complexity and interdependency across players, the author highlights that an action or an event taking place somewhere in this network will often cause unforeseen impacts in other parts of the system. The so-called chaotic or ‘butterfly-effect’ (i.e. “the idea (...) that a butterfly, flapping its wings somewhere over the Amazon basin, can cause a hurricane thousands of miles away” (Christopher, 2016: 159) would illustrate the applicability of the reasoning of unintended or unanticipated consequences (Merton, 1936).

Ancillary effects of negative events do not seem to be limited to global value chains or to sustainability related issues though, as operational disruptions and glitches, for example, are also claimed to disseminate across supply chain members (Scheibe and Blackhurst, 2017). From a sheer shortage of components (Tomlin, 2006) to strict losses in market value (Hendricks and Singhal, 2003, 2005), companies have shown to absorb, at least partially, the unexpected discontinuations in the production flows of their upstream partners. Even if this sort of repercussion seems to be unambiguous, the further investigation of the causes and effects of these phenomenon in supply chains and networks can very much add to the understanding and, potentially, to the prevention of unexpected value destruction in all sorts of business environments. Still, while the impact of a sudden interruption of physical flows (i.e. disruptions) is relatively well documented, the study of the effects of other sorts of events on supply chain partners (e.g. environmental disasters, corporate social irresponsibility, corruption, fraud and operational failure) is still underdeveloped in the literature.

The association of firms to crimes, condemnable management practices, operational difficulties and / or fails carried out by their partners suggests that negative events occurred in a firm (i.e. source firm) indeed hold the potential to negatively affect others. As firms' direct and indirect relationships with their partners become less obvious, supply chain risks (March and Shapira, 1987) must be reconsidered to account for this contemporary and possibly hazardous prospect. In referring to these outcomes, the concept of *supply chain contamination* is here defined as “the dissemination of negative events through supply chains, negatively affecting not only the market value of customers and suppliers (possibly that of customers of customers and suppliers of suppliers and so on), as well as potentially other dimensions such as corporate reputations, for instance” (Fracarolli Nunes, 2018: 581). In that way, the notion would be useful in denoting the extended effects that negative corporate events must have beyond the organizational limits of the firm originating it. Still, the definition supports the perception that

these consequences must travel across the links firms keep with one another when inserted in supply chains and networks. Figures 1, 2 and 3 illustrate a hypothetical case of *supply chain contamination*, representing the dissemination of a negative event across the upstream and downstream partners of a source firm. For simplification, only first and second tier suppliers are represented, being the same mechanism, however, applicable in the analysis of higher-level tiers, without prejudice of the structural rationale.



Figure 1: Phase I – A negative event takes place in a given focal firm

Source: Elaborated by the Author

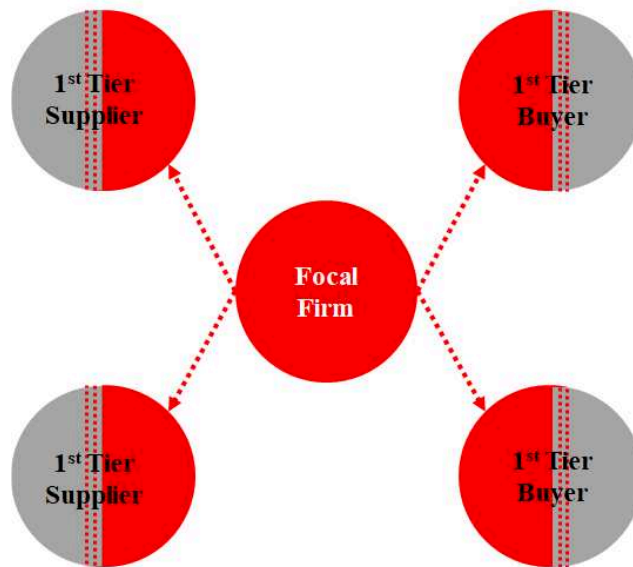


Figure 2: Phase II – First tier partners absorb the consequences of the negative event (both suppliers and buyers)

Source: Elaborated by the Author

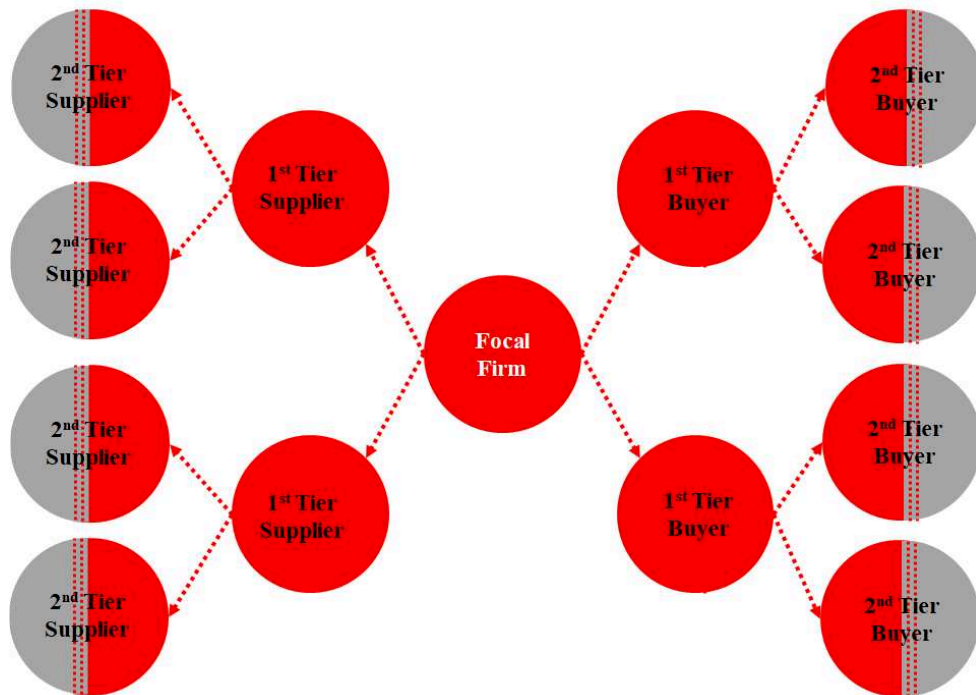


Figure 3: Phase III – Second tier partners absorb the consequences of the negative event (both suppliers and buyers)

Source: Elaborated by the Author

Within this set, the word dissemination assumes a distinct connotation from that most commonly associated with the transfer of practices from one company to another, especially for the implementation of corporate social responsibility policies (e.g. Luetkenhorst, 2004) and operational standards (e.g. Gereffi, Lee and Christian, 2009) within value chains. Instead of a rational orientation towards the implementation and possibly the uniformity of procedures across partners – or even between headquarters and subsidiaries (Acquier, Carbone and Moatti, 2018) –, in the present work the idea of dissemination is used to designate the unintended and possibly inevitable consequence of a negative event, referring to a process that, considered all the complexity of nowadays business environment may assume a “life of its on”. In other words, within the object of our analysis, the concept of dissemination would be closer to the spread of a disease within a given population, contaminating individuals as they share some interface.

It must also be noted that *supply chain contaminations* are not necessarily uniform, meaning that the consequences of a negative event may not propagate equally and maybe not even in a given order (1st tier, 2 tier and so on). According to the empirical evidence discussed in greater detail in the three articles of the thesis, it seems that several factors are influential in the pattern (if any) that this sort of dissemination shall assume (e.g. the nature of the event, the position of source firm in the supply chain, the reputational capital of each player). Figures 1, 2 and 3 must not be understood then as deterministic models for the process. Instead, they would be more adequately interpreted as illustrations of a standard or ideal case for the observation of the phenomenon. It forms, however, the initial idea over which the analysis and interpretation of the process are built across the three articles here presented, as well as across the body of the dissertation.

Nevertheless, while *supply chain contamination* must be argued to be discernible in the practical cases discussed before, apart from situations of supply chain disruption and glitches evidence on that direction remain either anecdotal or limited to perceptual measures, thus demanding both theoretical development and more solid empirical confirmation. Still, even if the concept of *supply chain contamination* must be useful to the diagnosis of the phenomenon, the comprehension of the process through which it occurs demands supplementary and more amplified perspectives. In that way, one must argue that the detached or isolated consideration of the causal relationship between a negative event and the *supply chain contamination* it may originate is limited to the representation of the beginning and the end of a potentially more complex process. Although the determination of empirical evidence on that sense is central to the reasoning discussed here, the comprehension, or, in some measure, the theorization of the mechanisms allowing such outcome must be useful.

The development that leads a company to be affected by events occurred in or caused by another is here portrayed in the concept of the *inertial effect*, illustrated in the image of “the waves caused by a stone that hits the water previously rested” (Fracarolli Nunes and Lee Park, 2016: 292). Broadly, this metaphorical transfer relates the disclosure of a negative event to the hitting of a stone in a calm water, and its dissemination across supply chain partners to the circular waves caused by the impact. Following the initial exploratory approach developed in the first study and the empirical evidence of the second, the inertial effect was conceptually structured. The rationale is further detailed in the section dedicated to the theoretical orientation ahead in the text and in the third article of this dissertation. Yet, within the reasoning of unintended or unanticipated consequences (Merton, 1936) and considering that none of these results is predetermined or planned, but possibly inevitable, the occurrence of *supply chain contamination* through the *inertial effect* is considered a *collateral effect*. In this context, a *collateral effect* would stand for the undesired and / or unpredicted consequences that negative events may come to cause, particularly for stakeholders of the firm originating it, or, moreover, to stakeholders of stakeholders (e.g. investors of supply chain partners).

On that regard Freeman (1984) defines stakeholders as any group that shall either affect or be affected by the operations of a company. The empirical demonstration that investors of a supply chain partner must be affected (i.e. *collateral effect*) by negative events occurred in or caused by a source firm (i.e. *supply chain contamination* through the *inertial effect*), allows the proposition of the concept of *incidental stakeholders*, here defined as “stakeholders of stakeholders, which, as such, may not be aware of their links with other companies, or even not consciously willing to take the risks associated with such a subsidiary connection” (Fracarolli Nunes, 2019: 4). The idea is central to the debate as, at the same time it contributes to an extended comprehension of the indirect relations between firms and different groups of stakeholders within supply chains, it also allows the construction of a theoretical model

proposing these links. Chart 1 below summarizes the four structural concepts developed, all more closely discussed in the section dedicated to the theoretical orientation of the dissertation, as well as along the proposed articles:

Chart 1: Developed Concepts on the Dissertation

Concept	Definition / Metaphorical Transfer
Supply chain contamination	Definition - “the dissemination of negative events through supply chains, negatively affecting not only the market value of customers and suppliers (possibly that of customers of customers and suppliers of suppliers and so on), as well as potentially other dimensions such as corporate reputations, for instance.” (Fracarolli Nunes, 2018: 581)
The inertial effect	Metaphorical transfer - “the waves caused by a stone that hits the water previously rested” (Fracarolli Nunes and Lee Park, 2016: 292)
Collateral effect	Definition – “the undesired consequences that negative events may come to cause, particularly for stakeholders of the firm originating the negative event, or, moreover, to stakeholders of stakeholders (e.g. investors of supply chain partners)”
Incidental stakeholder	Definition - “stakeholders of stakeholders, which, as such, may not be aware of their links with other companies, or even not consciously willing to take the risks associated with such a subsidiary connection” (Fracarolli Nunes, 2019: 4)

Within an inductive perspective and aiming to offer both evidence and additional understanding on the process of *supply chain contamination* through the *inertial effect*, the present dissertation proposes three individual, yet interrelated articles focused on the analysis of the *collateral effects* that corporate crisis, incidents and adverse situations may cause to the *incidental stakeholders* of a company. More specifically, along with the debate of 30 individual cases of environmental disasters, corporate social and environmental irresponsibilities, operational failures, fraud and corruption, and through the employment of the event study method, the consequences to the investors of a company in reason of a negative event concerning a supply chain partner (i.e. source company) are measured. Along with the test of

this effect, contextual conditions of the cases analyzed are approached, and the process of dissemination is approached through the development of concepts discussed above.

In that way, despite the implicit hypothesis that investors may adversely react to negative events within supply chain contexts, an exploratory approach is developed in the first article. Beyond the identification of cases and the documentation of the supply chain relationships in question, the open and comprehensive sampling procedure adopted allowed an initial differentiation between the effects emerging from distinct types of events, as well as the analysis around what sort of supply chain actor (i.e. source firm, buyers or suppliers) would be at greater risk to be affected. Following this opening investigation, the hypothesis that investors of supply chain partners are penalized for negative social / environmental events occurred in or caused by a source firm is tested in the second article of the dissertation. Based on the results of these two initial articles, one case was selected to be further studied because of its representativeness. The third article extends then the investigation of the case known as the Volkswagen Dieselgate, exploring the effects of the scandal to investors of companies of the American automotive industry. Figure 4 below presents a general schema of the chain of ideas developed in the three articles, making up their unit around the goals of the dissertation. The image of a horizontally segmented cone illustrates the notion that throughout the conduction of each individual study the investigation was tapering, in a way a macro-to-specific path was followed.

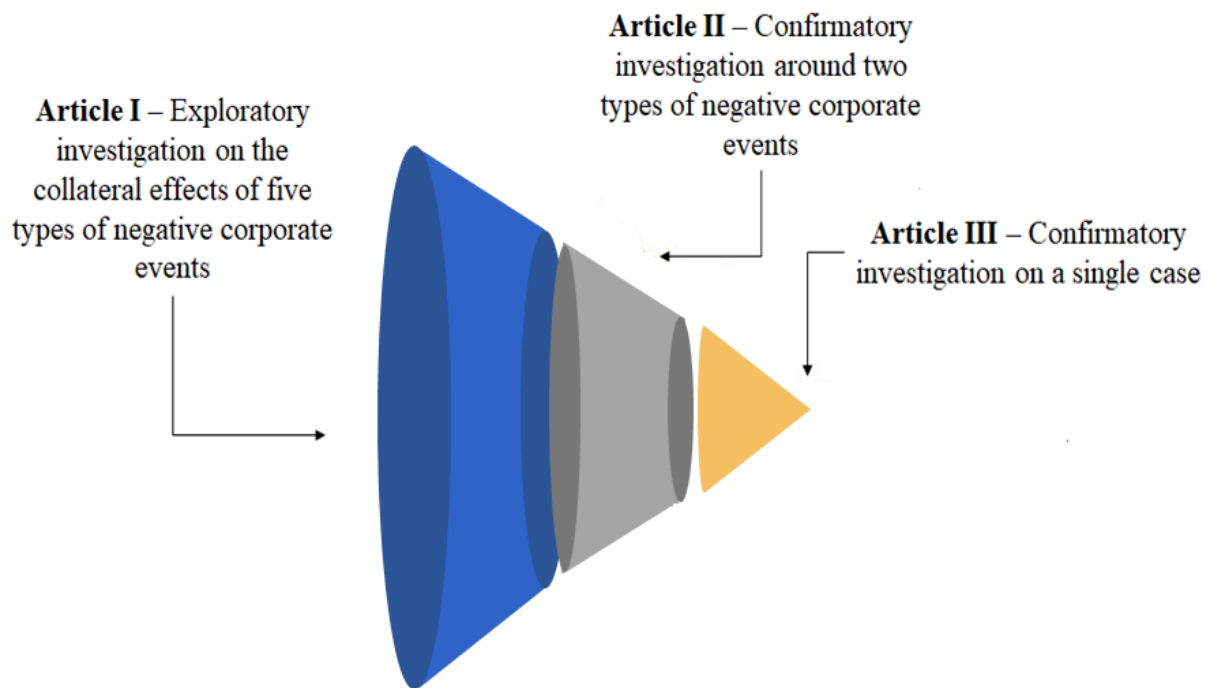


Figure 4: General Schema for the Dissertation in Three Articles

Source: Elaborated by the Author

After this central reasoning, the next section elaborates the main motives justifying the present investigation, as follows.

1.2. Motivation of the Research

Beyond standing as significant environmental challenges for individual companies (Massini and Miozzo, 2012), the reorganizations of manufacturing processes in the last decades have sensibly changed the relations firms keep with their buyers and suppliers (Brennan and Turnbull, 1999). Still, as organizational (mis)behavior seems to be openly debated on both traditional (Clemente and Gabbioneta, 2017) and social media (Starbird, Dailey, Walker, Leschine, Pavia and Bostrom, 2015), customers' awareness and criticism of operational patterns becomes increasingly complex, giving rise to a series of risks to which companies may be tied. By relegating important parts of their operations to third parties, for example, firms may incorporate condemnable social and environmental practices to their productions chains (Stainer and Grey, 2007). Whether due to negligence (Lin-Hi and Müller, 2013), incompetence (Mbogoh and Ogutu, 2017) or lack of economic incentives (Knox and Maklan, 2004), deficiencies in the appropriate implementation and control of corporate social responsibility principles by lead firms may result, among other things, in severe abuses of human rights and disrespect to sustainability principles in developing countries (Smith, 2003).

As discussed by Huber (1984: 931), post-industrial societies would be characterized by “more and increasing knowledge, more and increasing complexity and more and increasing turbulence”. The reasoning of the author seems to translate the instability of today's business environment that may somehow present specific menaces to firms operating in the global arena. Acquier, Gand and Szpirglas (2008), for example, argue that in face of the multiplication of public controversies issued from technical uncertainties, (Beck, 1992, 2005; Callon, Lascoumes, and Barthes, 2001), the increased number and assortment of stakeholders, snowball effects, and the augmented reach of communication within social systems, the control and management of crisis tend to become more problematic (Boin and Lagadec, 2000). Along with

the perception that companies are under strong surveillance and have their actions and carelessness immediately and openly debated by stakeholders, the notion that the practices or fails of a given company can negatively affect *incidental stakeholders* within its supply chain motivates the present study. In that way, the following sub-sections present more detailed debate on the complexity of modern supply chains and the risks emerging from them, the practices of corporate social irresponsibility as a phenomenon arguably more prone to take place in global value chains, and, finally, the debate of how negative corporate information may sharply affect companies as they are discussed in social media and on the internet as a whole.

1.2.1. Supply Chain Complexity

In noting structural changes in the organization of production, authors have stressed the increasing turbulence and uncertainty on market places in the last decades. For Christopher and Lee (2004), for instance, the volatility in demand was intensified in most industrial sectors as product and technology life-cycles have been significantly shortened. Wilding (1998), in turn, claims that globalization pressured firms to rethink their strategies as the trade-offs between operational costs (e.g. labour, transportation, inventory) and response time to customers became progressively intricate (Sharma, 1997). In that direction, Levy (1995) relates the augmented internationalization of industry value chains to both the higher permeability of national boundaries and the greater mobility of capitals. Accordingly, that would lead managers to face the key issue of deciding where components and finished goods are to be more efficiently sourced (i.e. internationally versus geographically close).

In answering these joint pressures for operational excellence (Tyndall, Gopal, Partsch and Kamauff, 1998) and cost efficiency (Hung Lau and Zhang, 2006), firms turned to outsourcing

alternatives, as the transferring of non-strategic activities to third parties would allow the offer of unique value for customers (Quinn and Hilmer, 1994). More specifically, following important social episodes of the 20th century such as the fall of the Berlin wall in 1989 (Quelch, Joachimsthaler and Nueno, 1991) and China's accession to the World Trade Organization in late 1990s (Bhala, 2000), Western companies advanced the de-verticalization of their operations as a form to enhance their competitiveness. At the same time the dispersion of economic activity (Jones, Kierzkowski and Lurong, 2005) to distinct geographic regions – e.g. Asia (Li, Lee, Hong, Haney and Kang, 2017), Eastern Europe (Marin, 2006) – allowed firms to profit from the massive supply of low-cost labor force (Egger and Falkinger, 2003), the consolidation of outsourcing strategies permitted them to specialize in their core competencies. By the time, multinational companies such as Nike typically transferred low value-adding activities (e.g. shoe production) to third parties, concentrating on the more technologically and managerial demanding operations of pre- and post-production phases (e.g. research and development, marketing, distribution and sales) (Quinn and Hilmer, 1994). Within a Ricardian perspective of comparative advantages (Ricardo, 1817; Milberg and Winkler, 2013), products previously conceived, made and commercialized in their entirety in a single country – and not rarely by individual companies – were now the result of an integration of processes of several foreign organizations, each contributing to the limit of their own specializations (Marin, 2006).

Beyond the development and management of more precise controls of physical flows (Humphrey and Schmitz, 2002a), these forms of multi-organizational business models also required the adoption of more refined relationships with geographically and potentially culturally distant buyers and suppliers (Berry, Guillén and Zhou, 2010). On that regard, Acquier, Valiorgue and Daudigeos (2017: 141) highlight that the literature on global value chains “(...) has explored how international trade and the global division of labour have led to an increased complexification and interconnectedness of production processes”. In that way, it

seems that the development of modern supply chains is the product of a circuitous path that led firms to concentrate on fewer competencies while diluting low value adding activities throughout the most effective possible partners. As a result, beyond linear 'supplier-organization-customer' schemes (Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia, 2001), the alignment of numerous specialized companies towards common interests became more challenging and sophisticated. Within this set, Lee Park and Paiva (2018:1955) discuss the increasing relevance of cultural aspects in the implementation of operations strategy. As stressed by the authors, "global supply chains emerge as a model for competitiveness, leading to different cultures interacting in cooperative behavior to gain better performance and competitive advantage". In other terms, as business environments became more uncertain and demanding, supply chains and supply chain networks gained complexity.

Incidentally, a social-technical system would be considered complex in case it is "made up of a large number of parts that interact in a nonsimple way" (Simon, 1962: 468). From this definition, two determinant qualities of complexity would follow. While structural complexity would refer to the number and diversity of elements defining the system, dynamic complexity would concern the interaction between them (Bode and Wagner, 2015). As pointed by the authors, these qualities would be especially present in supply chain contexts (Manuj and Sahin, 2011; Skilton and Robinson, 2009). In face of these and other perspectives, there would be "a general consensus that supply chains have become increasingly complex over the last decades" (Bode and Wagner, 2015: 216). In that vein, Surana, Kumara, Greaves and Raghavan (2005: 4235) posit that "supply chains have acquired a complexity almost equivalent to that of biological systems", while, Hwarng, Chong, Xie and Burgess (2005) argue for the complexity of multi-level supply chains managing operational parameters such as batch size, delivery frequency and ordering cycle. Similarly, Choi, Dooley and Rungtusanatham (2001) classify supply chain networks as complex adaptive systems (i.e. systems that conform and organize

without a specific entity managing or controlling it (Holland, 1995)). Holmberg (2000) adds that both the temporal and geographic separation between effects and causes (i.e. the time gap between an origin and its consequences and the fact that outcomes may be observed away from its source, respectively) increases complexity, condition worsened by the functional division typical of supply chains.

Beyond the perception that the relations between supply chain partners have, in general, become more mosaic and elaborate, the discussion of supply chain complexity is relevant as firms may be seen as parts of systems and networks. The idea is a central motive to the present development as, in such condition, collective responses to negative events rising in any part of these structures may be expected (i.e. dissemination). Considering the multitude of issues firms may face from possibly unpredicted situations, a further comprehension of the effects and mechanisms of these questions seems opportune. From a complementary perspective, the implications of higher levels of intricacy relates to the arguable enhanced risk that result from them. The next sub-section develops then the idea that supply chain complexity is linked to riskier supply chain profiles, representing thus an additional reason for the present dissertation.

1.2.2. Supply Chain Risk and Supply Chain Risk Management

Despite the benefits of operational specialization, the contortion of business relations would not be free of downsides. Along with the consensus that supply chains have become more complex, there would be also relative unity around the idea that “this complexity is not a desirable feature” (Bode and Wagner, 2015: 216). As noted by the authors, beyond complicating decision making (Manuj and Sahin, 2011), this condition would also precipitate disruptions (Chopra and Sodhi, 2004; Craighead, Blackhurst, Rungtusanatham and Handfield, 2007). That would be due to the increased tightness and interdependence of supply chains, position that leads eventual

breakdowns at any point to cause harmful outcomes and inefficiencies (Berger, Gerstenfeld and Zeng, 2004). In that way, issues such as natural disasters, labor disputes, and terrorism, among others, would represent important threats to the natural flow of material, information and cash across partners (Chopra and Sodhi, 2004).

On that regard Jüttner, Peck and Christopher (2003), point that pessimism around the “millennium bug” (i.e. the expectation that operations of machines and computers would collapse due to a possible incapacity to recognize year 2000) would be on the origin of risk concerns within supply chain contexts. Likewise, worries in the food industry (e.g. foot and mouth disease in the UK) and the instability caused by terrorist attacks in the United States would have also added to the perception that more robust contingency planning approaches were needed in the field. In turn, Tang (2006) links the increasing relevance of supply chain risk management to the implementation of new business models by industrial companies in the last decades. As pointed by the author, while outsourced manufacturing would be efficient in providing firms with cost advantages, the strategy would operate properly only in stable environments, with disruptions associated with uncertain economic cycles, consumer demands, as well as with both natural and man-made disasters turning supply chains significantly more vulnerable. In that way, while risk management would be more strongly developed in related disciplines like economics (e.g. Kahnemann and Tversky (1979); Tversky and Kahnemann (1992)), finance (Smith, Smithson, and Wilford, 1990), strategic management (e.g. Bettis and Thomas, 1990, Simmons, 1999), and international management (Miller, 1992; Ting, 1988), the discussion around (sources of) instability in supply chains would be only on its infancy by the time (Jüttner, Peck and Christopher, 2003). Similarly, Manuj and Mentzer (2008) recognize previous developments, stressing that, even if contingency management approaches were relatively efficient in treating issues of individual firms, they would not be directly applicable for groups of companies aligned in the form of supply chains.

This apparent late attention to the predictability of negative events and circumstances is, to some degree, surprising, as the discussion around the benefits and necessity of planning and forecasting would be solid within supply chain management literature. Paiva, Teixeira, Vieira and Finger, (2014), for example, show that at the same time planning would be positively related to trust between partners, it would also influence supply integration and operational performance. Stadler (2005), in turn, positions advanced planning as a building block of supply chain management, with Advanced Planning Systems (APS) being complementary to Enterprise Resource Planning ones (ERPs). Yet, considering that the capacity to share information shall be one of the main sources of differential performance within supply chains (Lee, So and Tang, 2000), the preservation of adequate levels of trust among partners must be important to the stability and, particularly relevant to the present discussion, the predictability of operations. The idea of transparency would assume thus an important role, as, beyond avoiding typical transaction costs (e.g. contracts) (Coase, 1937), it would turn relationships between supply chain partners more direct and dynamic. From this angle, it must be argued that, by simultaneously meeting two lasting manufacturing capabilities (cost efficiency and speed) (Ferdows and De Mayer, 1990) transparency would be critical not only for the operational performance of individual companies, but also to the conjunct of transactions within supply chains, with (ERPs) being often pointed as important tools in that direction (Akkermans, Bogerd, Yücesan and Van Wassenhove, (2003). As argued by Paiva, Roth and Fensterseifer (2008), however, rigid processes of strategic planning would not fulfill businesses needs under dynamic environmental conditions.

The relevance of transparency has also been linked to successful sustainable supply chain management, as, among the many factors pushing the sustainability debate would be the greater clarity of companies' environmental and social actions (Carter and Easton, 2011). Illustrative of that would be some of the measures taken by American companies such as Hewlett-Packard,

Nike, Intel and Apple in the last years, among which the publication of their respective supplier lists (Wingfield and Duhigg, 2012). In the case of Apple, more specifically, that would stand as a response to a series of accusations regarding bad practices on its supply chain (e.g. extremely harsh working conditions, child labor). Although the decision may not be directed to increase trust on its business-to-business relations (i.e. among all the companies involved in the production and distribution processes), it is arguably intended to offer more accurate information to customers. As discussed by (Akkermans, Bogerd, Yücesan and Van Wassenhove, (2003), markets are becoming increasingly more transparent, with customers' demands on that direction being met in a more personalized way (Pepper and Rogers, 1999; Jensen, 1999). Connected to the enhancement of supply chain transparency would be the idea of a greater visibility. As discussed by Delen, Hardgrave and Sharda (2007), the emergence and development of new technologies such as the radio frequency identification (RFID) would be key in the provision of real time information for partners. Indeed, authors argue that the motivation of supply chain management rests exactly on the elimination of barriers, what would be mainly dependent on the synchronization and sharing of information among buyers and suppliers (Kouvelis, Chambers and Wang, (2006). Accordingly, inventory management and asset utilization would absorb the most important benefits of an improved information visibility. Fawcett, Magnan, and McCarter, (2008) add that supply chain management would indeed lead partners to profit from the reduction of inventories, improved delivery services and shortened product development cycles.

Authors also point to other gains such as the increased resilience (Brandon-Jones, Squire, Autry, and Petersen, 2014). Within this reasoning, the understanding of supply chain management as one of the most challenging strategic issues faced by firms would reflect the constantly changing business environment, encompassing new rules of competition, the globalization of industries, the growing pressures on prices and the increased control held by

consumers (Christopher, 2016). Supply chain risk management through the development of greater levels of transparency and visibility would be then important not only in the avoidance of potential harmful sustainability issues, but also in the preservation of the continuous flows of goods across players. For the adaptation of risk management approaches to be successful (i.e. from individual companies to supply chains), it seems that the proper comprehension of the process through which logistics principles have been extended upstream and downstream becomes necessary, as, along with the dissemination of practices, concerns with the management of instability would follow. On what comes to supply chain risk, for Kleindorfer and Saad (2005), supply chain design and management are mainly susceptible to either uncertainties from the miscoordination of supply and demand or by exposures to the disruption of normal activities. Walters (2011:196), in turn, argues that resilience would be dependent on competent supply chain management within organizations, being connected with principles of risk reduction. Nevertheless, the reach of greater resilience in the supply chain level would be also dependent on the development of cooperation among companies. As stated by the author supply chain risk management “is the only way to make serious progress, and this implies cooperation in the fundamental design of a supply chain”.

Major problems in supply chains would not be restricted to exceptional happenings though. Instead, daily supply chain management questions, such as the poor quality of purchased products and services, are also pointed as important sources of instability, possibly presenting a domino effect from their origin to the final customer (Zsidisin, Panelli and Upton, 2000). In dealing with these matters, supply chains would become less efficient, as operational redundancies, less reliable lead times and less certain demand scenarios (Sheffi, 2001) would follow disruption management. Even leading manufacturing companies such as Dell, Toyota and Motorola, for instance, would incur in the maintenance of additional levels of inventory,

capacity and other connected elements throughout their entire supply chains as manners to treat the issue (Chopra and Sodhi, 2004).

Considering that the idea of risk is related to situations of instability and uncertainty (Miller, 1992) on which the predictability of outcomes is impaired (Ferson and Harvey, 1993), the possibility of disruptions may be framed as a form of operational exposure normal to supply chains. Supply chain risk, more specifically, would be understood then as “the variation in the distribution of possible supply chain outcomes, their likelihood and their subjective values” (March and Shapira, 1987: 1404). From this reasoning, Braithwaite and Hall (1999) point that supply chains may come to integrate hundreds or even thousands of companies across several tiers, encompassing considerable levels of risk to these structures. Likewise, Manuj and Mentzer (2008) claim that, given their numerous links interconnecting a wide network of firms, global supply chains would be riskier than domestic ones. Beyond a higher probability of disruption, the authors also highlight that such links may be also object of bankruptcies, breakdowns and macroeconomic and political changes, conditions that altogether would make supply chain risk management particularly difficult. Within a similar view, Harland and Brenchley (2001) point that supply chain risk may assume different forms. Building on that idea, Christopher and Lee (2004) stress that significant financial volatility comes from inventory costs due to obsolescence, markdowns and stock-outs. Still accordingly, the complexity and uncertainty of supply chains would also be responsible for what the authors call the ‘chaos risks’, effect resulting from over reactions, unneeded interventions, hesitations, mistrusts, and the spread of distorted information across partners (Childerhouse, Hermiz, Mason-Jones, Popp and Towill, 2003). The bullwhip effect (Lee, Padmanabhan and Whang, 1997a, b) – further discussed ahead as a form of dissemination in supply chain – would be an example of such situations (Christopher and Lee, 2004). In fact, considering that supply chains are argued to embody the means for the creation and maintenance of sustainable competitive

advantages (Barney, 2012), the protection of these means (through supply chain risk management) must be seen as strategic. Beyond allowing for the avoidance of punctual failures and disruptions, supply chain risk management may also work in the preservation of firms' intangible resources (e.g. corporate image, corporate identity, corporate reputation, credibility). From a customer value point of view, it is possible that interruptions of physical flows may come to harm not only the availability of products, but also the general attitude towards firms. Within this perspective, supply chain risk management would assume an arguably more complex task, as the desynchronization of flows would inevitably impact the sources of value creation in a long-term horizon.

In the context of global value chains, however, it seems that reputational risks (Fombrun, Gardberg and Barnett, 2000) gains further importance. As previously discussed, beyond the immeasurable cost of human lives, episodes linking companies of the fashion industry to thousands of deaths in Bangladesh, for instance, would severely impact the corporate images of the correlated brands. Similarly, cases associating global market leaders such as Apple to the decease of workers in Chinese suppliers (e.g. Foxconn) (Torres, Garcia-French, Hordijk and Nguyen, 2012) call for a more detailed comprehension of the extended consequences that corporate social responsibility fails may present to firms inserted in these contexts. While reputational issues may also raise from operational failures and setbacks like product malfunctioning and recalls, the disrespect to social and environmental matters within global value chains have given rise to a series of corporate scandals that indirectly related supply chain partners to these practices. The next section hence deepens corporate social irresponsibility issues within global value chains as an important stimulus for the present investigation.

1.2.3. Corporate Social Irresponsibility in Global Value Chains

As discussed, in response to mounting pressures for lower operating costs, the production processes of numerous companies have been thoroughly remolded in the last decades (Christopher, 2016). However, at the same time the development of production de-verticalization intensified, sustainability requirements became more demanding, turning the management of outsourcing production into the challenging activity of balancing low-cost outcomes with the meeting of both social and environmental standards (Babin and Nicholson, 2012). Even though the idea that firms have social responsibilities may be traced back at least to the beginning of the 20th century (Acquier and Gond, 2007), demands on that sense - along with the environmental perspective - seem to have intensified in the last decades. From this tension, multinational companies sourcing in developing countries were pressured not only to implement sustainable methods, but also to supervise the social and environmental practices in the operations of their suppliers, in a way that their production would come to be conducted in respect to rigorous sustainability guidelines (Svensson, 2007; Carter and Rogers, 2008).

Within this logic, the production of labor-intensive goods would generally be organized by global buyers working for (or on behalf of) major retailers and brand-name organizations (e.g. Tesco, Marks & Spencer, Gap) (Humphrey and Schmitz, 2002b). As pointed by the authors, that would be the case in many commercial exchanges between developed and underdeveloped countries encompassing the trade of products such as garments from East Asia to the United States (Gereffi, 1999), and the commerce of footwear between countries and regions like China and Brazil on one side and the United States and Europe on the other (Schmitz and Knorringa, 2000). In the context of this dismemberment of operational responsibilities, the need for these Global Value Chains (Gereffi, Humphrey and Sturgeon, 2005) to organize became urgent, as modern competition did not seem to be played by individual businesses any longer (Lambert and Cooper, 2000).

With the presence of power asymmetries in such arrangements (Acquier, Valiorgue and Daudigeos, 2017), the concept of governance would be central, as some members are expected to “set and / or enforce the parameters under which others in the chain operate” (Humphrey and Schmitz, 2002b: 20). As discussed by Kaplinsky (2000), the capacity to govern would tend to be possessed by those running intangible activities, often characterized by high barriers to entry (Porter, 1980). While these steps would be usually held in developed countries, production in developing ones would be limited to the respect of the parameters established by ‘governors’. Western retailers and multinational companies of the food industry, for example, have determined rigid standards for the production and processing of nourishment and other products (e.g. British Retail Consortium (BRQ), Global-GAP, Safe Quality Food (SQF) (Van Dijk and Trienekens, 2012). The set of these private production standards would target the improvement of quality and consistency of suppliers’ outcome, the enhanced control over suppliers’ production processes, the simplification of auditing and certification mechanisms, and the support to consumers’ and societal demand for socially responsible products, among other goals (Trienekens and Zuurbier, 2008). From this prospect, it seems that, according to their main objectives, the search for operational standardizations shall be classified in two main groups: in the first, variations in the quality of outcomes would be ideally eliminated, while in the second, respect for workers’ and human rights in general would be under constant vigilance, as “governments, activists, and the media have become adept at holding companies to account for the social consequences of their activities” (Porter and Kramer, 2006: 78).

Within a corporate social responsibility view (Carroll, 1999), beyond the attention to the sustainability risks previously discussed, supply chain management literature normally focusses on the enhancement of corporate images as the main reason for the adoption of responsible practices, as such attitudes would be valued by stakeholders (Chowdhury, Sundström and Hyder, 2016). As discussed by the authors, responsible images would allow companies to

differentiate from competitors (McWilliam and Siegel, 2000), positively affecting customers' purchasing decisions (Du, Bhattachariya and Sen, 2007). In that way, it may be argued that fails in the implementation and control of responsible practices in supply chains may be damaging to lead companies. Nevertheless, academic production has traditionally focused on the meaning and expectations for responsible behaviors, neglecting, to some degree, the substance of irresponsible ones (Lange and Washburn, 2012). Following the disclosure of a series of corporate scandals though, scholars have progressively approached affiliated themes. Moreover, beyond all the prominence of these and other co-related sorts of episodes in traditional communication channels (e.g. printed newspapers and magazines, radio stations, TV networks), social media seems to have functioned as a dynamic environment for both, the dissemination of such news and for their wide debate. As observed by Chae (2015), several business issues are treated under the hashtag '#supplychain' in the social media Twitter. Accordingly, along with more neutral issues such as information sharing and the hiring of professionals, critic topics related to corporate social responsibility, human rights and environmental standards are also commonly and openly debated, some of which carrying strong sentiments about companies. In consideration of this contemporary risk factor, the following subsection approaches the impacts that the fast and virtually immediate network communication may have on the dissemination of negative news around companies, industries and supply chains as an additional factor reasoning the development of the present study.

1.2.4. Public Debate and the Circulation of Negative Information

Understood as "internet-based applications (...) that allow the creation and exchange of User Generated Content" (Kaplan and Haenlein 2010: 61), social media is claimed to place considerable influence in the interrelation between companies and their stakeholders (He, Zha

and Li, 2013). Platforms such as Facebook (Ellison, Steinfield and Lampe, 2007), Twitter (Kwak, Lee, Park and Moon, 2010) and Youtube (Burgess and Green, 2013), for instance, have been largely employed as powerful communication environments for the advertising of products and services, as well as for their free evaluation by customers (Kietzmann, Hermkens, McCarthy and Silvestre, 2011). As an immediate response to the augmenting influence of these transferring mechanisms, firms have enhanced their communication efforts with consumers in such contexts (Gu and Ye, 2014) as, apart from issues related to their intrinsic political power (Shirky, 2011), or the use of novel and responsive technologies (Murthy and Gross, 2017), the increased relevance of social media seems to reflect changes in how users interact with it. As observed by Kietzmann, Hermkens, McCarthy and Silvestre (2011), that would stand for consumers' progression from a passive to an active position in terms of content, as they moved from text readers, video viewers and merchandise and utility buyers to creators, modifiers and vectors of information sharing. Following that shift, companies would have accelerated their electronic presence to offer their businesses to different publics, as well as to further interact with their clients (He, Zha and Li, 2013).

Beyond the potential positive outcomes of that synergy, just as increased brand equity (Kim and Ko, 2012) and loyalty (Laroche, Habibi and Richard, 2013), latent adversities may come to rise in response to negative customer experiences. In that vein Gallagher and Ransbotham (2010) identify three distinct flows of information within social medias: firm-to-customer, customer-to-firm, and customer-to-customer. Particularly relevant to the argument of the present work is the lack of impediment or content filtering represented by the former possibility, as it may seriously compromise the control firms may have traditionally exercised over the messages they officially convey. In this way, upon the occurrence of varied incidents such as service failures (Grégoire, Salle and Tripp, 2015), environmental disasters (Starbird, Dailey, Walker, Leschine, Pavia and Bostrom, 2015), product recalls (Lee, Hutton and Shu, 2015), and

even adverse drug reactions (Nikfarjam, Sarker, O'Connor, Ginn and Gonzalez, 2015), companies' names may be openly debated in a global terrace, with their attributes and capabilities being potentially disparaged or impugned as a prompt result. On that regard, He, Zha and Li (2013) also point to the development of massive openly and unimpededly available loads of user-generated tenor.

Considering the high reach of internet-based social media (Mangold and Faulds, 2009), such open flows of opinions and statements may be argued to hold a significant potential to compromise the image of companies not directly involved in negative practices. Also representative of that matter is the fact that the closer follow-up and analysis of social media is too argued to offer treasured inputs on the expectation publics hold around the response of firms to negative episodes, particularly relevant to the effective management of corporate crisis (Jin, Liu and Austin, 2014). Referring to the Mattel's toy recall, for instance, online consumers' response to the case encompassed a range of negative feelings such as confusion, fear, worry, alert and anger, with the two former demonstrating significant negative relation to organizational reputation (Choi and Lin, 2009). In this way, the perception that firms' reputations may be in constant risk due to this increased interconnectivity represents an additional risk factor that, along with the others previously presented, justifies our research as a valid instrument in the addressment of contemporaneous and relevant questions faced by firms. Besides, the questions raised offer the opportunities to supplementary views on the literatures of supply chain management and the Stakeholder Theory, as further addressed in the section dedicated to the theoretical orientation of the dissertation, as well as on the proposed articles. Figure 5 below summarizes the main points discussed in this section, showing how the complexity of management and risk control has evolved in the last decades.

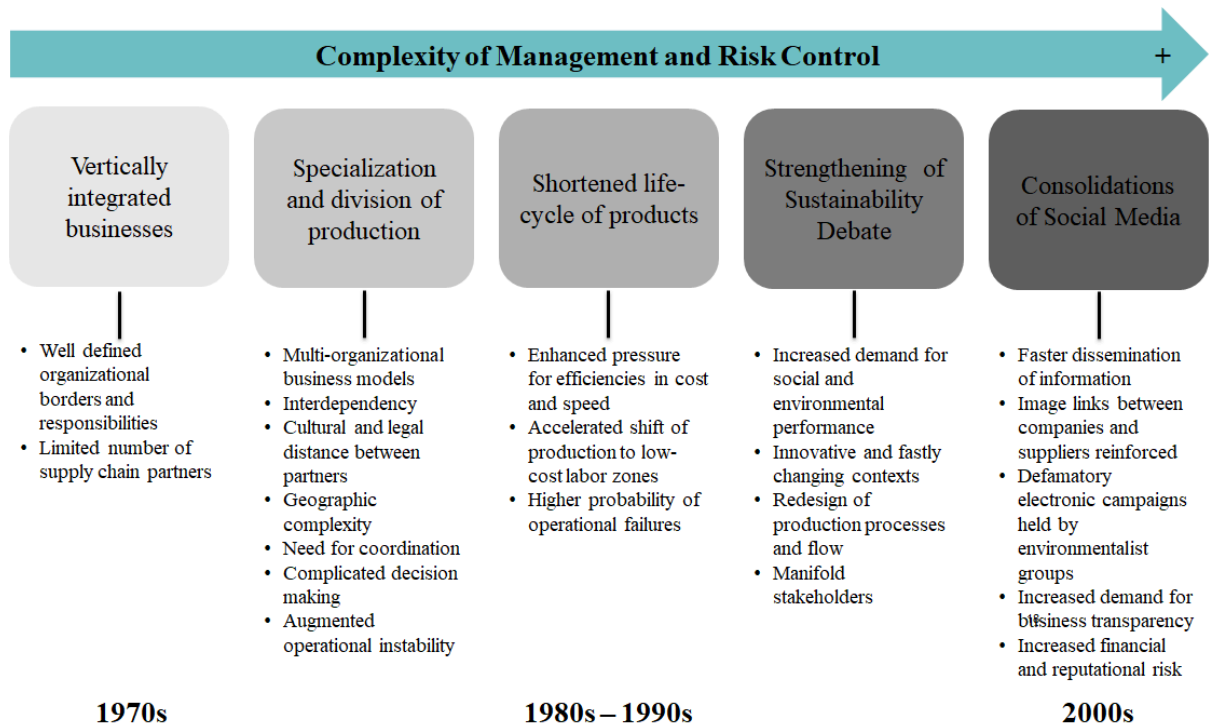


Figure 5: Evolution of Complexity of Management and Risk Control Increase over the years

Source: Elaborated by the Author

Part II – Overview of the Theoretical Orientation

The present section discusses the ongoing position of the literatures on supply chains, on the dissemination across supply chain partners, on the Stakeholder Theory, as well as on effects of corporate events. The individual discussion of these four themes is particularly relevant to the present investigation as the combination of concepts they offer form the basis for the development of our main objects, which are here conveniently denominated *supply chain contamination*, *inertial effect*, *collateral effects* and *incidental stakeholders*. In this sense, although standing for senses of distinct nature, the concepts of supply chain disruption, bullwhip effect, corporate events, market value destruction, and stakeholders, among others, are all discussed as composing a broader sense of risk to which firms within supply chains and networks may be exposed. From this view, along with the aspects argued to properly distinguish the ideas, the following sub-sections also present the literatures which stress their similitudes, in a way that a clearer and more precise image of the current state of the research on these areas is provided. Therewithal, the individual debates on each theme is also intended to add to the formulation of *supply chain contamination*, *inertial effect*, *collateral effects* and *incidental stakeholders* as theoretical construct partially built from others.

2.1. Supply Chains

Despite the wide employment of the term and the hefty development of the literature in the last decades, a convergent understanding around the nature of supply chains still appears to be somewhat distant for both academics and practitioners. Through the evolution of the debate – from its origins on late 1980s and early 1990s to the present – the proposed views around the concept seems to oscillate between the alignment of buyers and suppliers for the implementation of well-coordinated movements of materials (e.g. Lee and Billington, 1993), until more comprehensive perspectives, which, among other things, also embrace the flow of information (e.g. Vanpoucke, Boyer and Vereecke, 2009), funds (e.g. Tsai, 2008) and trade credit (Huang and Hsu, 2008), the presence of collaborative relationships (e.g. Formentini and Romano, 2016), and, more recently, the return of waste and used goods into the system (e.g. Östlin, Sundin and Björkman, 2008; Zeng, Chen, Xiao and Zhou, 2017). Independently of narrower or more comprehensive understandings, the relevance attributed to supply chains seems to have considerably grown, in a way that the concept may be hardly neglected by those analyzing disparate business matters such as the forms of trade and exchange on the modern economy, as well as the nature, the delimitation or even the rigidity of organizational borders.

Around the reasons bringing supply chains to the mainstream management debate might be this rapidly changing competitive environment, which, fueled by globalization, allowed firms to concentrate on their strengths while delegating parts of their operations to external players, often in distant corners of the world. Understood as the transfer of non-critic activities for which firms counts on no special capabilities to third parties, strategic outsourcing – allied with focus on core competencies – would comprehend the basic compound allowing managers to increase the skills and resources of firms in the search to increased competitiveness (Quinn and Hilmer, 1994). This sort of capability-based competition seems to be imbedded in the idea that firms no

longer competed through products and markets, but rather, through business processes (Stalk, Evans and Shulman, 1992). That would have moved the basis of marketing success from the development of strong brands sustained by significant advertising and selling to the notion that superior value is created by the more effective management of firms' core processes in relation to their competitors (Christopher, 2016).

As discussed by Beamon (1998), in turn, the transition from the focus on individual processes of single firms to a more comprehensive and general attention to the performance, design and analysis of supply chains would reflex, among other things, elements such as increased costs of manufacturing, lower supplies of basic resources, diminished life cycles, more egalitarian competition, and, broadly, the globalization of markets. Skjøtt-Larsen, Schary, Mikkola and Kotzab (2007), in turn, claim that with the expansion of global competition, the outsourcing of lower value activities to underdeveloped countries and the shortening of product life cycles, supply chain management has been increasingly figured as an area of great strategic importance to firms. On that regard, Evrard-Samuel, Goury, Gunasekaran and Spalanzani (2011) point to the leading operations strategy position assumed by supply chain management in both manufacturing and service industries, while Andersen and Skjøtt-Larsen (2009: 75) claim that “the capability to establish close and long-term relationships with suppliers and other strategic partners has become a crucial factor in creating competitive advantage”. Similar view is offered by Calvi, Evrard-Samuel, Merminod and Poissonnier (2014) who frame the development of partnerships between supply chain players as a vector of value creation.

Within this rationale, from late 1980s on, business practices have watched the focus on operational optimization gradually changing from individual facilities to supply chains (Linton, Klassen and Jayaraman, 2007) as a form to minimize the production cost of goods and services (Handfield and Nichols, 1999). In assessing the evolution of logistics and supply chain

management in Brazil, for example, Machline (2011) point to the similarities of the process observed in the country to that developed in the United States, even if with some years of gap between them. As stressed by the author, the focus on transportation was predominant in the decades of 1950s and 1960s, being amplified in the following two decades to accommodate a more managerial approach, incorporating issues such as stocks and warehouse management, deposits, information and communication. Still after the author, the transposition of these concepts into the broader notion of supply chain management only took place in Brazil in the 1990s, with the ideas traditionally associated to the logistics management of individual companies being extended to all suppliers and customers. Lummus and Vokurka (1999) position this supply chain focus as a symbolic issue of the business environment of the 1990s, caused, among other reasons, by the relatively modest number of vertically integrated firms by the time. As a result of the continuous specialization of companies and the strategic choice of not owing their sources of inputs, companies progressively searched for suppliers capable to provide low-cost quality materials. As discussed by Meixell and Gargeya (2005), in the last decades of the twentieth century, supply chains became an important part of international management, specially through the expansion of industries such as the automobile, computer, and apparel into foreign countries (Taylor 1997; Dornier, Ernst, Fender and Kouvelis, 1998).

The acceptance of the term was accompanied by an also agile evolution of its understandings. From scholars' attempt to keep up with the new object, several definitions for supply chain emerged, being the initial ones perhaps closer to a mindset more strongly concerned with the efficient flow of materials across companies. Exemplary of this early view would be the perspective offered by Stevens (1989), for whom supply chains would account for series of combined activities related to the planning, coordination and control of material, parts and finished goods. In accordance, Bowersox, Closs and Stank (1999) claim that supply chains are networks of companies engaged in bringing raw material into distributed products,

while Lee and Billington (1993: 835) statet that “a supply chain is a network of facilities that performs the functions of procurement of material, transformation of material to intermediate and finished products, and distribution of finished products to customer”. For La Londe and Masters (1994), in turn, the term would be appropriate to designate groups of companies organized around the moving of tangibles downstream, evolving the origination of raw material, the assembling of products, wholesaling, retailing and transportation.

Although competent in highlighting the involvement of diverse companies in the stream of tangibles from sources to consumers, the ideas presented by the authors may be understood as relatively rustic from the point of view of the difficulties and outcomes of more complex forms of integration among players. Even if the idea of networks is considered, the functionalist and objective task assigned to supply chains suggests the organization of companies within a linear sequence, with each holding individual responsibilities in the process. These initial visions seem to be restrained to the perception that different firms are responsible for different parts of the processes, possibly neglecting more sophisticated forms of coordination or collaboration among them. The conviviality between conceptual advances and gaps, however, may be typical of literatures on their early stages. It is possible that this initial exacerbated focus on the efficiency of flows translates the logistics heritage of the field, with the perceptions around supply chains being a natural extension of logistics principles and methods to the exterior of firms’ perimeters.

As discussed by Acquier and Aggeri (2008), however, Management Sciences would be characterized by the rapid renewal of concepts and theories. The evolution of the ideas may be perceived in the work of Swaminathan, Smith and Sadeh (1998), for instance. According to the authors, supply chains shall be understood as grids of autonomous or semiautonomous companies which are jointly responsible for activities such as the procurement, manufacturing

and distribution of related products. Beyond stressing the sharing of responsibilities among players, the notion that the level of firms' attachment to the chain must vary adds considerable complexity to such schemes. Sahin and Robinson (2002), in turn, expand the considerations of materials to other issues related to their efficient stream across companies. The authors delimit supply chains then as consisting of "suppliers/vendors, manufacturers, distributors, and retailers interconnected by transportation, information and financial infrastructure." Sahin and Robinson, 2002: 1). Similarly, Simatupang and Sridhar (2002) claim that supply chains are formed by the interconnection of firms working on the flow and transformation of goods, services, information and funds, from an origin to a final customer. Lambert, Stock and Ellram (1998) offer what seems to be a more comprehensive view regarding the "jurisdiction" of a supply chain. For the authors, along with the networks of companies involved in bringing products and services to markets, the final consumer must not be seen solely as a destination, but rather, as an active player in these configurations.

From the views offered by these authors, it is possible to identify the consideration of complementary aspects from areas providing support to industrial operations, such as marketing and information technology – which may be linked to the internal and external flow of information –, and finance, more directly related to the provision and management of funding, including among different players. On that regard Paiva (2010) shows that the integration of operations functions with those of close disciplines may indeed be beneficial at the firm level. More specifically, in analyzing companies of the food and machinery industries through a cumulative capabilities approach, the author found that manufacturing and marketing integration positively influence business performance. By adding these elements to the then predominant focus on material stream (both in the supply chain and in the firm units of analysis), literature seems to have advanced in the understanding that supply chains may represent a highly complex concept, involving both tangible and intangible elements. The very

consideration of consumers as integral part of supply chains significantly rises the intricacy and the elaboration of such arrangements. Fawcett and Magnan (2002), however, stress that the comprehensive view of supply chains – from suppliers’ suppliers to customers’ customers – represent a sort of mantra, which, although familiar to most practitioners of the area, is not actually incorporated as an extensive supply chain integration.

Specifically around the organization and design of supply chains, Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001) distinguish between three different types of channel relationships, each standing for different degrees of supply chain complexity: direct supply chains, extended supply chains and ultimate supply chains. While a direct supply chain comprehends a company, a supplier and a customer implicated in the flow of products, services finances and/or information (Figure 6), an extended supply chain would include the suppliers of the immediate suppliers as well as the customers of the immediate customers (Figure 7). In turn, an ultimate supply chain involves all the organizations concerned with all the flow of products, services, finances, and information, from the ultimate supplier to the ultimate customer (Figure 8). This sort of “supply chain architecture” proposed by the authors is particularly relevant for the present study, as beyond illustrating the relationship between supply chain partners in such arrangements, it also suggests that firms (and their stakeholders) must be connected, even if not sharing a direct interface. Beyond standing as the basic structure allowing negative events to disseminate in supply chain contexts, the idea is central to the development of the concept of *incidental stakeholders*, further discussed in the following section and in the second article of the dissertation.



Figure 6: Direct Supply Chain

Source: Adapted from Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001)



Figure 7: Extended Supply Chain

Source: Adapted from Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001)

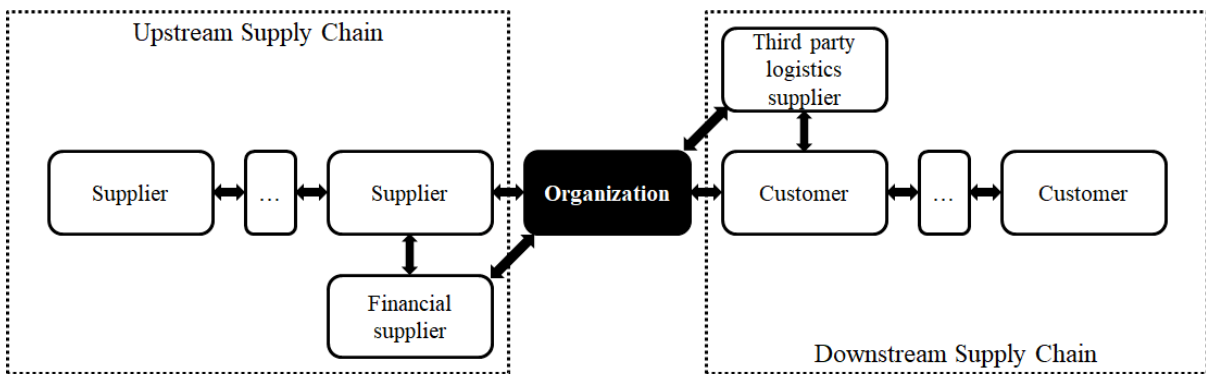


Figure 8: Ultimate Supply Chain

Source: Adapted from Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001)

From a strategic point of view, the prominence of supply chains must be acknowledged by the promotion of its role in competitive environments. In substitution to classic firm-oriented examinations, many authors claim that modern competition must not be understood as a dispute among individual firms any longer, but rather, among supply chains instead (e.g. Christopher, 1992, 2005; Ketchen and Hult, 2007, Lambert and Cooper, 2000). From this reasoning, more detailed and cautious analysis of the issues concerning this form of arrangements seem to be at the center of the creation and maintenance of long-term competitive advantages. Around this matter, Christopher (2016) states that

“we are now entering the era of ‘supply chain competition’. The fundamental difference from the previous model of competition is that an organisation can no longer act as an isolated and independent entity in competition with other similarly ‘stand-alone’ organisations. Instead, the need to create value delivery systems that are more responsive to fast-changing markets and are much more consistent and reliable in the delivery of that value requires that the supply chain as a whole be focused on the achievement of these goals.” (Christopher, 2016: 15)

From this reasoning, more than a source of competitive advantage, supply chain management has been portrayed as a manner to improve the general performance of organizations (Li, Ragu-Nathan, Ragu-Nathan and Rao, 2006) and a key element in the development of operational efficiencies for a wide range of individual activities such as retail (Fernie and Sparks, 2014), purchasing (Weele and Raaij, 2014), outsourcing, and production planning (Roh, Hong and Min, 2014), among others. As discussed by Carter, Rogers and Choi (2015) and Lambert, Cooper and Pagh (1998), the term would have its origins on the work of consultants (Oliver and Webber, 1992), being rapidly assimilated by academia (Ellram and Cooper, 1990; Jones and Riley, 1987), and since then, serving in the gathering of procurement, operations and distribution into a common discipline. In this way, supply chain management would be viewed as an intermediary between fully-vertically-integrated operations and those systems on which each member works in a completely independent manner (Cooper and Ellram, 1993).

The fast acceptance and incorporation of the term within business practice would be mainly driven by the comprehension that upstream and downstream players would necessarily have their efficiency jointly augmented, in a way that the whole supply chain would be made competitive (Li, Ragu-Nathan, Ragu-Nathan and Rao, 2006). From this angle, supply chain management would be defined as “an integrative philosophy to manage the total flow of a distribution channel from the supplier to the ultimate user” (Cooper and Ellram, 1993: 13). Accordingly, that would comprehend the coordination of the process and activities related to businesses across the whole channel and not only between a limited number of members of the

chain. Other authors offer complementary views. For Spekman, Kamauff and Myhr (1998: 632), for example, “supply chain management represents a paradigm shift that extends one’s appreciation for the concepts of co-operation and competition. Co-operation is no longer seen as a process between one set of trading partners. Co-operation now exists along the entire supply chain”.

2.2. Dissemination across Supply Chains

From an operational perspective, fails, problems in communication, and disruptions have been argued to impact the activities of both upstream and downstream partners. Among the most common forms of absorption of external turbulence would be the bullwhip effect (Lee, Padmanabhan and Whang, 1997a: 93), a phenomenon that “occurs when the demand order variabilities in the supply chain are amplified as they move up the supply chain”. In that way, in face of several issues such as the employment of demand forecast and batch ordering, or the occurrence of shortages in supply, lead times, and variations in price (Lee, Padmanabhan and Whang, 1997a, b), suppliers and suppliers of suppliers would face increased volatility in their operations in comparison to source firms, as misinformation would be on its way towards upstream players.

That would come from the fact that, in the condition of companies operating as serial supply chains, end users represent the demand for the last companies in such arrangements, while the demand for upstream players would come from the immediate downstream link (Metters, 1997). Demand seasonality and forecast errors are shall thus be increased as they move towards ultimate suppliers, in a way that this demand distortion would create inefficiencies for upstream partners. According to the author, the effects of the phenomenon would greatly vary, depending on the business environments in which firms are inserted. Nevertheless, the elimination of the bullwhip effect would possibly result in the increase of product profitability by 10 to 30% (Metters, 1997). Measures like the centralization of demand information (i.e. the provision of complete demand information to each stage of the supply chain) have been pointed as a solution to the issue (Chen, Drezner, Ryan and Simchi-Levi, 2000). For Disney and Towill (2003), in turn, the adoption of techniques such as the vendor management inventory could offer guidance in that sense. As pointed by the authors, beyond the removal of layers of the decision-making

process, the elimination of delays in the information flow could contribute to lower levels of upstream variability. These matters must also be seen as forms of increased visibility, in the attempt to manage supply chain risks.

Other approaches have been used in the analysis of the effects of operational dysfunctions in supply chains. Hendricks and Singhal (2003), for instance, estimate the effects of supply chain glitches (i.e. gaps between supply and demand, possibly due to suppliers, customers or internal sources) on shareholders' wealth. Examples of the issues analyzed by the authors would be the difficulties faced by Sony to deliver the Playstation 2 videogame console for the 2000's holyday season because of part shortages, the mismatch of supply and demand in Nike's operations in 2001 due to problems in the implementation of supply chain management systems, and Ericsson's complication to meet the demand for mobile phones in 2000, following both internal and supplier production problems. Using the method of event study, the authors claim that the announcement of production or shipment delays are responsible for abnormal decreases in shareholder value around 10.28% on average. Beyond identifying and measuring such outcome, they also advance on the conditions turning these results more likely. Accordingly, disruptions of that sort would be less harmful to large firms, while companies under higher growth prospect would be more severely impacted. Capital structures, in turn, would be of little importance. The study also finds no difference in time comparisons, suggesting that these negative reactions have probably always been observable.

In a second study, Hendricks and Singhal (2005) analyze the long-term effects of supply chain disruptions. As showed by the authors, when a time period of one year before and two years after an occurrence of that kind is considered, firms involved experienced an average of 40% drop on their market value. In that way, the study also suggests that the recovery from a supply chain disruption may not be fast. Although efficient in demonstrating that supply chain

partners must be affected by causes external to their organizational borders, both the analysis of bullwhip effect and the ones around the results of disruptions seem to be strongly related to physical issues within supply chain contexts. Considering that industrial firms have the output of products as one of their main objectives, the relation between disturbances in the normal flow of goods and the impact they may have to supply chain members may be direct. Yet, it is possible that less evident matters (i.e. not straightly related to operational problems) may come to also disseminate within supply chain contexts, affecting, among other things, the stock price of buyers and suppliers. Cases of reputational spillover (Stuart, Hoang and Hybels, 1999; Kang, 2008), for instance, may be analyzed. In that vein, companies buying from or selling to other companies involved in unethical behavior (e.g. fraud, corruption, modern slavery, pollution) may be also indirectly affected. Although still focused on the effects on the market value of supply chain partners, the further understanding of these forms of possible dissemination in supply chains represent an important part of the present investigation, differentiating it from previous developments.

Other authors seem to have followed related directions as more recent empirical studies have approached the dissemination of information in supply chain contexts. Using co-searches of stocks as a proxy for information diffusion, Agarwal, Leung, Konana and Kumar (2017), for instance, show that it is possible to construct better predictions of the stock market returns of firms based on the joint analysis of the on-line searches for the stocks of its supply chain partners. As pointed by the authors, “if two firms are economically dependent through supply chain relationship and if information related to both firms diffuses in the market slowly or rapidly then our ability to predict stock returns increases or decreases, respectively” (Agarwal, Leung, Konana and Kumar, 2017: 2). Even if partially contradictory to some of the perspectives proposed by the random walk theory, such as the impossibility of predicting the future return of securities - as further discussed in the section dedicated to the empirical setting of the

dissertation -, the findings suggest some form of connection between buyers and suppliers that go beyond sheer commercial transactions or operational flows. In fact, the correlational movements in the stock price of two distinct firms argue for their joint analysis in the eyes of investors, with the financial results of a company being partially dependent on the results of the other. While some correlation may be found basically between all the companies operating in a given environment (as they are all influenced by some variables), correlations may be argued to be more likely to be observed upon changes that affect the general economy, and indirectly, all the companies concerned. That seems to be the rationale of the analysis of stock exchange indexes (e.g. CAC-40, S&P 500, DAX, IBOVESPA), which may work as proxies of the general state of the economy, or at least of the expectation of investors around it. In that case, correlations emerging from these broader movements would be the object of macroeconomic investigation.

Specific correlations between companies, however, may denote particular effects that the operations of one company may produce in another. In these cases, the notion of one company being a stakeholder of the other seems to be more defensible. Around that, Freeman (1984) points that stakeholders are those groups or individuals which may affect or be affected by the achievement organizations' goals. From a supply chain perspective, that would include not only buyers and suppliers, but also buyers of buyers and suppliers of suppliers, and so on. This discussion is expanded on sections 2.3. In the case of the correlations between the movements of stock prices, it seems reasonable to expect that negative events concerning a source firm would negatively affect its supply chain partners. The reasoning here argued to pertain to a more microeconomic analysis forms the basic structure of the ideas tested in the present study and is better developed in the section dedicated to the discussion of its overarching research question ahead in the text.

As observed by Chen, Drezner, Ryan and Simchi-Levi (2000), much of the research on the bullwhip effect has concentrated on the demonstration of the existence of the phenomenon, the identification of its causes and the proposition of methods for the minimization of its impacts. Considered the relevance of such path for the test and solidification of any social construct, the present investigation proposes a similar development to what is here defined as *supply chain contamination*. More specifically, in the articles that compose the present dissertation, efforts are more strongly concentrated on the identification of these phenomena and of their causes, while the possibilities for the minimization of their effects compose a relevant part of the discussion of the investigation.

As previously discussed, however, the theorization of the process through which an event occurred in a company may come to spread across supply chains and networks is also derived from what is here named the *inertial effect*. Accounting for the dissemination of energy from a central point to its periphery, the metaphorical transfer (i.e. “the waves caused by a stone that hits the water previously rested” (Fracarolli Nunes and Lee Park, 2016: 292)) relates a negative event to the disturbance caused by the impact of a stone in the water. By parallel, normal or undisturbed operations are related to the image of a calm and rested water, while the circular waves that follow an impact refer to the process through which a negative event occurred in or caused by a company (i.e. the point where the stone hits the water) may be transmitted to other companies by consequence (i.e. *supply chain contamination*). The term inertial, although commonly placed to designate the absence of movement, is here employed according to its technical sense, which accounts for the property of bodies to keep their current state of movement. From this angle, the term inertial must be interpreted as the tendency that the water has to maintain its movement and spread the energy brought to the system to its surroundings, just like the links between companies in a supply chain must allow the continuation of the effects of an event occurred in a given focal firm, so that it shall be perceived on its partners.

As discussed by Chen, Rungtusanatham, Goldstein, and Koerner (2013) metaphorical transfers must evidence conceptual parallels linking the proposed metaphor to the target phenomenon at the levels of ontology, analogy and identity (Tsoukas, 1991; Garud and Kortha, 1994). While the ontology level shall exhibit “logical correspondence between the constituent elements of the metaphor and the target” (Chen, Rungtusanatham, Goldstein, and Koerner, 2013:580), the analogy level would be that which “demonstrates correspondences between the relationships among constituent elements of the metaphor and relationships among constituent elements of the target”. Figure 9 below represents the ontological and the analogical equivalences between the elements that constitute the metaphor of circular waves and the target of dissemination of negative events in supply chain networks, and the identity equivalence between the metaphor and target:

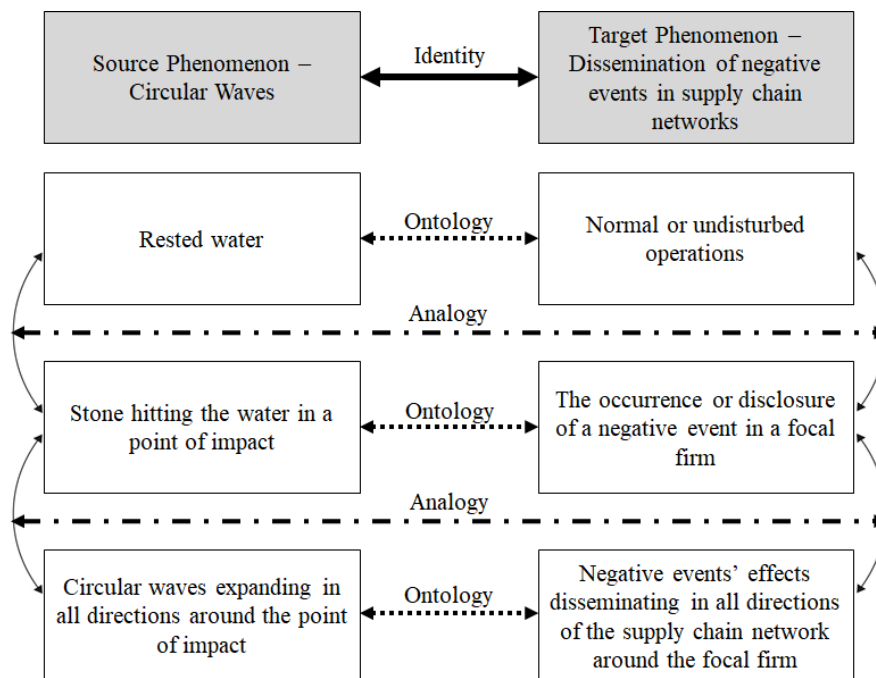


Figure 9: Equivalence at the ontology, analogy and identity levels for circular waves and dissemination of negative events in supply chain networks

Source: Adapted from Chen, Rungtusanatham, Goldstein, and Koerner (2013)

Similar to Chen, Rungtusanatham, Goldstein, and Koerner (2013), we turn to three different aspects to demonstrate the analogical equivalence between the metaphor of circular waves and the target of dissemination of negative events in supply chain networks. The *perturbation aspect* reflects the stone hitting the water in a point of impact, and therefore perturbing the equilibrium of the system. On the target phenomenon, such perturbation would be triggered by the occurrence or disclosure of a negative event impacting the normality of operations. The *central aspect* relates to the strong effect encountered on the point of impact between the stone and the water and, on the target phenomenon, would translate into a negative event strongly affecting the focal firm. Finally, the *decreasing force aspect* illustrates the circular waves' decreasing intensity as they propagate from the impact point to the periphery. In supply chain networks, negative events' effects would also disseminate with decreasing intensity, meaning that supply chain partners are decreasingly affected as they departure from the focal firm. In this sense, first tier partners would be more strongly impacted than second tiers ones, and so on.

Once ontological and analogical equivalences are found, more general principles that simultaneously explain aspects of both the metaphor and the target may be drawn in the highest level of identity (Chen, Rungtusanatham, Goldstein, and Koerner, 2013). As taught by Ketchen and Hult (2001), the identity-level principles represent generalizable insights, which finally provide the theoretical rationale supporting the idea that the metaphor and the target may be considered identical (Garud and Kotha, 1994). Within this reasoning, three principles are identified as generated from the previous equivalences:

Principle 1. The central principle: Focal firms relative to any given negative corporate event will more strongly absorb its effects.

Principle 2. The dissemination principle: The effects of any given negative corporate event will not be restricted to the focal firm. Instead, supply chain partners will also be negatively

affected.

Principle 3. The decreasing force principle: As the effects of any given negative corporate event disseminate through supply chain networks, they will affect partners less strongly as they departure from the focal firm, until its force ceases.

Figure 10 below illustrates the metaphorical transfer of the *inertial effect*, with the source firm representing the point of impact of a stone and the different tones of grey symbolizing both the circular waves that follow the impact and the *supply chain contamination* of first and second tier suppliers:

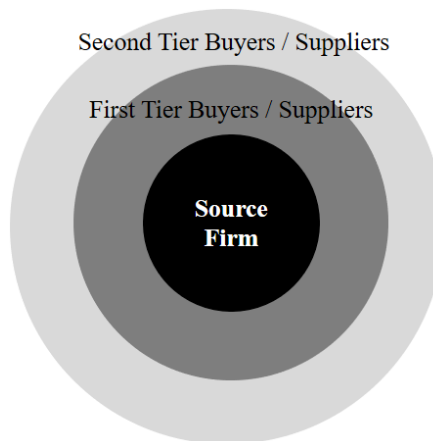


Figure 10: The metaphorical transfer of the Inertial Effect – Circular waves caused by the impact of a stone in the water / Supply chain contamination of first and second tier suppliers in face of a negative event occurred in or caused by a source firm

Source: Elaborated by the Author

Along with that development, initial theorization is also built over the intersection between the descriptive properties of the Stakeholder Theory proposed by Donaldson and Preston (1995) and the traditional design of supply chains, based on the work of Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001). The joint consideration of these two distinct literatures give rise to the Supply Chain Extended Stakeholder Model as briefly introduced in the preface

above and more detailed both in the following sections and in the second article of the dissertation.

2.3. Stakeholder Theory

Pointed as a “corrective to perceived defects of business and business ethics and as an alternative model of corporate governance” (Sternberg, 1997: 3), Stakeholder Theory has served as the theoretical basis for studies on the most distinct areas such as corporate sustainability (Montiel and Delgado-Ceballos, 2014), environmental marketing (Polonsky, 1995), the role of governments (Dahan, Doh, and Raelin, 2015), the determinants of dividend policy (Holder, Langrehr and Hexter, 1998), and the choice of accounting methods (Bowen, DuCharme and Shores, 1995), among others. In that sense, Phillips, Freeman and Wicks (2003) generically delimit the Stakeholder Theory as a theory of organizational management and ethics. Accordingly, it would be different from other understandings of strategic management due to its explicit addressment of morals and values as central features of organizational administration. In that line, the authors still add that, dissimilarly to other approaches, Stakeholder Theory proposes that both the ends of cooperative activity and the means through which these ends are pursued must be critically investigated.

For Donaldson and Preston (1995: 66) the Stakeholder Theory would be at the same time descriptive (i.e. “it represents a model describing what the corporation is”), and instrumental (i.e. it establishes a framework for examining the connections, if any, between the practices of stakeholder management and the achievement of various corporate performance goals”). Accordingly, however, although these two aspects represent significant facets of the reasoning, the fundamental basis to be considered would be its normative capacity, or its potential to provide interpretations around the function of the corporation, including the identification of both moral and philosophical guidelines for their operation and management. That would demand the acceptance of two main ideas: (1) stakeholders – persons or groups – hold legitimate interests in corporate activity, either on its procedural and / or substantive aspects,

and must be identified according to the perception of their interests in the corporation, independently of any corresponding functional interest in the opposite direction; and (2) the interests of all stakeholders merit consideration for themselves (i.e. they have intrinsic value), apart from their eventual contribution to the interests of any other group, such as shareholders. Within this angle, Phillips, Freeman and Wicks (2003) stress eight main normative justifications for Stakeholder Theory, composing what the authors identify as a branch of literature concerned with its moral foundations: common good (Argandoña, 1998); feminist ethics (Burton and Dunn, 1996; Wicks, Gilbert, and Freeman, 1994); integrative social contracts theory (Donaldson and Dunfee, 1999); property rights (Donaldson and Preston, 1995); Kantianism (Evan and Freeman, 1993); doctrine of fair contracts (Freeman, 1994); principle of stakeholder fairness (Phillips, 1997, 2003); and, notably relevant for the development of the present dissertation, risk (Clarkson, 1994). Donaldson and Preston (1995) adjoin that the Stakeholder Theory would be also managerial, as, beyond portraying existing situations or predicting cause-effect relationships, it would be also useful for the recommendation of attitudes, structures and practices. In that way, in the establishment of organizations structures, general policies, as well as on case-by-case decision making processes, stakeholder management would require attention to the interests of all the related parts. From this perspective, Holder, Langrehr and Hexter (1998) argue that Stakeholder Theory proposes firms as nexus of contracts between investors and non-investors, allowing, among other things, the analysis of typical financial decisions such as those related to dividend-policies and investments as being connected.

Nevertheless, as highlighted by Phillips, Freeman and Wicks (2003), the term stakeholder generically assumes a broad range of significances to an equally large audience, meaning that, when used unreflectively, the managerial prescriptions and implications of the Stakeholder Theory would be nearly infinite. As discussed by the authors, at the same time this capacity of

fitting the most distinct situations is one of its main strengths, it also opens space for harsh critics, standing as a main theoretical liability. In building his view on the issue, Jensen (2010) points that, given the logical impossibility to simultaneously maximize more than one dimension, resolute behavior would require the definition of a single valued objective function.

As stated by the author

“Two hundred years of work in economics and finance implies that in the absence of externalities and monopoly (and when all goods are priced), social welfare is maximized when each firm in an economy maximizes its total market value. (...) In sharp contrast stakeholder theory argues that managers should make decisions so as to take account of the interests of all stakeholders in a firm (including not only financial claimants, but also employees, customers, communities, governmental officials, and under some interpretations the environment, terrorists, and blackmailers). Because the advocates of stakeholder theory refuse to specify how to make the necessary tradeoffs among these competing interests they leave managers with a theory that makes it impossible for them to make purposeful decisions” (Jansen, 2010: 32).

The reasoning seems to be close to the perspective offered by some of the most prominent economist of the so-called “Chicago School of Economics” (Miller Jr. 1962; Ebeling, 2006), among which Nobel prize winner Milton Friedman. In his well-spread article entitled “The social responsibility of business is to increase profits”, Friedman (1970) claims that as businessmen defend the expansion of firms’ goals from profits to desirable social ends (e.g. the provision of employment, the elimination of discrimination, the avoidance of pollution) they would be actually promoting what the author calls a “pure and unadulterated socialism”, working as “unwitting puppets of the intellectual forces that have been undermining the basis of a free society these past decades”. Accordingly, the idea that businesses have responsibilities would not be possible, as this attribute would be limited to people. In that way, businessmen (i.e. individual proprietors or corporate executives) would be the individuals holding responsibilities instead. Particularly around corporate executives the author points that in a free-enterprise and private-property oriented system, they would figure as no more than employees of business owners, holding thus direct responsibilities to their employer. This responsibility would refer to the conduction of businesses in accordance to owners’ desire, generally meaning

the pursuit of profit maximization under the compliance to the basic rules of society, both legal and ethical. In the case of corporations directed to eleemosynary purposes such as hospitals and schools, the search for profit would give way to the objectives of the good performance of the respective services. Whatever the case, Friedman (1970) highlights, the corporate executive must be seen as an agent of those individuals that either own the corporation or establish benevolent institutions, meaning that their (i.e. corporate executives') responsibility is to them (i.e. owners). Still, the criterion of performance would be straightforward, and all the agents contractually arranged would be clearly defined.

On that perspective, Jensen's (2010: 32) position suggests that, the pushing of managers to account for several counterparts could be actually detrimental to society. As pointed by the author "With no way to keep score, stakeholder theory makes managers unaccountable for their actions. It seems clear that such a theory can be attractive to the self-interest of managers and directors". Sternberg (1997) adds that, although advocated to the point of being considered business orthodoxy, the Stakeholder Theory would be fundamentally misguided and incapable of providing advances in corporate governance, business performance or conduct. The author adds that the Stakeholder Theory would be intrinsically conflicting with all substantive objectives, undermining both private property and accountability.

If firms are indeed artificial persons (Friedman, 1970), the idea that they (i.e. firms) – or actually any other type of organization – represent a gathering of real people who identify with meanings, values and purposes would be possible. Ornstein (1986), for instance, analyze the meanings connoted by organizational symbols on the perception of individuals around the psychological climate in organizations. Finegan (2000), in turn, explores the connection between personal values, organizational values and organizational commitment, while Eden and Huxham (2001) argue for the need for the negotiation of purposes and goals in the

formation of multi-organizational collaborative groups. On that regard it may be argued that, although organizational borders are, in general, permeable (Lawrence and Lorsch, 1967), members and non-members of organizations must be identifiable in a moment in time, as they must share common reasons. However, irrespective of the nature or dynamics of the relationships that form and hold organizations together, the fact that they are themselves constituted by people, contributes to the idea that the Stakeholder Theory is indeed a theory of moral and ethics, and as so, possibly a subsidiary of primary disciplines such as Moral Philosophy. Taylor (1998), for instance, explains that Platonic ethics is concerned with the study of how one should live. Once more, if firms are artificial persons and, as so, must not hold responsibilities (Friedman, 1970), Stakeholder Theory would not be valid to analyze the behavior of firms, but only that of some classes of stakeholders (i.e. individuals). Within this view, both its instrumental and normative attributes – as discussed by Donaldson and Preston (1995) – could come to have their relevance questioned, resting its descriptive view as its potentially most relevant facet. The present study concentrates then on the later, stretching the notions of what firms are to the design of what constitutes a supply chain, particularly in relation to the links between firms and their eventual extended stakeholders as discussed ahead.

Although authors do not employ the concept of stakeholders in their development, it seems that the propositions of the three levels of supply chains complexity discussed by Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001) (Figures 6, 7 and 8) implicitly refer to upstream and downstream partners as capable to either affect or be affected by the operations of a given organization. Moreover, by claiming that virtually any actor involved in the mentioned flows retain the same property, it may be argued that, in comparison to Donaldson and Preston's (1995) stakeholder model, a larger number of stakeholders must be considered, particularly those not sharing direct interfaces with the focal firm in question. In the cases of the extended and ultimate supply chains, that would account basically for suppliers of suppliers

and customers of customers, as well as potentially to the stakeholders of these players. The perception of this indirect relation (i.e. without a clear or objective interface between organizations and stakeholders) is particularly relevant for the present study, in a way that the intersection between Donaldson and Preston's (1995) reasoning and that of Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001) gives rise to the Supply Chain Extended Stakeholder Model discussed ahead.

As previously discussed, however, in restraining the interpretation of the concept, Freeman (1984) defines stakeholders as any group that shall either affect or be affected by the operations of a company. For Clarkson (1994), in turn, stakeholders would be those individuals or groups capable to bear risk in a firm. From this definition the author distinguishes between those stakeholders which are voluntary and involuntary risk-bearers. Accordingly, "voluntary stakeholders bear some form of risk as a result of having invested some form of capital, human or financial, something of value in a firm. Involuntary stakeholders are placed at risk as a result of firm's activities. But without the element of risk there is no stake (Clarkson, 1994: 5). Mitchell, Agle and Wood (1997) add that in this sense, a stake would represent only something that can be lost, in a way that the employment of the concept of risk to denote stake would narrow the stakeholder field to those holding legitimate claims, independently of their power to influence firms or the legitimacy of their relationship with them. Based on this debate, for the objectives of the present dissertation it would be possible to propose additional perspectives on the classification of stakeholders, according to their intentions to stand as one. While *voluntary stakeholders* would relate to those groups that are not only aware of their positions, but also seek to exercise them (e.g. investors, customers, employees, trade associations, suppliers), *involuntary stakeholders* would gather individuals and / or organizations that happen to be at risk to affect or of being affected by the operations of companies without having necessarily chosen to be in such position (e.g. political groups, communities, governments). Building on

the Donaldson and Preston's (1995) stakeholder model, Figure 11 differentiates these groups, showing *voluntary stakeholders* in black and *involuntary* ones in white as comprehended in the present study:

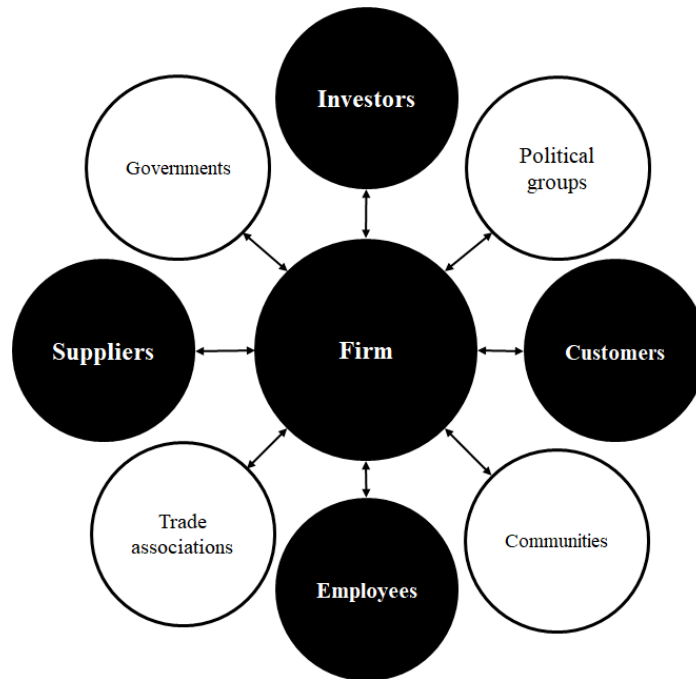


Figure 11: Voluntary and Involuntary Stakeholders

Source: Adapted from Donaldson and Preston (1995)

Considered the risk of *supply chain contamination* through the *inertial effect*, if on the one hand an investor conscientiously chooses to be a counterpart of company A (i.e. *voluntary stakeholder*), from the moment this company engages in trading with company B, either in the position of a supplier or customer, this very same investor becomes a stakeholder of this second company (i.e. company B), even if they are not aware of it or have not rationally chosen such position, becoming then an *involuntary stakeholder*. The same must be true for employees of a given company that trades with another, as well as to any other group of stakeholders of companies that decide to interact or to develop any kind of relationship allowing the attachment of their images. Moreover, apart from an agreed buyer-supplier relationship, supply chains may not stand for formal teams of companies which consciously decide for and pursuit a relationship

with one another. Instead, it is possible that companies do not come to have a clear perception of all the organizations composing their supply chains, situation that is aggravated when more distant links are considered. In that way, buyers of buyers, suppliers of suppliers and so on, must also be potentially considered *involuntary stakeholders* of a firm understood as focal. Following a similar reasoning, a second classification must be built over the presence or absence of interfaces between a focal firm and its stakeholders, being them voluntary or not. It must be argued that some *involuntary stakeholders* only assume this position when companies transact with one another. In other terms, from the link between companies, particularly around the concept of supply chains, series of involuntary stakeholders are formed as the chain extends. As the existence of this *involuntary stakeholders* is dependent on the relation of companies, they are here denominated *incidental stakeholders*. When applied to the descriptive dimension of the Stakeholder Theory, this reasoning, allied with the design of ultimate supply chains proposed by Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001) (Figures 6, 7 and 8), allows the development of the *Supply Chain Extended Stakeholder Model* in which it is possible to differentiate the *incidental stakeholders* of a company within supply chain contexts. Still, along with the illustration of the architecture that indirectly connects firms to their *incidental stakeholders*, the *Supply Chain Extended Stakeholder Model* offers the structural basis for the study of dissemination across supply chains and supply chain networks. Beyond the positioning and representation of *incidental stakeholders* as indirectly connected to all supply chain partners, the model supports the detection of the impacts of a negative event in shareholder value as a valid measure for the *supply chain contamination* through the *inertial effect* here investigated. Figure 12 presents the model and depicts in black the source firm and *non-incidental stakeholders* (voluntary or involuntary) – and in white the *incidental* ones (all involuntary).

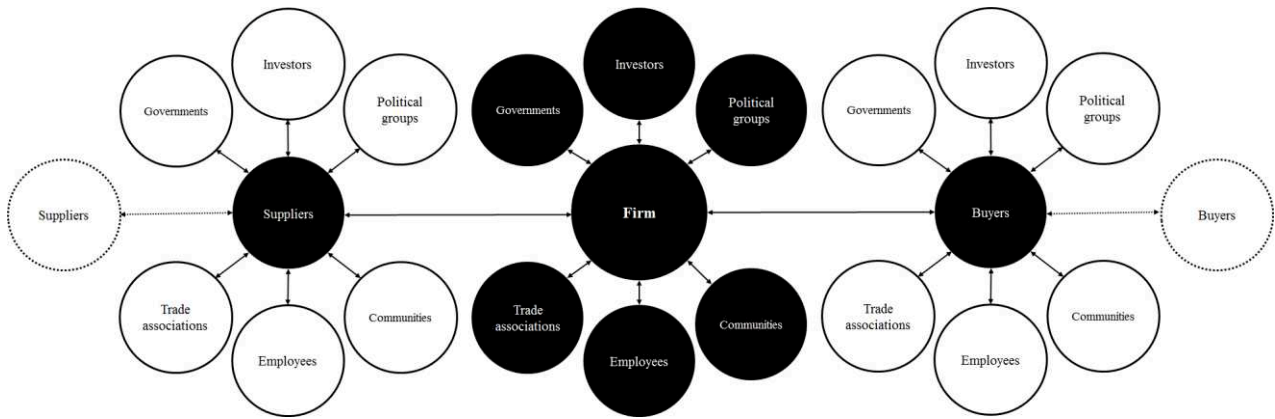


Figure 12: The Supply Chain Extended Stakeholder Model

Source: Elaborated by the Author

The model serves as a supply chain risk map, illustrating all the stakeholders (incidental and non-incidental) which may be at risk to suffer from forms of *supply chain contamination* through the *inertial effect*. Particularly, it may be useful in the reconsideration of supply chain risk management decisions, as incidental sources of risk come to be considered. Although cases of disruption have shown to affect *incidental stakeholders* – empirical evidence point to the loss of market value, what denotes losses to investors – the concepts of *supply chain contamination*, *inertial effect* and *incidental stakeholder*, all gathered in the Supply Chain Extended Stakeholder model proposed, allow the theorization of such effects. Also, the extension of the analysis of supply chain disruptions to other cases of negative events must reinforce the theoretical validity of the model as an instrument to be applied in the assessment of forms of supply chain risk and risk management as a whole.

2.4. Corporate Events

From tsunamis (Murari, Achyuthan and Singhvi, 2007) and earthquakes (Dey and Singh, 2003) to forms of ordinary social actions (Heise, 1979), the label ‘event’ is employed to designate basically “anything that happens” (Shipley and Zacks, 2008: 1). In that way, in opposition to the staticity of objects and properties, the nature of events would be essentially dynamic, standing for any action or change that takes place in the real world (Kaneiwa, Iwazume and Fukuda, 2007). As discussed by Lamport (1978), the concept of time itself would be derived from the more basic concept that there is an order in which events take place. Accordingly, the idea of something occurring before or after another (e.g. “We say that something happened at 3:15 if it occurred after the clock read 3:15 and before it read 3:16” (Lamport, 1978: 558)) would also permeate our reasoning about systems.

Beyond their tangible results, events would be also object of interpretations, in a way that related consequences may depend on the assignment of personal meanings (Berkowitz and Alioto, 1973). Negative personal events, for instance, are claimed to trigger steady and rapid “physiological, cognitive, emotional, and social responses” (Taylor, 1991: 67) in individuals. Although some positive effects must be observed (Tedeschi and Calhoun, 1996), traumatic life experiences are often related to adverse long-term consequences (Hetherington, Cox and Cox, 1985), like augmented levels of stress (Yule, Bolton, Udwin, Boyle, O’Ryan and Nurrish, 2000) anxiety (Bowlby, 2010) and depression (Hammen, 1991), to name a few. From a sociological perspective, in turn, events would represent forms of ordinary public interactions (i.e. social actions) which comprehend separate components such as an actor, an act and an object (Heise, 1979). In that way, when it comes to the analysis of corporate events, these notions may translate into the identification of the origin of the event – possibly the source firm or any external element (i.e. actor); an attitude, a negligence, a decision or an random happening (i.e.

act); and those for who the act is manifested, being the company itself or any group of stakeholders (i.e. object).

Given their potential to seriously affect the results of businesses and the complexity on their predictions, the examination of corporate events has received considerable attention from scholars. Beyond studies of their nature, investigations have mainly focused on the consequences of unpredicted realities (e.g. Mitchell and Stafford, 2001; Krüger, 2015). Nevertheless, if measuring the long-term organizational consequences of new facts and information must be burdensome, the sizing of the immediate effects of corporate events on stock prices may be somehow more direct, as, based on the premises of the Efficient Market Hypothesis (Fama, Fisher, Jensen and Roll, 1969; Fama, 1970; Jensen, 1978), the valuation of securities is expected to be immediately adjusted in response to relevant news around firms. In that way, stock price reactions would “reflect both the economic importance of events and the extent to which events are surprises” (Malatesta and Thompson, 1985: 237). More specifically, the application of the event study method (Fama, 1970; Brown and Warner, 1980) would allow the perception and measure of possible abnormal returns, signaling the existence of consequence to firms in terms of investors’ expectations. Not limited to prompt outcomes, the adjustment of stock prices would actually reflect the reconsideration of the future performance of firms. Depending on the valuation method employed by each individual agent, negative or positive reactions must then account for measures of expectations, with investors anticipating future impacts. Techniques of discounted cash flows (Götze, Northcott and Schuster, 2015), for example, would illustrate such situations.

Within this prospect, the economic impact of corporate events of the most distinct sorts have been intensively analyzed. Acquisition attempts, for instance, have been shown to positively affect stock prices of firms taking the action (Malatesta and Thompson, 1985), while the

shareholders of targeted companies are claimed to capture most of the value expected to be created in the advent of mergers (Datta, Pinches and Narayanan, 1992). Likewise, processes of substitution in companies' top management are also often treated, as, according to Friedman and Singh (1989: 718), the event of a CEO succession represents important "instances of organizational change". As discussed by the authors, the outcomes of these processes would be contingent on organizational contexts such as the pre-succession organizational performance, organizational size, and elements of the content of a succession event. In this sense, stockholders' reaction would be positive when pre-succession performance is poor and the succession is initiated either by the board or, to a lesser extent, by the CEO himself. In that vein, investors' reaction to more traumatic and sudden situations have also been approached. Worrell and Davidson III (1987), for instance, show that, following the death of CEOs, stock market positively reacts to internal succession processes, but not for external ones. Borokhovich, Brunarski, Donahue and Harman (2006), in turn, point that, upon the decease of top executives, investors' reaction is positively related to the level of independence of the board, factor which would be the main source of abnormal returns. In analyzing the effect of the relationship between corporate environmental and financial performances, Endrikat (2016), in turn, meta-analyzes findings yielded by event studies approaching investors' reaction to both positive and negative corporate environmental performance-related events. Accordingly, results suggest positive variations for positive events and negative variations for negative ones, nevertheless, in the presence of what the authors classifies as an asymmetry in the stock market reactions (i.e. investors' reactions are stronger for negative events).

When it comes to the effects of the adoption of corporate policies, Groening and Kanuri (2013) show that investors' reaction is often negative upon stakeholders-positive corporate social events (e.g. the enhancement of retirements benefits), and positive when negative ones take place (e.g. concerns with the health and safety of employees). Using the event study

method to investigate more than 1,000 contexts of such kind, the authors argue that in nearly half of the cases the incongruence between investors and stakeholders' perception is observed. In that way, investors' logics would not take into account benefits to society, but rather, it would reflect only their financial judgement of corporate social events as potential sources of revenues or costs, with stock prices being positively or negatively adjusted accordingly. On that direction, and in accordance to the discussion proposed before, Bird, Hall, Momentè and Reggiani (2007) point that, while a neo-classical view of corporate management would focus solely on the meeting of shareholders' interests, a stakeholder perspective (Freeman and Reed, 1983; Freeman, 1984, 1994; Donaldson and Preston, 1995) would demand businesses to equally consider the concerns and needs of a spectrum of interested parts. These visions would be conflicting, as the pursuit of one direction would come with the inevitable sacrifice of the other. The authors, however, show that there is little evidence that socially responsible actions do destroy shareholder value. Accordingly, socially performant firms in areas such as diversity management, environmental protection and employee relations have actually been positively evaluated by the stock market, with investors' preference for one or another action, however, possibly varying in time. Within a complementary perspective, Godfrey (2005) and Gardberg and Fombrum (2006), argue that the engagement in corporate social responsibility activities would lead firms to count on forms of goodwill or moral capital, which, upon the occurrence of negative events would work as an insurance-like protection. Also employing the event study method, Godfrey, Merrill and Hansen (2009) show that the insurance effects of these activities is not universal though. While institutional action (i.e. directed to firms' secondary stakeholders or society in general) indeed offer protection to firms, technical ones (i.e. concerning trading partners) would not be useful in that matter.

Less obvious events have also been analyzed through similar approaches. Agrawal and Kamakura (1995), for example, investigate the economic worth of celebrity endorsement.

Under the argument that the announcement of an endorsement of that kind may be seen as information by market analysts around the expected return of firms, the authors show that, on average, such events lead to positive returns in terms of stock price valuation. Yet, around eventual manipulations or minimizations on the impact of negative corporate events, Kothari, Shu and Wysocki (2009) argue that, as managers predict negative investors' reaction to unfavorable news, they would tend to delay the disclosure of negative information. Kohut and Segars (1992), in turn, claim that the financial performance of firms shall influence CEO's communication. In line with this argument, Patell and Wolfson (1982) show that positive information (i.e. news) are more prone to be released when security markets are open and negative ones tend to be announced after the close of trading. McWilliams and Siegel (1997) complement the idea. As pointed by the authors, a multitude of endogenous issues such as

“corporate control changes, corporate refocusing, CEO turnover, the use of affirmative action programs, layoffs, plant closures, corporate illegalities, product recalls, customer service changes, diversification programs, strategic investment decisions, and the formation of joint ventures, as well as the effects of exogenous events such as the enactment of major legislation, the appointment of top executives to cabinet positions and the death of CEOs” (McWilliams and Siegel, 1997: 626)

have been investigated through the event study framework in the Management literature.

On what relates to the effects of corporate events beyond organizational borders (i.e. outside the source firm), studies have focused on the eventual effects for competitors and industry players. As discussed by Patten and Nance (1998), in analyzing the extended consequences of the episode known as the Exxon Valdez, scholars have argued that the increased public pressure for the elevation of environmental patterns of oil companies and the possible augmented regulation that would follow were expected to negatively impact the market value of Exxon Mobil's competitors and that of other firms within the industry (e.g. Dowdell, Govindaraj and Jain, 1992; Blacconiere and Patten, 1994). As shown by the authors, however, the accident triggered nearly instantaneous elevation in the price of gasoline, both in wholesale and retail,

what, apparently, was well received by intra-industry firms. In investigating the stock market reaction around 25 petroleum companies other than the source firm (i.e. Exxon Mobil) the authors show that the portfolio cumulative abnormal returns were significantly positive after the incident. On the other hand, the analysis of individual companies suggests that the threat of increased regulatory costs negatively affects the market value of these companies, with firms that discussed operations in Alaska in their financial reports, large firms and firms counting on more modest environmental disclosure having less important market value appreciations. Likewise, in investigating the effects of the BP Oil spill in 2010 to oil and gas companies operating in American waters, Heflin and Wallace (2017) show that those that had a more advanced environmental disclosure upon the occasion were less penalized in terms of market value. As pointed by the authors, that would represent investors' belief that companies experienced in this sort of communication would be more prepared to answer to expected increased environmental regulation, as well as less likely to be involved in comparable circumstances, what, accordingly, would stand for additional motivation for the development of environmental disclosure among firms.

Similar approaches were also employed in the analysis of increased regulation for companies of other industries. Dowdell, Govindaraj and Jain (1992), for instance, show that beyond the 29% drop in Johnson & Johnson market value – accounting for USD 2.31 billion at the time - the wide-spread Tylenol incident in 1982 also caused serious damage to the stock price of other companies of the pharmaceutical industry. Despite that, authors argue that the extended negative effects would not be due to the scandal *per se*, but actually, would have taken place in face of the subsequent packaging regulation proceedings. From this angle, it seems that while corporate events are considered relevant, their investigation is still greatly restricted to their impacts on source firms themselves, or limited to their effects on competitors and industry players. Apart from glitches and disruptions (e.g. Hendricks and Sigal, 2003, 2005) their

collateral effects to surrounding companies such as supply chain partners are still relatively ignored, gap which the present dissertation seeks to help fulfilling, particularly on what relates to other sorts of negative events (environmental disaster, corporate social and environmental irresponsibilities, operational failure, corporate fraud and corruption).

A more comprehensive analysis of the use of the event study method in operations and supply chain management literatures must be useful though. In this sense, Ding, Lam, Cheng and Zhou (2018:329) perform a review of 29 papers published between 1995 and 2017 in renowned operations and supply chain management (OSCM) journals which applied short-term event studies. Accordingly, the use of the method to analyze related issues would follow the theoretical logic that OSCM would be strategic for the generation of shareholder value through mechanism of revenue growth, cost reduction, and the reach of efficiency in the use of both fixed and working capital (Martyn and Lynette, 1999). Still after the authors, the reasoning would have allowed researches on the field to conduct various empirical studies, “among which the event study method represents one of the most popular methodologies adopted in the literature”. That would include supply chain disruptions (Hendricks and Sighal, 1997), environmental management (Jacobs, 2014; Klassen and McLaughlin, 1996) and quality management (Lin and Su, 2013; McGuire and Dilts, 2008).

Chart 2 below presents studies analyzed by the authors, as well as the respective OSCM journals that published them.

Chart 2: Studies Employing Short-term Event Studies Published in Top OSCM Journals between 1995 and 2017

Journal	Articles
<i>Journal of Operations Management</i> (JOM)	Brandon-Jones, Dutordoir, Frota Neto, and Squire (2017), Hendricks and Singhal (2003), Hendricks, Singhal and Wiedman (1995), Hendricks, Singhal and Zhang (2009), Jacobs and Singhal (2017), Jacobs, Singhal and Subramanian (2010), Mitra and Singhal (2008), Modi, Wiles, and Mishra (2015)
<i>International Journal of Production Economics</i> (IJPE)	Lam, Yeung, Cheng, and Humphreys (2016), Lin and Su (2013), McGuire and Dilts (2008), Wood, Wang, Olesen, and Reiners (2017), Yang, Lu, and Zhou (2014)
<i>Management Science</i> (MS)	Girotra, Terwiesch, and Ulrich (2007), Hendricks and Singhal (1996), Hendricks and Singhal (1997), Kalaignanam, Kushwaha, Steenkamp, and Tuli (2013), Klassen and McLaughlin (1996), Thirumalai and Sinha (2011)
<i>Production and Operations Management</i> (POMS)	Ba, Lisic, Liu, and, Stallaert (2013), Jacobs and Singhal (2014), Jacobs (2014), Xia, Singhal, and Zhang (2016)
<i>International Journal of Operations and Production Management</i> (IJOPM)	Dam and Petkova (2014), Paulraj and Jong (2011)
<i>Decision Sciences</i> (DS)	Sabherwal and Sabherwal (2005)
<i>European Journal of Operational Research</i> (EJOR)	Nicolau and Sellers (2002)

Source: Adapted from Ding, Lam, Cheng and Zhou (2018:329)

The hypothesis that the disclosure of a negative event may negatively affect supply chain partners not directly involved emerges from the intersection of several distinct literatures, as previously approached on the section dedicated to the theoretical bases of the study and on each of the individual articles. Particularly, the comprehension that firms do not compete alone any longer, and that they may have *incidental stakeholders* argue for the extension of the adjustment of stock prices to new information (Fama, Fisher, Jensen and Roll, 1969) to a broader sense.

Ultimately, if supply chain management literature is correct in proposing the mutual dependence among companies, the assumptions of the Efficient Market Hypothesis are expected to be also valid in such arrangements, in a way that new information shall be incorporated in the market value of supply chain partners. This reasoning is further developed in the following section, with the discussion of the overarching research question of the dissertation and a visual synopsis of the three individual articles being proposed.

2.5. Overarching Research Question and Visual Synopsis of the Articles

As discussed in the previous sections, in answer to shortened product life-cycles, pressures for the lowering of production cost, and the opportunities emerged in low-cost labor zones, among other factors, many Western firms faced the complex strategic process of operational de-verticalization, as, in a context of capability-driven competition they were pushed to concentrate on their core activities. With the transferring of important portions of their outcome to third parties, the typical production cycle of design-manufacturing-marketing was progressively portioned, no longer being executed within the organizational boundaries of individual companies, but rather, carried out jointly by a conjunct of firms, each serving the lineup with its own core competencies and skills. If, by one side, companies gave up control of parts of their operations, the output of the whole system would be more competitive. The dependence of each partner in relation to the other, however, demanded the development of forms of cooperation and trust, including information sharing, collective planning and the unification of strategies. From this phenomenon, competition started to be understood as something that no longer took place between individual companies, but instead, between teams of companies responsible for the collective production of goods and services, formally or informally connected in the structure of supply chains.

Considering that within supply chain contexts individual companies must be seen as “gears” that are part of a larger whole, one may argue that any difficulty presented to an individual organization would be expected to reflect in the other “gears” of the scheme, in a way that the functioning of the systems is compromised. Within this view, if companies are dependent on each other, negative events affecting a firm must also affect its partners. As shown by Hendricks and Singhal (2003, 2005) operational glitches and disruptions originated in a given company

shall indeed affected upstream partners, outcome demonstrated through the negative variation in the market value of these companies. Although successfully testing for the level of dependency argued by supply chain management literature and demonstrating that the effects of negative corporate events shall not be limited to the organizational borders of the source firm, the approach of the authors is restricted to the interruption of physical flows. Considered that, along with other flows (e.g information, funds), the efficient management of physical flows represents one of the main goals of supply chain management, the perception that interruption of that sort may be critical in terms of value destruction is particularly important. Nevertheless, with the evolution of business schemes and networks, the increased demand for sustainability, the augmented vigilance of stakeholders around ethical issues, and all the risks that come along with this complexity, the extension of the examination to more nuanced negative corporate events becomes necessary. In this way, this investigation is constructed around the following overarching research question: *Beyond the interruption of physical flows (i.e. supply chain glitches and disruptions), do negative events disseminate across supply chain partners (i.e. supply chain contamination)?*

While this question could be possibly answered through the analysis of the impact of negative events in diverse factors related to supply chain partners (e.g. corporate image, identity and reputation, customer purchase intension, corporate credibility and trust), following Hendricks and Singhal's (2003, 2005) approach this dissertation concentrates on the effect that such events may come to present in the market value of related companies. The choice is made as the analysis of market value data through the method of event study argues for objective measures of the tested effects. Still, the answering of this questions represents the inquiry of causal relation between a negative corporate event and its impacts on the market value of supply chain partners. The nature of this sort of investigation is consistent with our ontological and epistemological positioning, further discussed in section 2.6 ahead in the text.

Along with the provision of empirical tests of *supply chain contamination*, the present dissertation seeks to advance the comprehension of its process and consequences. Considering that under the premises of the Efficient Market Hypothesis (further discussed in the empirical setting section and in each of the three articles) events are expected to be immediately reflected in the price of securities (Fama, Fisher, Jensen and Roll, 1969; Fama, 1970), the reaction of supply chain partners' investors is here considered an evidence of such relation (i.e. cause and effect between a negative event and the variation in the stock price of a supply chain partner). As previously discussed in the section dedicated to the theoretical background of the dissertation, this class of investors (i.e. investors of supply chain partners) would stand for *incidental stakeholders* of a source firm, as shown in Figure 11. Although the *Supply Chain Extended Stakeholder Model* describes the possible architecture of this relation, additional questions, particularly on the conditions in which *supply chain contamination* must occur, and on the reach of its effects emerge. In that way, the following subsidiary research questions are also considered: *What are the factors influencing the occurrence of supply chain contamination?* and *What sort of supply chain players (i.e. buyers and suppliers) are more willing to be contaminated?*

This section also presents the main structure of the articles, in a way their problematization, approaches and contributions to the dissertation are synthesized and made more accessible and clearer. Beyond that, the joint consideration of the distinct views may contribute to a further comprehension of their coherence in the pursuit of a global objective (i.e. overarching research questions). In this sense, a visual synopsis is presented in Chart 3, contextualizing the research questions, methods and results of the individual articles in relation to the broader perspectives of the dissertation.

Chart 3: Visual Synopsis of the Articles

Do negative events spread through supply chains?			
Article	<i>Supply chain contamination: An exploratory approach on the collateral effects of negative corporate events</i>	<i>The impact of negative social / environmental events on the market value of supply chain partners</i>	<i>Caught red-handed: The cost of the Volkswagen Dieselgate</i>
Research Question(s)	(i) Do investors negatively react to announcements of negative corporate events related to a supply chain partner? (ii) Do factors such as the nature of the event (i.e. environmental disaster, social irresponsibility, operational failure, fraud or corruption), the positioning of the partner in the supply chain (i.e. supplier/customer) and the fact of the source company (i.e. those originating the event) itself be affected influence the reaction of investors?	Do investors negatively react to announcements of negative social / environmental events related to a supply chain partner?	Is the disclosure of an environmental fraud capable of triggering an inertial effect on other companies?
Context	With the investigation 20 cases of negative corporate events, the effects of such happenings are analyzed for 307 companies (21 source companies, 158 suppliers and 128 customers)	The study investigates 15 cases of negative social / environmental events, analyzing the market value fluctuation of 82 supply chain partners.	After the proposition of the inertial effect as a theoretical concept to treat the ways through which corporate events may disseminate to their surroundings, the study further investigates the collateral effects of the case known as the Volkswagen Dieselgate, analyzing the dissemination of its impacts through companies of the American automotive industry (automakers and suppliers operating in the country)
Method (when applicable)	Documentary research and Event study	Event study	Event study
Main Findings	Results show that in 12 out of the 20 cases investigated negative events spread through supply chains, contaminating the market value of suppliers and customers.	Results suggest that investors do not react to negative social / environmental issues within supply chain contexts when source firms are small or when no major operational consequences are expected (e.g. glitches). Negative reactions, were observed, in turn, when source firm was arguably strategic to partners.	The study shows that the disclosure of the fraud held by the German company indeed disseminate to the companies of the American automotive industry, costing USD 1.19 bi and USD 4.26 bi to the companies of the industry and supply chain levels of analysis respectively.
Overall Contribution	The empirical findings lead to the development of the concept of supply chain contamination to address the collateral effects of negative corporate events in these contexts.	Results possibly denote the predominance of an economic perspective on investors' behavior, meaning that their "for profit logics" shall be dominant over eventual ethical concerns. Beyond that, the concept of incidental stakeholder is developed and supports the theoretical development of the supply chain extended stakeholder model.	Results empirically support the conceptualization of the inertial effect, showing that a negative event may indeed disseminate beyond organizational borders.

2.6. Ontological and Epistemological Positioning

Within a Philosophy of Science perspective, this section discusses the ontological and the epistemological positioning of the dissertation. In clarifying its framing around the nature of knowledge and the means available to access it, these discussions justify the reasoning behind the (implicit) hypotheses here conjectured, as well as the method employed in their testing. The section is expected then to evidence the consistency between the conception and the execution of the present dissertation inside a valid and defensible tradition of scientific construction.

2.6.1. Ontological Positioning

Despite the skepticism of some scholars around the functionality of related matters (e.g. Nelson, 1912; Rorty, 1979), Burrell and Morgan (1979: 7) mark that “all theories of organization are based upon a philosophy of science and a theory of society”. In that way, social scientists would approach subjects through either explicit or implicit acceptances around the nature of the social world, as well as around the adequate forms to investigate it. Accordingly, those would be assumptions of ontological and epistemological natures, both having direct impact on methodological choices to be followed in the conduction of any study. More specifically, ontological assumptions would concern the essence of the phenomena being investigated. That would typically include questionings about the relation of an individual with its presumed reality, or, the consideration that reality is either imposed to the individual (i.e. external), or indeed the product of the individual’s conscience (i.e. internal). While in the first case reality would have an objective nature, in the second it would stand for a form of outcome of the singular cognition. In other terms, external realities would exemplify circumstances in which

reality “is a given ‘out there in the world’” while internal ones would embody “the product of one’s mind”.

For Ritchie, Lewis, Nicholls and Ormston (2003), this fundamental division would translate in

“whether or not social reality exists independently of human conceptions and interpretations; whether there is a common, shared, social reality or just multiple context-specific realities; and whether or not social behaviour is governed by ‘laws’ that can be seen as immutable or generalizable” Ritchie, Lewis, Nicholls and Ormston (2003: 11)

As pointed by the authors, such divisions give rise to three distinct positions: realism, materialism and idealism. Within the realism perspective, there would be an external reality that is independent of people’s beliefs or understandings around it. This segregation between one and another claim for a differentiation between the way the world is and its meanings and interpretations (which are proper of individuals). Likewise, materialism would also account for the existence of a real world. It posits, however, that only material features of that world (e.g. economic relations, physical features) would hold reality. From this angle, values, beliefs or experiences would stand for forms of ‘epiphenomena’ or features that, despite arising from the material world do not shape it. Lastly, idealism views argue that reality may only be known through the human mind, as well as through socially constructed meanings. Still after the authors, in face of these fundamental divisions, the decision of how to study the social world has often raised key philosophical debates.

Bernstein (2011: 1), in turn, discuss this matter with the lens of a dualism, highlighting the presence of what he calls an “uneasiness that has spread throughout intellectual and cultural life” and that would affect nearly every discipline and aspect of existence. The discomfort would be due to the opposition between objectivism and relativism, often also expressed by tensions between rationality and irrationality, objectivity and subjectivity and realism and

antirealism. More precisely, this antagonism would be present since the earliest times of Western philosophy, or at least since Plato's offensive against the Sophists and on Protagoras' supposed relativism. In that way, objectivism would represent "the basic conviction that there is or must be some permanent, ahistorical matrix or framework to which we can ultimately appeal in determining the nature of rationality, knowledge, truth, reality, goodness, or rightness" (Bernstein, 2011: 8). Within this comprehension, an objectivist would claim for the existence of such matrix and that the essential task of a philosopher is to find out what it is, supporting his discoveries with the strongest possible reasons. In turn, in denying the positive arguments of objectivists, in its strongest designs, relativism would stand for

"the basic conviction that when we move towards the examination of those concepts that philosophers have taken to be the most fundamental – whether it is the concept of rationality, truth, reality, right, the good, or norms – we are forced to recognize that in the final analysis all such concepts must be understood as relative to a specific conceptual scheme, theoretical framework, paradigm, form of life, society or culture." (Bernstein, 2011: 8)

From this interpretation, a relativist argues that such concepts could not have a determinate and univocal significance, as he/she believes there is or there shall be a nonreducible plurality of the referred conceptual schemes. Moreover, the relativist would not recognize substantive overarching frameworks or unique metalanguage through which we could apply rationality arbitrate or univocally assess competing arguments of alternative paradigms. In examining the effects of such robust antithesis, the author recalls that contemporary thinking normally moves between these and other extremes and that the attempts made to move out of this framework have regularly been absorbed into these basic oppositions. Around these endeavors, Ritchie, Lewis, Nicholls and Ormston (2003) refers to Bhaskar's (1978) critical realism or Hammersley's (1992) views on subtle realism as modifications, so that the opposite poles shall be seen in less extreme ways.

When it comes to the ontological positioning of the present study, some considerations are necessary on the delimitation of our object and on the nature of investors' behavior. As detailed in the previous sections, the current investigation addresses the dissemination of negative corporate events across supply chains. In fact, before further develop this matter, the study is concerned with the identification of a causal relation between a negative event and its potential *collateral effects* outside the organizational borders of the source firm. While it is possible that supply chain partners come to be affected in numerous ways, the test for the variation in the market values was selected as the most adequate manner to properly detect and measure conceivable consequences. If by one side the relation between a negative corporate event and its economic and financial effects seems to be immediate, it is a fact arbitrated by investors, who take notice of an event, interpret it and make decisions. From this angle, any corporate event would be the object of an evaluation which shall trigger a reaction.

Within the premise that, although bonded, rationality is present in the decision of economic agents (Arthur, 1991), and considering the postulates of the efficient market hypothesis (Fama, Fisher, Jensen and Roll, 1969; Fama, 1970; Jensen, 1978), positive corporate events, understood as those capable to increase the future generation of cash flows of a firm, are expected to be immediately (or almost immediately) incorporated to the price of a security. In that way, in case a positive fluctuation in the valuation of a stock price was indeed due to a new event, through the method of the event study the effects of this event could be captured and measured. The same reasoning is valid for negative ones. In case investors believe that a new fact or information is likely to negatively affect the future generation of cash flows, they are expected to promptly adjust stock prices, bringing them to their new fair value. Independently of the nature of the event, the consideration that it is either positive or negative stands for the result of an interpretation by those evaluating its consequences. From this perspective, the analysis of events could be argued to departure from a more objective view, representing an

issue of a subjective instance. However, research on the impact of events on stock prices suggest that investors comply, to a reasonable extent, to expected practices, in a way that their exposition to similar stimulus would lead them to equally similar and expected behaviors. That would be closer to more objectivist views of human behavior, advocated by disciplines such as behavior psychology (Jonassen, 1991; Mills, 1998). Although the variations of stimulus are possibly infinite, the response of investors to each individual provocation must be analyzed through the prism of a catalogue of reactions, in which a relation of predicted causes and consequences must exist. From this perspective human behavior would be, at least to some degree, codifiable, planned, predicted, or in other terms, objective. Even if the level of alignment between human action and pre-established formulas must be considerably inferior to those levels discernible in the hard-sciences, that difference would not be due to the possibly distinct natures of each. Instead, it would translate the lack of knowledge around humans, meaning that, as knowledge advances and come to decode the extremely complex constitution of the mind, the possibilities of responses must be, perhaps, fully identified. Considering then that, human nature may not be indecipherable, contextual realities would not be possible, as the same outcomes could be fabricated if properly understood. In face of this comprehension, the present work is ontologically positioned as objectivist, building its arguments in the believe that reality and truth exist independently of their interactions with the human mind. The following section discusses the adequate forms to reach this knowledge, here understood as being possible to be achieved.

2.6.2. Epistemological Positioning

As discussed by Bunge (2012), although the process of building knowledge has been successful in many aspects, from the consciousness that we shall never know enough – allied with the

value one recognizes in knowledge – would rise the need to a continuous and indefinite inquire. In this sense, such is the dedication in acquiring, expanding, applying and diffusing knowledge that economists speak of a “knowledge industry”. Yet, despite this intense focus we would still rest ignorant about knowledge itself, with fundamental questions like whether it is the brain or the mind that knows, or the extend (if any) of the cognitive ability of both subhuman animals and computers remaining unanswered or cloudy. Within this prospect we would hold only rudimentary information around the development (ontogeny) and evolution (phylogeny) of these abilities, in a way that we continue pondering if“(…) the study of knowledge is a harmless armchair specialty or a useful cross-disciplinary field of inquiry, both factual and theoretical, scientific and philosophical” (Bunge, 2012: 13). From this angle, the author claims that“(…) while the knowledge industry is thriving, the science and philosophy of knowledge are still in bud”.

Following ontological perspectives, scientific investigation would embody then a second set of acceptances around the grounds of knowledge (Burrell and Morgan, 1979). As discussed by the authors, these epistemological assumptions relate to

“how one might begin to understand the world and communicate this as knowledge to fellow human beings. These assumptions entail ideas, for example, about what forms of knowledge can be obtained, and how one can sort out what is to be regarded as ‘true’ from what is to be regarded as ‘false’” (Burrell and Morgan, 1979: 13)

Still accordingly, that would encompass, among other things, whether the identification and communication of the nature of knowledge as being hard is possible, or whether knowledge is to be considered something softer and subjective, spiritual or even transcendental, being based on essentially personal experiences and insights. Within the first perspective, knowledge would be seen as something that can be acquired, while in the second, it has to be personally experienced.

Lined up with the perspective of knowledge as hard positivism – i.e. the traditional approach of the natural sciences – would be characterized epistemologies which, through the search for regularities and causal relations between their elements, target the explanation and predictions of happenings of the social world (Burrell and Morgan, 1979). Accordingly, on the other hand, anti-positivist epistemology opposes the utility of a search for laws and regularities in the social world, being this, essentially relativistic and only possible to be understood from the perspective of the individual directly involved in the activities being investigated. In this sense, anti-positivist approaches would reject the standpoint of the observer – characteristics of positivist epistemology – as a valid instrument for the understanding of human enterprise.

On what seems to be a more anti-positivist view, for Goldman (1986: 1) epistemology must be seen as a multidisciplinary affair and “not the province of pure, *a priori* philosophy”, as, although it would be indeed orchestrated by it, many other disciplines (empirical ones included) represent important contributions to the whole. In that vein, epistemology would be distinguished into individual and social. While the former would need the concepts of cognitive sciences in the understanding of the relations between characters and their human mind-brain, the latter would necessarily be supported by a range of distinct social sciences and humanities, which may combine models, facts and insights into social systems of science, but also into learning and culture. Still accordingly, considering that epistemology deals with knowledge and that knowledge, in turn, is understood as a property of individual minds, within an individual perspective epistemology would be ultimately interested in the knowing mind. Multidisciplinarity would be obvious to some, as beyond this individual dimension, knowledge would also be a cultural product which is transmitted through language and social communication. Nevertheless, as addressed by the author, the multidisciplinarity perspective would not be free of critics. As the study of the method, for instance, epistemology should be seen as autonomous, once it would be actually prior to sciences themselves. In that way, as

pointed by Bunge (2012), there would be several possible explanations for the underdevelopment of our knowledge of knowledge, among which the idea that epistemology would be actually impossible (e.g. Nelson, 1912), or would have nothing new to add, as well as philosophy in general (Rorty, 1979).

Pragmatically, for Burrell and Morgan (1979), the assumptions about the nature of science would be all divided between the antagonist subjectivist and objectivist approaches, with ontological positioning switching (or fluctuating) between nominalism and realism, and epistemological ones between anti-positivism and positivism, respectively. If, by one side, ontological positions would imply in epistemological perspectives, they would also be necessarily aligned with the comprehensions of the human nature and with the potential methodologies that follow. The debate around human nature would be then basically represented by the contrast of the extremes of voluntarism (i.e. individuals are fully autonomous and free-willed) and determinism (i.e. individuals and their activities regarded as being completely determined by the situation or the environment surrounding them), accounting for the matter of what model of man is reflected in social-scientific theories. In turn, still according to the authors, the methodological debate would stand for the conflict of ideographic and nomothetic approaches. While the former “is based on the view that one can only understand the social world by obtaining first-hand knowledge of the subject under investigation” (Burrell and Morgan, 1979: 6) and stresses the importance of the approximation to one’s subject and the detailed exploration of background and life history, the later emphasizes the materiality of research being based upon systematic protocol and technique, being epitomized in the approach proper to natural sciences that focus on processes of testing hypothesis with scientific rigor. In that way, the ideographic approach would highlight the analysis of the subjective account generated when the researcher gets inside the situation and the nomothetic one would be concerned with the building of scientific tests and the employment of quantitative techniques

in data analysis (Burrell and Morgan, 1979). As pointed by the authors, among the tools comprised by nomothetic methodology would be surveys, questionnaires, personality tests, as well as standardized research instruments, which is the case of the event study method employed in the three articles composing this dissertation. In that way, the objectivist comprehension of reality discussed in the previous sub-section include a positivist epistemological understanding, both linked to a deterministic view of human nature and the use of nomothetic methodologies. Figure 13 illustrate these views, presenting the assumptions of the present study.

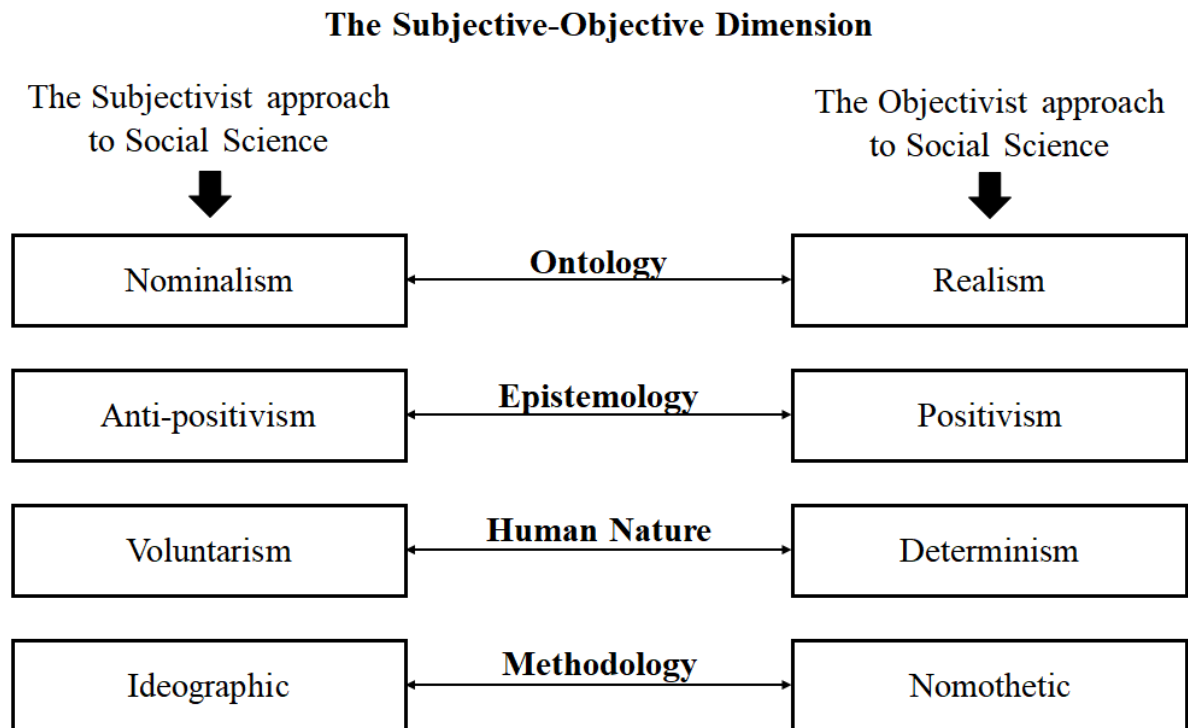


Figure 13: Scheme for analysing assumptions about the nature of Social Science by Burrell and Morgan (1979)

Source: Adapted from Burrell and Morgan (1979: 315)

Part III - Empirical Setting

This section presents the empirical procedures adopted in the three articles of the dissertation. Along with the sampling processes and the documentary research applied in the data collection, a general debate on the decisions and choices made throughout the development of the studies is provided. Likewise, building on the main arguments of the Efficient Market Hypothesis, the method of event study is also approached as the adequate technique to test for the dissemination of negative events across supply chain partners (i.e. *supply chain contamination*).

3.1. Sampling and Data Collection

Considering the objectives of the present dissertation and those of each of the three individual articles composing it, the selection of the cases to be investigated takes a preponderant role in the development of its main argument. Starting from an exploratory, comprehensive, and general study on the *collateral effects* of negative corporate events (article 1), until the analysis of a specific case (article 3), the sampling procedures of the three distinct articles were individually developed in the attempt to avoid eventual bias and personal choices of the author(s). In the first article the sampling procedures were kept as wide and unrestricted as possible, in a way that basically any case of negative corporate events in the period between January 1985 and December 2016 (32 years), could come to be analyzed. Admittedly, such task is problematic right from the start, as the conception of what constitutes a negative event is inherently a personal interpretation and as so, likely to vary from one individual to the other. In search to attenuate the eventual effects of the subjective nature of this assessment, it was decided for the electronic search of events which recognized certain criteria usually associated with situations that could cause negative outcomes to the companies involved. In this sense, the electronic databases of three international newspapers – The New York Times (www.nytimes.com), The Guardian (www.theguardian.com) and Le Monde (www.lemond.fr)

were consulted, being searched the combination of the following words: ‘supply chain’, ‘disaster’, ‘scandal’, ‘environment’, ‘workforce conditions’, ‘slavery’, ‘contamination’, ‘environmental responsibility’, ‘social responsibility’, ‘defect’, ‘safety’, ‘glitch’, ‘delay’, ‘corruption’, ‘bribery’, ‘misconduct’ and ‘fraud’. While the reasons for the selection of the three publications are explained in the article, it must be recognized that the choice of such searched words fails to eliminate the subjective component of the study, as it still reflects the personal criteria of the author. Due to the eventual reduction in the effectiveness of the sampling procedure, this condition must be recognized as a limitation of the study.

As an additional selection criterion, only cases in which source firms had their stocks publicly traded were considered in the final sample. This principle was adopted as it would allow the differentiation between events that (1) negatively affected only supply chain partners; (2) those in which only the source firm was affected; (3) those in which no firm was affected; and (4) those in which both the source firm and at least one supply chain partner was affected. This latter situation fits the definition of *supply chain contamination* here defended. From this initial filter, 20 cases were identified, and, according to a personal assessment of their nature, classified in five different categories: environmental disasters, corporate social irresponsibility, operational failure, fraud and corruption. In fact, these 20 cases represented 21 source firms, as in one of the cases investigated (case 5 - Samarco Tailings Dam Collapse), two parental firms (Vale and BHP Billiton) which owned the company in the proportion of 50% each were considered.

Following the identification of the cases and source firms, supply chain partners were identified through the conduction of an extensive documentary research in numerous research objects, as the provision of evidences of the links between source companies and their upstream and downstream partner was fundamental to the conduction of the tests proposed. Within the

20 cases identified and beyond the 21 respective source firms, these procedures resulted in the recognition of 286 supply chain partners divided in 158 suppliers and 128 customers. A brief description of the cases and the relationship between these companies, including the provision of evidence of their relation, is presented in the first article of the thesis, as well as on the discussion session ahead in the text.

The second part of the data collection refers to the compilation of the stock prices of all the companies of the sample, as well as of the levels of the respective stock exchanges indexes (e.g S&P 500, CAC 40, FTSE 100, iBovespa) in the period between 207 days before and 7 days after each event being considered. This range allows the appropriate consideration of the estimation and event windows, as detailed in the article. All these market data was collected either from the Yahoo Finance or from the Google Finance databases.

Similar sampling and data collection procedures were adopted in the second article. Nevertheless, considering the objective of further analyzing negative events of two specific categories (i.e. social and environmental), adaptations in that regard were necessary. Beyond the three electronic data bases consulted for the sampling of article 1 (i.e. The New York Times, The Guardian and Le Monde), the electronic archive of seven additional international publications were also consulted: Washington Post (www.washingtonpost.com), The Telegraph (www.telegraph.co.uk), The Economist (www.economist.com), Financial Times (www.ft.com), El País (www.elpais.com), O Estado de São Paulo (www.estadao.com.br) and Clarín (www.clarin.com). The words used in the search tools were “buyer”, “catastrophe”, “child labor”, “client”, “corporate social responsibility”, “customer”, “failure”, “global warming”, “hazard”, “human rights”, “protest”, “pollution”, “infraction”, “servitude”, “supply chain”, “supplier”, “sustainability”, and “tragedy”, resulting in the identification of 15 cases (all discriminated in the article) comprehending 82 supply chain partners. Daily stock prices

and the levels of the respective stock exchange indexes were collected from the Yahoo Finance public database. Noteworthy is the fact that, although independent, the sampling procedures of article 1 and 2 resulted in five overlapping events which were distinctively analyzed in consideration of the specific objectives of each study. Moreover, the identification of supply chain partners for these overlapping events was also significantly different, which allowed for different analysis in each case. In this way, it was decided to maintain these cases in both articles in respect to the sampling procedures of each and due to the distinct contributions they offered in the different angles discussed within the objectives of each individual study.

Finally, for the third article of the dissertation, the scope of analysis was reduced to a single case because of its representativeness. Building on the episode known as the Volkswagen Dieselgate, the impact of the event was measured in the stock price of companies of the American automotive industry, choice motivated by four main reasons: (1) the scandal refers to vehicles sold in the U.S.A and was disclosed in face of a fraud held against the environmental legislation of that country; (2) the American automotive market is one of the biggest of the world; (3) the American automotive market is not particularly based on the Diesel technology, what, given the characteristics of the case, adds to the complexity of the event; and (4) Volkswagen was strategically interested in developing its Diesel technology in the U.S.A. as a critical part of its strategy. Within this set, the sample of the study was restricted to companies listed in three main American stock exchanges: The New York Stock Exchange (NYSE), the National Association of Securities Dealers Automatic Quotation System (Nasdaq); and the American Stock Exchange (AMEX). In order to delimit the scope of the investigation, two different Standard Classification Codes (SIC) were selected as they allow the investigation in both the industry and supply chain levels of analysis (3711 – motor vehicles and passenger car bodies and 3714 – motor vehicles parts and accessories). While 7 companies of the industry level met these criteria, 26 in the supply chain level also composed the final sample of the study.

The daily stock prices were collected from the Center of Research in Security Prices (CRSP). Chart 4 below summarizes the distribution of cases across the three articles of the dissertation:

Chart 4: Studied Cases Distribution per Article

Cases Studied	
Article I	1 – Exxon Valdez; 2 – BP Oil Spill*; 3 – Rena Oil Spill; 4 – Samarco Tailings Dam Collapse; 7 – Shell Nigeria; 12 – Foxconn Riots*; 17 – Pegatron*; 18 – CP Foods*; 19 – Samsung Malaysia; 20 – A380 Delay; 21 – Boeing 787 Dreamliner; 22 – Samsung Galaxy Note 7; 23 – Dynegy Fraud; 24 – Olympus Fraud; 25 – Toshiba Fraud; 26 – Volkswagen Fraud / Dieselgate**; 27 – Siemens; 28 – HP; 29 – Rolls-Royce; 30 – GlaxoSmithKline
Article II	2 – BP Oil Spill*; 5 – Palm Oil – Unilever; 6 – Palm Oil – Nestlé; 8 – Junking the Jungle; 9 – Licence to Kill; 10 – Palm Oil – P&G; 11 – Zara Brazil; 12 – Foxconn Riots*; 13 – Bangladesh Fire; 14 – Child Labor; 15 – Zara Argentina; 16 – Rana Plaza Collapse; 17 – Pegatron*; 18 – CP Foods*; 26 – Volkswagen Fraud / Dieselgate**
Article III	26 – Volkswagen Fraud / Dieselgate**

Note: * Cases common to Articles I and II; ** Cases common to Articles I, II and III

In the next sub-section, the main consideration around data analysis are presented, as follows.

3.2. Data Analysis

Timmermann and Granger (2004) discuss the impossibility of predicting speculative returns, a central argument of the Efficient Market Hypothesis. As discussed by the authors, the idea would be originated more than a century ago in what is known as the random walk theory (Bachelier, 1964), and would stand that, in case returns were forecastable, unlimited returns

could be generated, what cannot occur in a stable economy. As pointed by Malkiel and McCue (1985: 2), “A random walk is one in which future steps or direction cannot be predicted on the basis of past actions. When the term is applied to the stock market, it means that short-run changes in stock prices cannot be predicted. Investment advisory services, earning predictions, and complicated chart patterns are useless”. In that way, as highlighted by Timmermann and Granger (2004), a capital market would be considered efficient if it is impossible to make economic profit by trading on the basis of a given information setting (Jensen, 1978), or, in similar terms, if it correctly reflects all relevant information to the determination of a security price (Malkiel, 1992).

From these perspectives, it may be argued that under the Efficient Market Hypothesis premises security returns are unforecastable, as new information - in case they are relevant - must be immediately incorporated to the price of securities (Fama, Fisher, Jensen and Roll, 1969). As the prediction of new information is impossible on itself – meaning that no one is actually capable to predict the future – the effects of this unpredictable future new information (i.e. return of securities) would be impossible. In this sense, the reasoning of the random walk theory around the returns of securities – over which the Efficient Market Hypothesis is constructed –, would actually reflect the unpredictable nature of life. Nevertheless, despite its apparent simplicity, the Efficient Market Hypothesis would be difficult to test (Timmermann and Granger, 2004).

On that regard, Fama, Fisher, Jensen and Roll, (1969) claim that the empirical work to the date was capable only to infer the efficiency of markets upon the observation of the independence of successive price changes, and that only a limited number of tests were dedicated to the speed of the adjustment of prices to specific types of new information. In advancing this investigation, the authors propose the study of the process by which new

information is incorporated or adjusted in the price of common stocks. In doing so they introduce the event study methodology, which “started a methodological revolution in accounting and economics as well as finance” (Binder, 1998: 111) for its wide applications in these disciplines in the examination of security price behavior in face of events such as changes in accounting rules, earning announcements, modification in regulation and the announcement of monetary supply. In that way, still accordingly, “The event study methodology has become the standard method of measuring security price reaction to some announcement or event” (Binder, 1998: 111) as it allows the testing of the null hypothesis that new information is incorporated by the market (Fama, 1991). In that vein, Brown and Warner (1980) argue that event studies represent an objective test of market efficiency, once the absence of abnormal returns in the sequence of an event would not be consistent with the hypothesis that information is quickly and efficiently adjusted in the price of securities.

Broadly, event studies must be understood as set of techniques which, through the contrast between actual and normal returns (i.e. returns observed after a given event and those expected on its hypothetical absence) allows the measure of the effects of new information in the price of a security. The difference between normal and actual returns is thus defined as abnormal returns (Campbel, Lo and Mackinlay, 1997), which, in presenting statistical significance, are validated as empirical evidence of the impact of the event. For its ample acceptance, methodological robustness, solid theoretical foundation and wide application in the analysis of events of the most distinct natures, the event study method is employed in the three articles of the dissertation, all of which further develop the arguments of the Efficient Market Hypothesis and the event study methodology.

Part IV - The Articles

4.1. Article One – Supply Chain Contamination: An Exploratory Approach on the Collateral Effects of Negative Corporate Events

4.1.1. Background of the Article

The first paper, entitled “Supply chain contamination: An exploratory approach on the collateral effects of negative corporate events”, derives from my initial ideas for the development of my Master’s thesis at Fundação Getulio Vargas – Escola de Administração de Empresas de São Paulo. After my personal consideration of a number of factors such as the relatively short period of time to obtain the title (2 years) and my inexperience in research, I came to the conclusion that the project was ambitious for that moment and should therefore be postponed. The initial manuscript was then temporarily left out, although sampling procedures and some empirical tests had been carried out. It is important to note that this early work already developed the concepts of *supply chain contamination* and *inertial effect*. Beyond that, the project considered a broad and exploratory investigation of cases of negative events, as well as the use of the event study method as the adequate mean to provide evidence of their effects in supply chain partners. In view of the preliminary results obtained, it was hypothesized that events linked to corporate social and environmental irresponsibilities could cause negative effects to supply chain partners and should be further analyzed. Given the more focused scope, the idea (i.e. investigation of negative social / environmental events) evolved to my Master’s thesis and to the second article of this dissertation, with the initial investigation, however, following in parallel.

A full article based on the Master’s thesis was then developed and submitted to the *European Management Journal*. Throughout the revision process, valuable insights were gathered and incorporated to strengthen the paper. In answering reviewers’ suggestions, I chose to deepen the Efficient Market Hypothesis theoretical background and to include the theoretical

development around *supply chain contamination*. The submission was then repositioned from a confirmatory role to an exploratory endeavor, therefore the reasoning from literature and the hypothesis drew on the first version were subtracted. Reviewers also demanded improvements on the method section, seeking an enhancement in the understanding of the study's procedures. Although constructive, the critics from reviewers were harsh and the manuscript was classified as a risky major revision in the first and second revision rounds. Concerned with what seemed to be a high risk of rejection, at the third resubmission round, I chose to re-design and re-write the paper in coherence to its new exploratory nature, though not suggested by the reviewers themselves. In fact, the initial project was resumed, replacing the paper derived from the Master's thesis. Adding to the previous structural modifications, among the main distinctions was the reconfiguration of the sampling procedures, both in terms of scope and elimination criteria. As a result, the analysis of negative social/environmental events gave rise to an investigation of negative corporate events in general, as foreseen in the initial project. Additionally, cases on which source firms did not have their stocks publicly traded were eliminated, as the concept of *supply chain contamination* implied on the effect of a negative event being transmitted from one actor to another. From the 15 cases of the previous version, ten failed to respect the sampling criteria adopted, being replaced by 15 new cases. Still, the distinct sampling procedures applied also allowed for the identification of a larger number of supply chain partners, as well as the differentiation between upstream and downstream effects. Consequently, the sample was also enhanced from 82 to 307 studied companies (i.e. 21 source companies, 158 suppliers and 128 customers), and the cases studied were classified in five different categories, encompassing then negative environmental, social irresponsibility, operational failure, fraud and corruption events. The new article was then renamed as to better reflect its contributions and resubmitted. After 2 additional revision rounds (summing up 4), the paper was accepted for publication in the European Management Journal. After 11 months

in press, the paper was published in the volume 36, issue 4, from pages 573 to 587 in August 2018.

“Supply Chain Contamination: An Exploratory Approach on the Collateral Effects of Negative Corporate Events”

Mauro Fracaroli Nunes

4.1.2. Abstract

The present work investigates the impact of negative events on supply chain partners. Through a contextualised discussion of the literature on supply chains and on the efficient market hypothesis, it is proposed that negative events negatively impact the market value of suppliers and customers. Following an exploratory approach, 307 companies (21 source companies, 158 suppliers and 128 customers) comprehending 20 cases of environmental disaster, corporate social irresponsibility, operational failure, corporate fraud and corruption were analysed. Results show that in 12 out of the 20 cases investigated supply chain partners indeed had their market value penalised, encompassing, to a greater or lesser degree, all five categories of cases considered. Yet, while both suppliers and customers absorbed the outcomes of negative events, suppliers seem to be at greater risk of sustaining such losses. Likewise, cases in which the source companies were also negatively affected seem to be slightly more prone to cause losses among suppliers and customers. In this sense, the concept of supply chain contamination is coined to address the observed outcomes. The study offers new insights into the applicability of the efficient market hypothesis and contributes to the assessment of the dissemination of negative events in supply chains, a theme that, despite its potential detrimental consequences for firms and stakeholders, has not yet been sufficiently treated in the Management literature.

Keywords: Negative corporate events, Supply chain contamination, Collateral effects, Event study, Dissemination

4.1.3. Introduction

Negative events, understood as adverse or threatening occurrences (Taylor,1991), have traditionally channelled the attention of the media (Bednar, Boivie, and Prince, 2013; Freudenburg, Coleman, Gonzales, and Helgeland, 1996) and general public (Zavyalova, Pfarrer, Reger, and Hubbard, 2016). Although diverse circumstances may correspond to such classification (e.g. earthquakes, landslides, tsunamis and accidents), from a business perspective, unfavourable news around corporate social irresponsibility (CSI) (Kölbel, Busch, and Jancso, 2017), the recognition of firms' detrimental impact on the environment (Harrison,2016), or even their inability to provide customers with safe and quality products (Borah and Tellis, 2016), among others, have also concentrated a considerable portion of public debate. Beyond the arguable erosion of the reputational capital of firms, under the assumptions of the efficient market hypothesis (Fama, Fisher, Jensen, and Roll, 1969; Jensen, 1978), negative corporate events are expected to trigger correspondently negative reactions from investors, penalising the market value of firms in the adjustment or incorporation of such news (Fama,1970).

The demands faced by organisations are not limited to their own operations, though (Gualandris, Klassen, Vachon, and Kalchschmidt, 2015). With the development of complex arrangements of trade and exchange, supply chains have been brought to the centre stage of the agitation (Pagell and Shevchenko, 2014; Zhu, Sarkis, and Lai, 2013). Within this set, it is possible that a negative event occurred in a firm comes to influence the perceptions and actions of customers, employees, investors and other related parties around one or more than one of its supply chain partners. Some of the most flagrant cases of corporate failures and setbacks (e.g. modern slavery, child labour and environmental damage) might be analysed inward this notion.

In that way, the perception that modern competition is not held among single companies, but rather, amidst supply chains (Lee, 2000), raises some pressing questions: (i) Do investors negatively react to announcements of negative corporate events related to a supply chain partner? and (ii) Do factors such as the nature of the event (i.e. environmental disaster, social irresponsibility, operational failure, fraud or corruption), the positioning of the partner in the supply chain (i.e. supplier/customer) and the fact of the source company (i.e. those originating the event) itself be affected influence the reaction of investors? In search to answer these questions, the present study is supported by the literature on supply chains and by the main arguments of the efficient market hypothesis on the adjustment of stock prices to new information (Fama, Fisher, Jensen and Roll, 1969). In this exploratory approach, the investigation concentrates on 20 cases of negative corporate events comprehending a total of 307 publicly traded companies (i.e. 21 source companies, 158 suppliers and 128 customers). In face of the cases identified, the method of event study is applied to their market data.

Results show that in 12 cases, investors of suppliers and customers negatively reacted to such announcements, distributed, although unevenly, among all the categories considered. While all four cases of corporate social irresponsibility presented losses to suppliers and customers, similar results were only partially detected in cases of other natures. Yet, at the same time losses were also observed in source companies in seven of the 12 cases, market value damages were restricted to supply chain partners in five. Results also suggest that, although both suppliers and customers were found to be affected, suppliers seem to be more likely to present market value losses as a consequence of negative events. The empirical outcomes subsidize the conceptualisation of the term supply chain contamination to properly address the observed phenomenon. In this sense, this examination is expected to contribute not only to the literature on supply chains but also to a broader understanding of the adequacy or applicability of the efficient market hypothesis within supply chain contexts.

From a managerial perspective, it is hoped that the results offer new insights to an extended assessment of the risks in which single firms and supply chains may be embedded, potentially providing decision-makers with new factors to be considered in their investment and/or executive deliberations. After this introduction, this study is organized into four main segments: Section 2 presents the theoretical background, followed by a review of the methods employed in section 3. The results and discussion are then presented in section 4, with the concluding remarks in section 5.

4.1.4. Theoretical Background

4.1.4.1. Supply Chains

According to Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001), supply chains have emerged in response to the increasing focus on time- and quality-based competition. The demand from customers for products to be delivered ‘consistently faster, exactly on time and with no damage’ (Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia, 2001: 2) would have forced firms to build closer relations with their suppliers and manage more effective ways to coordinate the flow of products and services. As discussed by Chen and Paulraj (2004), however, the development of the supply chain concept occurred in a complex and multifaceted manner, with the direct influence of several fields, such as the quality revolution (Dale, Lascelles, and Lloyd, 1994), the notions of materials management and integrated logistics (Carter and Price, 1993; Forrester, 1961), industrial markets and networks (Ford, 1990; Jarillo, 1993), the notion of increased focus (Porter, 1987; Snow, Miles, and Coleman, 1992) and influential industry-specific studies (Lamming, 1993; Womack, Jones, and Roos, 1990). As a result, different and sometimes unrelated terminologies have been used by researchers to treat

the issue. Expressions such as ‘demand pipelines’ (Farmer and Van Amstel, 1991) and ‘value streams’ (Womack and Jones, 1994), among others, would be common in that regard.

The literature around supply chains evolved in a perceivable path that seems to have started on the coordination of material streams among companies, leading to a more developed and complex idea that sources of competitive advantage may reside in the relationship among firms (Dyer and Singh, 1998). For La Londe and Masters (1994), for instance, supply chains are defined as a set of companies through which materials flow. They would typically include several partners, such as raw-material and component producers, product assemblers, wholesalers, retail merchants and transportation companies. Lambert, Stock, and Ellram (1998), in turn, define supply chains as a set of firms aligned to bring products and services to market. Christopher (1992) states that supply chains represent a network formed by organisations that, through downstream and upstream linkages, are involved in different processes and activities that may yield services and products, adding value to firms.

In advancing the idea, Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001: 4) state that a ‘supply chain is defined as a set of three or more entities (organisations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer’. They also define three degrees of supply chain complexity: direct supply chains, formed by a firm, a supplier and a customer; extended supply chains, including suppliers of immediate suppliers, and customers of immediate customers; and ultimate supply chains, from the ultimate supplier through to the ultimate customer (i.e. consumer). The latter is illustrated in Figure 14.

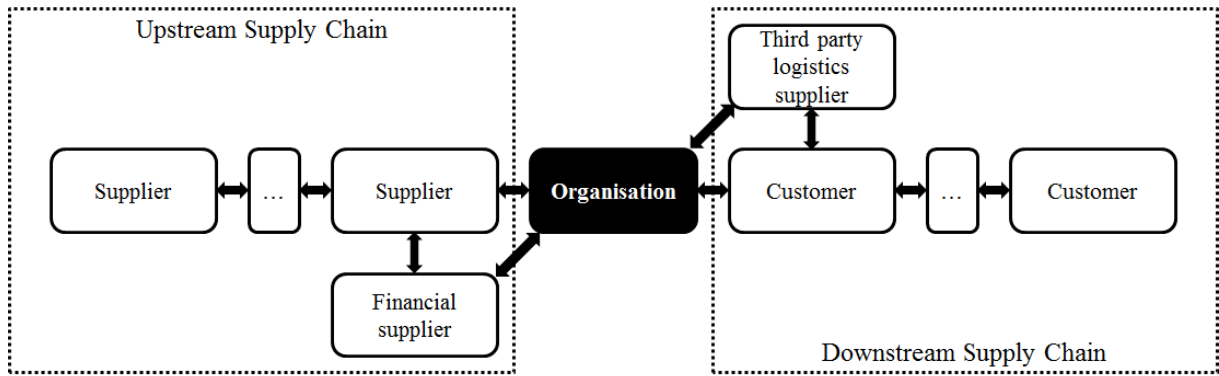


Figure 14: Ultimate Supply Chains

Source: Adapted from Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001)

Complementing the theoretical positioning of the study, the sub-section below explores the preminent aspects of the efficient market hypothesis. The approach is relevant to the purposes of this investigation since, as along with theoretically supporting the eventual detection of negative reactions in face of negative events, it also supports the utilisation of the event study method as the proper apparatus to address the issue.

4.1.4.2. *Efficient Market Hypothesis*

The hypothesis that security markets are efficient has been widely accepted by academic financial economists (Malkiel, 2003). Accordingly, upon the emergence of late facts, news would be rapidly incorporated into the prices of securities, in such a way that the study of neither past nor financial information of firms (i.e. technical and fundamental analysis) would be useful in offering investors the opportunity to obtain greater returns than those offered by a randomly selected portfolio of stocks (within comparable levels of risk). The existence of arbitrage opportunities (i.e. the trade of assets in distinct markets as to profit from differing prices in a given moment) would be discarded, with the achievement of above-average returns without the acceptance of above-average risks being virtually impossible (Malkiel, 2005). In turn, Jensen (1978:96) claims that ‘a market is efficient with respect to information set Θ_t if it is impossible

to make economic profits by trading on the basis of information set Θ_t . Efficient markets would then be those capable of fully echoing all available information in a fast and unbiased manner, in such a way that fair estimates of underlying values would be constantly provided (Basu,1977).

Fama (1970) develops the idea by proposing three versions of the efficient market hypothesis: weak, semi-strong and strong. With the weak version, the price of assets is thought to fully reflect all past publicly available information. Once prices are considered independent, future estimates would be fully determined by information not contained in price series, following a 'random walk'. In the semi-strong form, in turn, prices would be expected to not only reflect all publicly available information but to instantly change in response to any new data (in such a way that no abnormal return can be earned through eventual transactions based on such information). Finally, the strong form additionally proposes that even private or insider information may be reproduced in the price of securities, which, based on such premises, could possibly generate abnormal returns.

Consistent with the idea of an efficient market, successive price changes in individual common stocks had been indicated as nearly independent by many empirical studies conducted by the time (Fama, Fisher, Jensen and Roll, 1969).Nevertheless, despite works such as Mandelbrot (1966) and Samuelson (1965) being successful in linking aspects of the theory of efficient markets to the theory of random walks (Fama,1970), market efficiency could only be inferred, as very little testing had been conducted on the 'speed of adjustment of prices to specific kinds of new information' (Fama, Fisher, Jensen and Roll, 1969: 1). Through the examination of the process of price adjustment, the authors concluded that announcements of stock splits lead the market to positively react as increased dividends were associated with events of this kind, driving investors to re-evaluate the stream of expected income from their

shares and adjust prices almost immediately. In face of such developments, no other proposition in Economics would count on more solid empirical evidence, to the extent that the related Finance, Accounting and Economics of Uncertainty literature accepted the efficient market hypothesis as ‘a fact of life’ (Jensen, 1978: 96).

This assumption is central to the present inquiry. In case investors recognise negative events as potentially compromising the future cash flows of source companies and/or their supply chain partners (either for operational, reputational, legal issues or for any other reason), the stock prices of these firms are expected to be negatively adjusted in response. Incidentally, given the analysis of public market value data, the current investigation finds better support in the semi-strong form of the efficient market hypothesis, which, following the applications built over its delimitations, is also called event studies (Fama, 1991). Beyond expressing the application and pertinence of this premise, the comprehension also validates the use of event studies as a consequent research method. The technique, which is coherently employed in the analysis conducted here, is complementarily debated in the section devoted to the methods engaged. Unlike the traditional approaches, however, this investigation seeks to empirically examine the collateral effect of events within supply chains. In other words, this analysis moves the conventional focus on individual companies, possibly extending the applicability of the efficient market hypothesis. The issue is further discussed as a theoretical implication of the study in the ‘Conclusion’ section.

4.1.5. Methods

As discussed by Hughes, Price, and Marrs (1986), a research is believed to be in an exploratory stage when theoretical models are still missing or at a considerably underdeveloped phase.

Accordingly, the research interests in those cases would be organised around the definition of theoretical constructs and their respective operational conceptualisation, which shall be linked to observable variables. Considering the arguable novelty of the problems treated in the present research and the still incipient or inexistent theorisation around the validity and application of the efficient market hypothesis in supply chain contexts, this study should be viewed as exploratory in nature. The development of theoretical constructs to address the observed outcomes of the present inquiry - discussed in greater detail ahead in the text - also corroborates this understanding.

Within this reasoning, the present empirical research is divided into two main blocks. Within a qualitative approach, the first one comprises documentary research around the 20 cases. The second block presents a quantitative perspective through the application of 307 individual event studies derived from the analysed material. Fig. 2 presents an overview of the adopted methodological approach. As shown, while documentary research procedures were used to build the sample and provide an understanding of each case analysed, the event study method, in all its steps, supplied the results of the investigation.

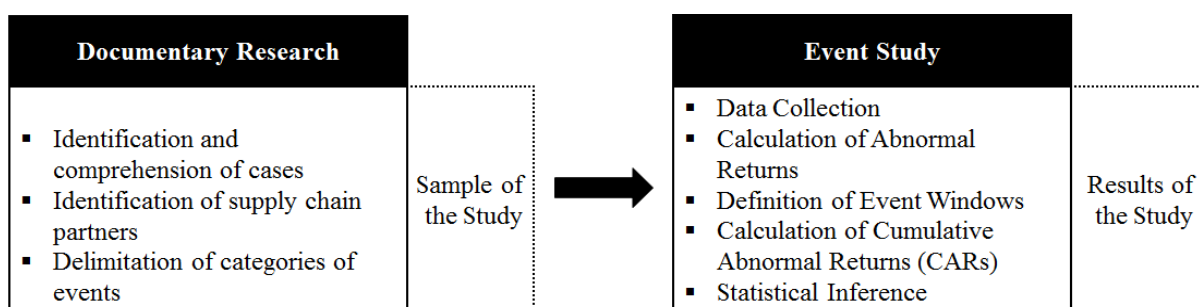


Figure 15: Overview of the Method Approach

4.1.5.1. *Documentary Research*

The specific objective of the qualitative analysis is to provide a description of each case and a more detailed understanding of the events studied. Moreover, the assessment of all the

documents gathered in the process strives to identify supply chain partners of the firms involved in the announcements. As well as contributing to the understanding of the events, this identification is particularly relevant as it leads to the construction of the sample tested in the quantitative section. As discussed by Ludke and André (1986), documentary analysis represents an important tool for qualitative research, as it either complements the information sourced through other means or supplies new and relevant aspects of a studied problem. Several other authors have also stated the utility of the method. Sá-Silva, Almeida, and Guindani (2009), for instance, argue that these tactics must be appreciated and valued, especially by social researchers, as they can be used to retrieve potentially rich information that could easily be neglected by other forms of research. This reflects the idea that the method may drive academics to deepen their understanding of objects which demand a historical and socio-cultural contextualisation in order to be properly studied.

The authors clarify, however, that the concept of document should not be restricted or limited to written or printed material. Instead, for research purposes, documents may be more appropriately conceptualised through several other forms of communication used as sources of information, indication and clarification of objects, such as films, videos and slides. Documentary research is then understood as a primary source of data once the documents are presumed not to have been scientifically treated or interpreted before (Oliveira, 2007). As discussed by Sá-Silva, Almeida and Guindani (2009) the first step in conducting documental research is to find the material relevant to the object of interest. Secondly, the representativeness and credibility of such documents must be assessed. Thirdly, the meanings of the messages must then be properly understood. In that regard, the authors also highlight the fact that documents are not objects of modifications, meaning that, eventually, the interpretation of uncommon or unknown material produced by third parties may be the only way researchers might produce high quality studies.

The event definitions in this paper were guided by the disclosure of negative events in at least one of the electronic data bases of the following international newspapers: The New York Times (www.nytimes.com), The Guardian (www.theguardian.com) and Le Monde (www.lemonde.fr). The present study turns to these informational sources considering that news, which reflect market losses of companies, are presumed to be more likely to be reported by journals with an economic and financial focus. More generalist newspapers seem then to be a way to avoid or, at least, to soften eventual bias in that regard. The choice of three different sources may also allow for a broader perspective, enhancing the assessment of cases independently of the economic or political editorial positioning of a single publication. Additional criteria for the choice are the reach and relevance of the publications. While The New York Times and The Guardian websites are, respectively, positioned first and second in terms of Internet-based popularity (4imn.com Web Ranking, 2016), Le Monde is the leading French-language publication in the ranking. The reason for choosing both English and French is the fact that these are the two official working languages of the United Nations, with the latter having remained as a working language of diplomacy for more than a century (The Economist, 2013). These conditions may allow the research to capture an enlarged spectrum of international news, particularly relevant to cases within international supply chains.

Regarding the search procedures, combinations of the following terms were applied: ‘supply chain’, ‘disaster’, ‘scandal’, ‘environment’, ‘workforce conditions’, ‘slavery’, ‘contamination’, ‘environmental responsibility’, ‘social responsibility’, ‘defect’, ‘safety’, ‘glitch’, ‘delay’, ‘corruption’, ‘bribery’, ‘misconduct’ and ‘fraud’. The time period considered runs from January 1985 to December 2016. As for restrictions, the following elimination criteria were adopted (adapted from Hendricks and Singhal, 2003): cases that do not actually address the discussed themes; cases in which supply chain partners were not clearly identified; cases in which source companies and/or all supply chain partners were privately held companies (i.e. not publicly

traded); and cases in which source companies and / or supply chain partners had insufficient daily stock price information on the Yahoo Finance and Google Finance public databases, excluding firms not publicly traded on Nasdaq (USA), New York Stock Exchange (USA), American Stock Exchange (USA), London Stock Exchange (United Kingdom), Euronext Paris(France), Xetra Exchange (Germany), Frankfurt Stock Exchange (Germany), Madrid Stock Exchange (Spain), Amsterdam Stock Exchange (Netherlands), Copenhagen Stock Exchange/Nasdaq Copenhagen (Denmark), BMF Bovespa (Brazil), Korean Stock Exchange (South Korea), Tokyo Stock Exchange (Japan), Shanghai Stock Exchange (China), Shenzhen Stock Exchange (China), Taiwan Stock Exchange (Taiwan), Hong Kong Stock Exchange (Hong Kong), Stock Exchange of Thailand (Thailand), Bombay Stock Exchange (India), National Stock Exchange of India (India) or Singapore Exchange (Singapore).

Additionally, supply chain partners were also identified through the access to news published by other newspapers and magazines such as Corriere della Sera, El País, Daily Mail, Le Figaro, L'Opinion, O Estado de S. Paulo, Folha de S. Paulo, Time, The Economist, Veja, among others; the websites of the identified companies; any internally produced material supplied by the identified companies, such as annual reports, sustainability reports, press releases, financial statements, among others; reports produced by environmentalist groups and non-governmental organisations (NGOs); live and recorded broadcast transmissions available on video-hosting Internet sites; academic and practitioner publications, websites and complementary sources on financial information and market data such as Bloomberg, Reuters, among others. The final sample resulted in 307 companies (i.e. 21 source companies, 158 suppliers and 128 customers). The cases were grouped into five categories according to the nature of the event e environmental disaster, social irresponsibility, operational failure, corporate fraud and corruption e and then arranged in a chronological order within these categories. Charts 5 and 6 present the cases, along with a brief summary of each.

Chart 5: Negative Environmental and Corporate Social Irresponsibility Events – cases, brief description and supply chain partners

Case No.	Case (Event)	Source Companies	Description	Suppliers	Customers
1	Exxon Valdez	Exxon	More than 11 million gallons of crude oil spilled in Alaska, damaging around 1,300 miles of sea coast.	Parker Drilling Company (1)	
2	BP Oil Spill	British Petroleum (BP)	One of the greatest oil spills of all times occurred in 2010 in the Gulf of Mexico.	ABB (2); Accenture (3); Anadarko (4); Cameron International (5); Fluor Corporation (6); General Electric (7); Halliburton (4); JA Solar Holdings (8); KBR Inc. (9); Microsoft (10); National Oilwell Varco (11); Sempra Energy (12); Transocean (4); T-Systems (13); Weatherford (14)	Marathon Oil (15)
3	Shell Nigeria	Royal Dutch Shell	Release of the United Nations report on deep pollution caused by more than 50 years of oil exploration in Nigeria.	ABB (16); Emerson Electric (17); Fluor Corporation (18); Johnson Controls (19); KBR Inc (20); MAN SE (21); Noble Corporation (22); Parker Hannifin Corporation (23); Tesoro Corporation (24); T-Systems (25)	Hyundai Motor Company (26); Penske Automotive Group (27)
4	Rena Oil Spill	Costamare	Considered as New Zealand’s worst maritime environmental disaster, the container ship Rena spilled nearly 2,000 tons of fuel in the sea.		A.P. Moller-Maersk (28)
5	Samarco Tailings Dam Collapse	Samarco (Vale do Rio Doce and BHP Billiton)	Collapse of a tailings dam releasing mining waste into Rio Doce river, destroying historic cities and killing 19 people. Regarded as Brazil’s worst environmental disaster.	ABB (29); Accenture (30); Braskem S.A. (31) ; Cemig (31); Clariant (32); Ultrapar (33); Cap Gemini (34); Gerdau (35); Emerson Electric (32); Energisa (33); FLSmidth (32); General Electric (35); Metso Corporation (31); Orica (32); Petrobrás (31); Caterpillar (31); Valmet Corporation (32); Weir Group (33); Dassault Systemes (36); Outotec (37) ; ThyssenKrupp (38)	Nucor Corporation (39)
6	Foxconn Riots	Foxconn	Reports of riots and deaths due to extreme conditions imposed on workers.		Acer (40); Amazon (40); Apple (41); Cisco (40); Dell (193), Google (42); HP (43); IBM (194), Intel (192); Lenovo (196); Microsoft (43); Motorola (40); Nintendo (41); Nokia (40); Sony (41); Toshiba (40).
7	Pegatron	Pegatron	Over 70,000 employees in poor working conditions.		Apple (44); Lenovo (45); Microsoft (45); Sony (45)
8	CP Foods	Charoen Pokphand Foods	One of the most severe cases of modern slavery in shrimp production revealed by English newspaper The Guardian.		Carrefour (46); Costco (46); KFC (195); McDonald’s (195); Morisson (47); Tesco (46); Wal Mart (46)
9	Samsung Malaysia	Samsung	Accusations of illegal confiscation of passports, exploration and underpaying of Nepalese migrant workers in Malaysia.	Broadcom (48); Cadence Design Systems (49); Dialog Semiconductor (50); General Dynamics (51); HannsTouch Solutions Inc. (52); Imagination Technologies Group (53); LOT Vacuum Co (54); Marvell Semiconductors (55); MediaTek (56); Namuga Co (54); NXP Semiconductors (57); Partron Co Ltd (54); Radiant Opto-Electronics Corporation (52) ; Rambus (58); Samsung SDI Co (59); Silicom Motion (60); Skyworks Solutions (61); Sodastream (62); Taiwan Semiconductor Manufacturing (63) ; Xilinx (64)	Alibaba Group Holding Ltd (52); Amazon (65); AT&T (66); Bed Bath and Beyond (67); Best Buy (68); Carrefour (69); Costco (70); Home Depot (71); JC Penney (72); JD.com (52); Kohl’s (73); Lowe’s (74); Macy’s (75); Microsoft (76); Nordstrom (77); Qualcomm (78); Sears (79); Sprint Corporation (80); Staples (81); Target (82); Telstra (52); Tesco (83); T-Mobile (84); US Cellular (85); Verizon (86); Vodafone (87); Wal Mart (88)

Notes: Environmental disaster cases 1–5, and social irresponsibility cases 6–9; the numbers in parentheses represent evidence reference numbers (Appendix A).

Chart 6: Operational Failure, Fraud and Corruption Events – cases, brief description and supply chain partners

Case No.	Case (Event)	Source Companies	Description	Suppliers	Customers
10	A380 Delay	Airbus	Postponement of Airbus A380 superjumbo's first delivery date by 6 months, following several operational difficulties.		Air France (89); Fedex (90); Korean Air (91); Lufthansa (92); Qantas (93); Singapore Airlines (94)
11	Boeing 787 Dreamliner	Boeing	Due to electrical system problems on its lithium-ion batteries (including an onboard fire), the entire fleet of Boeing 787 Dreamliner was grounded, causing diverse operational issues for airports and airline companies around the world.	B/E Aerospace (95); BAE Systems (96); Circor Aerospace (97); Cisco Systems (98); Curtiss-Wright (99); Elbit Systems (100); General Electric (101); Honeywell (102); Meggitt (103) Rockwell Collins (102); Thales S.A. (104); UTC Aerospace Systems (105).	Air Canada (106); Air China (107); Air France (108); Air Lease Corporation (109); American Airlines (110); Ryanair (111); Cathay Pacific (112); Delta Airlines (113); FedEx (114); Panalpina World Transport (115); SES S.A. (116); Singapore Airlines (117); Southwest Airlines (118); United Airlines (119)
12	Samsung Galaxy Note 7	Samsung	Following a series of reported combustion and explosions, the Korean multinational Samsung announced the discontinuation of the product.	Broadcom (48); Cadence Design Systems (49); Dialog Semiconductor (50); General Dynamics (51); HannsTouch Solutions Inc. (52); Imagination Technologies Group (53); LOT Vacuum Co (54); Marvell Semiconductors (55); MediaTek (56); Namuga Co (54); NXP Semiconductors (57); Partron Co Ltd (54); Radiant Opto-Electronics Corporation (52) ; Rambus (58); Samsung SDI Co (59); Silicom Motion (60); Skyworks Solutions (61); Sodastream (62); Taiwan Semiconductor Manufacturing (63) ; Xilinx (64)	Alibaba Group Holding Ltd (52); Amazon (65); AT&T (66); Bed Bath and Beyond (67); Best Buy (68); Carrefour (69); Costco (70); Home Depot (71); JC Penney (72); JD.com (52); Kohl's (73); Lowe's (74); Macy's (75); Microsoft (76); Nordstrom (77); Qualcomm (78); Sears (79); Sprint Corporation (80); Staples (81); Target (82); Telstra (52); Tesco (83); T-Mobile (84); US Cellular (85); Verizon (86); Vodafone (87); Wal Mart (88)
13	Dynegey Fraud	Dynegey	Upon the California electricity crisis, the company was indicated as conducting diverse deceptive practices, among which price manipulations.	Air Liquide S.A. (120); Dow Chemical Company (120); General Electric (120); Siemens (121)	
14	Olympus Fraud	Olympus	Accounting arrangements applied in the hiding and dissimulation of long-term losses revealed by a top executive of the company after he was fired.		Amazon (122); Best Buy (123); Costco (124); Staples (125); Tesco (126); Wal Mart (127)
15	Toshiba Fraud	Toshiba	Through the improper recognition of costs of projects, the company overestimated its operating profits by USD 1.2 billion between the years 2008 and 2014.	Cadence Design System (128); Foxconn (40); Intel (129); Inventec (130); Microsoft (131); Nvidia (132); Panalpina (133); SunPower Corporation (134); Synopsys (135); Xilinx (136)	Amazon (65); Best Buy (68); Costco (137); Ford (138); Kohl's (139); Macy's (140); Sears (141); Staples (142); Target (143); Tesco (144); Wal Mart (145)
16	Volkswagen Fraud	Volkswagen	Volkswagen admits having used illegal software to cheat environmental tests in the U.S.A.	Aisin (183); American Axle (188); Autoliv (189); Ballard Power Systems (146); BASF (147); BorgWarner (148); Bosch (182); Bridgestone (183); Continental (149); Dassault Systemes (150); Delphi (180); Gentex (184); Honeywell (151); IBM (152); Infineon Technologies (153); Kumho Tires (154); Lear (187); LG Electronics (155); Magna (156); Maruti (157); Meritor (181); Microsoft (158); Mobileye (186); Motorola Solutions (159); NGK (190); Nokia (160); Plastic Omnium (161); SAP (162); Siemens (163); Tenneco (185); ThyssenKrupp (183); Tupy S.A. (164); Valeo S.A. (183)Visteon (165)	UPS (191)
17	Siemens	Siemens	Disclosure of a bribery scheme to corrupt government officials in the development of its business in diverse geographic areas. The scandal cost the company USD 1.6 billion in the then largest fine for bribery ever applied. International investigations showed that in the management of some of its IT contracts, the company maintained bribery practices in countries like Poland, Germany, Mexico and Russia.	Nvidia (166); Qualcomm (167)	Samsung Heavy Industries (168)
18	HP	HP		Citrix (169); Intel (170); Nvidia (171); Oracle (172)	

19	Rolls-Royce	Rolls-Royce	As a result of an investigations conducted by an external law firm, practices of bribery in China and Indonesia were found to be carried out by the company.	Airbus (173); Boeing (174)
20	GlaxoSmith Kline	GlaxoSmith Kline	Investigations conducted by Chinese authorities claim the existence of a network of corruption led by the company in the country. Among others, the goal of the corruption pattern was to artificially increase sales and prices.	Adaptimmune (175); Exelixis (176) ; Genpact (177); Infosys (178); Parexel (179)

Note: Operational failure cases 10–12, corporate fraud cases 13–16 and corruption cases 17–20; the numbers in parentheses represent evidence reference numbers (Appendix A).

4.1.5.2. *Event Study*

As discussed by Dwyer (2001), events are characterised by changes, developments or announcements that can produce a relatively large impact on the price of assets over a period. In this way, event studies examine the effect of a specific event (or a set of events) on the value of assets (De Mortanges and Rad, 1998). According to MacKinlay (1997), through the use of financial market data, event studies represent a powerful tool that allows analysts to measure the variances in the market value of firms due to new information. As discussed by Corrado (2011), although the event study method was primarily conceptualized as an empirical tool for studies of Finance and Accounting, studies in the most diverse areas of Management have employed the approach. From a broad perspective, event studies may then be seen as an apparatus that, by contrasting actual returns (i.e. returns actually observed after a given event) to normal ones (i.e. returns that would be expected if the event had not taken place), allows the apprehension of the impact of a given fact on the market value of companies.

From the difference between the latter and the former emerges the concept of abnormal returns (Campbell, Lo, and MacKinlay, 1997) which, in presenting statistical significance, evidences an impact caused by the event in question. Regarding the estimation of normal returns, the study relies on the Market Model (Fama, 1970), according to which normal returns (r_{it}) are a function of the returns of the market portfolio (r_{mt}) (i.e. the conjunct of stocks that represent the overall return of a particular market), parameters a_i and b_i (i.e. the constant and angular coefficient resulting from the linear regression between the returns of the stock per se and those of the market portfolio within a 200-day estimation window) and the error term ε_{it} (i.e. the portion of the return of stock i not explained by market movements, capturing the effect of firm specific information). The return of a given stock i in a given moment t would then be expressed as follows:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it}$$

where

r_{it} = normal return of stock i on day t

r_{mt} = the market return on day t

α_i = the intercept of the relationship for stock i

β_i = the slope of the relationship for the returns of stock i with the market return

ε_{it} = error term for stock i on day t, with $E(\varepsilon_{it}) = 0$ and $\text{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_{it}}$

The abnormal return for any stock i on day t is calculated as the difference between the ex post (i.e. actual) and the ex ante (i.e. normal) return of the stock, according to the following formula:

$$AR_{it} = Actr_{it} - r_{it}$$

where:

$Actr_{it}$ = return of stock i on any day t (ex post or actual return)

r_{it} = normal or ex ante return (expected return of stock i on any day t according to the Market Model)

In turn, event windows reproduce the stretch of time considered for the evaluation. Conventionally, as well as the event day itself, event windows also encompass a number of days before and / or after it, in order to cope with potential forethoughts or delayed reactions. For control purposes, five different event windows are considered, as represented in Table 1.

Table 1: Five Event Windows and Estimation Periods

	Event Window			Estimation Period		
	Number of Days	Initial Day	Final Day	Number of Days	Initial Day	Final Day
Event Window 1	2	D0	D1	200	D-200	D-1
Event Window 2	3	D0	D2	200	D-200	D-1
Event Window 3	6	D0	D5	200	D-200	D-1
Event Window 4	3	D-1	D1	200	D-201	D-2
Event Window 5	5	D-2	D2	200	D-202	D-3

Through the sum of individual abnormal returns calculated for each day within a given event window, cumulative abnormal returns (CARs) represent the effect of an event across the whole period considered. For any given day t , the CAR is calculated by the following formula:

$$CAR_T = \sum_{t=1}^T AR_t$$

where T represents any particular day within the event window.

Statistical inferences in event studies aim to analyse if CARs calculated are statistically significant. Following the traditional practices of inferential statistics, H_0 (the null hypothesis) stands for the inexistence of statistically significant CARs, while H_a (the alternative hypothesis) stands for their presence. Considering that $E(\varepsilon_{it}) = 0$ and $\text{var}(\varepsilon_{it}) = \sigma^2_{\varepsilon_{it}}$ within the efficient market premises (Fama, 1970), abnormal returns are understood as normally distributed. For that reason, the statistical inference may be run over parametric t-tests. The statistic of the test for CARs is the ratio between the cumulative abnormal return itself and its estimated standard deviation, as follows:

$$\text{Statistic of Cumulative Abnormal Return} = \frac{\text{Cumulative Abnormal Return in Day } t}{\text{CAR Estimated Standard Deviation}}$$

As discussed by MacKinlay (1997), the variance (σ_i^2) and standard deviation (σ_i) for the CARs are calculated as follows:

$$\sigma_i^2(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1)\sigma_\varepsilon^2$$

$$\sigma_i(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1)^{0.5}\sigma_\varepsilon$$

where τ_2 is the last day within the event window and τ_1 the first day within the same period. $\tau_2 - \tau_1 + 1$ then covers the number of days in a given event window. σ_ε represents the error term of the market model regression. The statistic inference is applied for three different significance levels (99%, 95% and 90%).

4.1.6. Results and Discussion

Considering the objectives of the study, results may be grouped into two main categories, according to the following criteria: 1 e cases in which suppliers and/or customers were (and were not) negatively affected; and 2 e cases in which source companies were (and were not) negatively affected. From the combinations of these conditions, four main classifications of results emerge:

Group 1 – Cases in which both source companies and supply chain partners were negatively affected;

Group 2 – Cases in which negative effects were restricted to source companies;

Group 3 – Cases in which negative effects were restricted to supply chain partners;

Group 4 – Cases in which neither source companies nor supply chain partners were negatively affected.

The cases within each group may be represented in a 2 X 2 matrix, as illustrated in Figure 16.

		Source firms NEGATIVELY affected	Source firms NOT affected
Supply Chain partners	NEGATIVELY affected	<p>GROUP 1</p> <p>Case 2 – BP Oil Spill (Environmental Disaster)</p> <p>Case 3 – Shell Nigeria (Environmental Disaster)</p> <p>Case 5 – Samarco Tailings Dam Collapse (Environmental Disaster)</p> <p>Case 12 – Samsung Galaxy Note 7 (Operational Failure)</p> <p>Case 15 – Toshiba Fraud (Fraud)</p> <p>Case 16 – Volkswagen Fraud (Fraud)</p> <p>Case 20 – GlaxoSmithKline (Corruption)</p>	<p>GROUP 3</p> <p>Case 6 – Foxconn Riots (Corporate Social Irresponsibility)</p> <p>Case 7 – Pegatron (Corporate Social Irresponsibility)</p> <p>Case 8 – CP Foods (Corporate Social Irresponsibility)</p> <p>Case 9 – Samsung Malaysia (Corporate Social Irresponsibility)</p> <p>Case 18 – HP (Corruption)</p>
	NOT affected	<p>GROUP 2</p> <p>Case 1 – Exxon Valdez (Environmental Disaster)</p> <p>Case 4 – Rena Oil Spill (Environmental Disaster)</p> <p>Case 11 – Boeing 787 Dreamliner (Operational Failure)</p> <p>Case 14 – Olympus Fraud (Fraud)</p> <p>Case 19 – Rolls-Royce (Corruption)</p>	<p>GROUP 4</p> <p>Case 10– A380 Delay (Operational Failure)</p> <p>Case 13– Dynegy Fraud (Fraud)</p> <p>Case 17– Siemens (Corruption)</p>

Figure 16: Overall Empirical Results and Classification Groups

The analysis begins with the 12 cases in which source companies were negatively impacted (groups 1 and 2). As shown in Fig. 3, at the same time, companies at the origin of environmental disasters experienced losses in all five cases considered (cases 2, 3 and 5 in group 1, and cases 1 and 4 in group 2), three out of four companies giving rise to cases of corporate fraud also presented losses in terms of market value (cases 15 and 16 in group 1, and case 14 in group 2). In turn, source companies were penalized in two out of three cases of operational failure (case 12 in group 1 and case 11 in group 2). On cases of corruption, mixed results were found, with two out of four source companies suffering market value losses (case 20 in group 1 and case 19 in group 2). Particularly interesting, however, is the fact that none of

the companies at the origin of cases of corporate social irresponsibility suffered market value penalisations upon the disclosure of such facts. Although this was not the primary objective of the study, results suggest that, when it comes to source companies, there seems to be a graduation of the relevance of negative events, with environmental issues being the most significant on one side, and cases of corporate social irresponsibility being the least on the other.

Regarding cases of environmental disasters more specifically, results may be argued to be coherent with a strong environmental awareness supported by the broad public debate on matters like global warming, the extinction of endangered species, animal ethics, among others. The debate promoted by non-governmental organisations and environmentalist groups (e.g. Greenpeace, Sea Shepherd Conservation Society), as well as by the general media, allied with the creation of various sustainability indexes (e.g. Dow Jones Sustainability Index, FTSE4Good), may have led stock market players to believe that such events could severely compromise the generation of cash flows by those companies, either through immediate retaliation from the public or even through diverse issues such as the loss of governmental incentives, for instance. These factors could, at least partially, explain the negative reactions of the shareholders of these companies. The results concerning cases of corporate social irresponsibility, on the other hand, seem to contradict the corresponding attention that such cases have received. Arguably, they should be expected to have presented similar results to those observed in environmental cases. Running counter to these perspectives, despite the condemnable nature of the issues addressed in this group (e.g. modern slavery, child labour, poor working conditions), it is feasible that investors have not anticipated major operational losses for the companies directly or indirectly involved. Within a distinct but related perspective, Hillman and Keim (2001) show that, while shareholder value is positively associated with stakeholder management, it is negatively affected by the participation of firms

in social issues. Within the two extremes are the cases of corporate fraud, operational failure and corruption, all suggesting both neutral and negative results.

As previously discussed, however, cases of corporate fraud and operational failure have presented slightly stronger suggestions of negative reaction than those related to corruption. It seems that these sorts of events, even considering the sharp market value losses some of them have caused, are not homogeneous in terms of investors' response to source companies. On the differences between the results of each group, it is important to note that it cannot be assumed that they were all analysed by the same pool of investors. Instead, it is very possible that the investors in one group or even in individual companies have no direct links to one another. Additionally, there is the diversity of financial markets analysed, as discussed in section 3.1. Nevertheless, considering the assumptions of the efficient market hypothesis, security markets would be expected to respond to events in a fast and homogeneous manner, otherwise arbitrage opportunities would be offered. Nonetheless, results must be regarded within a macro-prospect, as further particularisations are to be addressed in future research.

Particularly relevant for the study is the investigation of the potential collateral effect of the events analysed within supply chain contexts. As also shown in Fig.3, 12 events negatively affected supply chain partners (groups 1 and 3), denoting what is here defined as supply chain contamination. Based on the empirical findings, supply chain contamination would be understood as the dissemination of negative events through supply chains, negatively affecting not only the market value of customers and suppliers (possibly also that of customers of customers and suppliers of suppliers and soon), as well as potentially other dimensions such as corporate reputations, for instance. As also demonstrated in group 3, in cases 6-9 (corporate social irresponsibility) and 18 (corruption), supply chain partners were contaminated even though the source company did not present negative results. In other situations, the

contamination seems to be the reflection of the damages observed in the source company, as ascertained in cases 2, 3, 5 (environmental disaster), 12 (operational failure), 15 and 16 (fraud), and 20 (corruption), all pertaining to group 1. Despite the relatively small differences in the number of cases in each situation (seven in group 1 and five in group 3), results suggest that supply chain contamination is more likely to occur when the source company is also affected. Further research, however, would be necessary to assess this factor.

The nature of the events seems to play a different influence when compared to the exclusive analysis around source companies. Once more, intriguing in that regard is the observation of supply chain contamination in all four cases of corporate social irresponsibility analysed (cases 6-9 in group 3), even though none of the source companies was affected. This result could potentially indicate a predisposition of investors to associate such issues with supply chain problems. This perception would be supported by several other cases of poor working conditions, in which major problems were concentrated on the operations of suppliers. The other categories all present mixed results. Regardless of the degree, however, all types of events presented supply chain contamination. On the fact of the supply chain partner being either a supplier or a customer, it seems that contamination is more likely to affect the former, as results indicate eight cases of supplier contamination (cases 2, 3, 5, 9, 12, 16, 18 and 20) and five of customer contamination (cases 6, 7, 8, 12 and 15), as shown in Table 2. Noteworthy is the fact that only in case 12 e Samsung Galaxy Note 7 e supply chain contamination was observed in both suppliers and customers, as, in all other cases, the contamination was restricted to either one or the other. Moreover, the data show that, while 26 individual suppliers were found to be contaminated, only six customers turned out to be in the same situation. Table 2 also presents the statistically significant CARs calculated and their respective levels of significance within each of the five distinct event windows analysed.

Table 2: Results for Significant Event Studies

Case	Company	Position	CAR (0, 1)		CAR (0, 2)		CAR (0, 5)		CAR (-1, 1)		CAR (-2, 2)		
1	Exxon Valdez	Exxon	Source company	-1.88%	*	-3.30%	**	-5.73%	***				
2	BP Oil Spill	British Petroleum (BP)	Source company					-4.16%	*				
		ABB	Supplier			-8.42%	***	-10.04%	***			-7.83%	***
3	Shell Negeria	Royal Dutch Shell	Source company	-3.39%	***	-4.69%	***			-5.13%	***	-5.62%	***
		MAN SE	Supplier									-8.70%	***
		Noble Corporation	Supplier	-5.80%	***	-9.67%	***			-7.86%	***	-12.35%	***
4	Rena Disaster	Costamare	Source company								-7.51%	***	
5	Samarco Tailings Dam Collapse	BHP Billiton	Source company	-7.69%	***	-8.80%	***	-12.12%	***	-7.69%	**		
		Ultrapar	Supplier	-2.52%	*								
		FLSmidth	Supplier					-8.37%	*				
		Caterpillar	Supplier					-4.97%	*				
6	Foxconn Riots	Google	Customer								-5.30%	*	
		Huawei	Customer					-13.74%	**				
7	Pegatron	Sony	Customer								-9.12%	*	
8	CP Foods	McDonald's	Customer								-2.41%	*	
9	Samsung Malaysia	LOT Vacuum	Supplier			-14.19%	**	-16.97%	**			-14.98%	**
		Namuga	Supplier	-7.66%	*								
11	Boeing 787 Dreamliner	Boeing	Source company	-2.76%	**	-3.41%	**						
12	Samsung Galaxy Note 7	Samsung	Source company	-7.44%	***	-4.93%	**			-9.30%	***	-5.28%	*
		HannsTouch Solutions	Supplier	-9.57%	**	-9.16%	*	-11.49%	*	-11.15%	**		
		Radiant Opto-Electronic	Supplier									-8.03%	*
		Silicom Motion	Supplier					-12.36%	**				
		Xilinx	Supplier							-4.61%	**	-5.37%	**
		Bed Bath and Beyond	Customer					-7.15%	**			-6.17%	*
14	Olympus Fraud	Olympus	Source company	-42.53%	***	-49.72%	***	-62.89%	***	-39.12%	***	-48.06%	***
15	Toshiba Fraud	Toshiba	Source company	-5.43%	**								
		Costco	Customer					-3.58%	*				
16	Volkswagen Dieseltgate	Volkswagen	Source company	-17.71%	***	-30.39%	***	-27.56%	***	-17.76%	***	-30.43%	***
		BorgWarner	Supplier			-8.73%	***	-6.13%	**			-7.15%	***
		Continental	Supplier	-2.77%	*								
		Honeywell	Supplier	-1.62%	*	-2.09%	**	-4.23%	***	-1.80%	*	-2.61%	*
		Magna	Supplier			-4.90%	**						
		Plastic Omnium	Supplier	-4.50%	**	-8.44%	***					-7.33%	**
		Delphi	Supplier			-3.53%	*	-4.63%	*				
		Meritor	Supplier			-7.40%	**	-13.31%	***				
		ThyssenKrupp	Supplier					-5.09%	*				
	Tenneco	Supplier	-3.97%	***	-8.79%	***	-7.60%	***	-3.87%	**	-6.54%	***	
	Lear	Supplier			-3.31%	*							

	American Axle	Supplier			-4.17%	*							
	Ainsi	Supplier	-4.02%	*	-4.92%	*							
18	HP	Nvidia	Supplier					-8.62%	*				
19	Rolls-Royce	Rolls-Royce	Source company	-2.43%	*	-3.21%	*	-6.34%	***	-2.87%	*		
20	GlaxoSmith Kline	GlaxoSmith Kline	Source company	-2.25%	**					-2.97%	**	-2.97%	*
		Exelixis	Supplier					-12.39%	**				

Notes: Significant at the *90% level, **95% level and ***99% level

From a broad perspective, results suggest that negative events do indeed have the potential to negatively affect not only the companies directly responsible but also their supply chain partners. While the penalization of the first group in terms of market value is not exactly unforeseen, the empirical demonstration that suppliers and customers of these companies may absorb, at least partially, the negative impacts of their failures may be seen as a supplementary contribution to the literature on the efficient market hypothesis, as well as to that on supply chain management. The amplification of the premises for the adjustment of prices to new information (Fama, Fisher, Jensen and Roll, 1969) from single companies to supply chains is particularly stimulating. As well as suggesting that the market value of firms may not be a direct function off actors strictly concerning them, this argument also calls for a re-evaluation of the risk factors to be considered in the analysis of individual firms.

When making transaction decisions, investors may also consider the potential influence that failures and non-routine behaviours of suppliers and customers might come to have on the performance of selected stocks. In other words, apart from the commonly employed analysis, additional factors relative to the business conduction of suppliers and customers must be more closely monitored. However, although the results concentrate on the investigation of market value reactions, they may also be of great interest to managers, as the fluctuations observed can be argued to be a final symptom of more deeply rooted issues. As discussed, it is possible, for instance, that supply chain contamination from negative events comes to seriously damage other aspects of neighbouring companies, as, in those cases, they may be

collaterally associated with corporate misconducts and failures. Along with the detection of market value losses presented in the present investigation, the impairment of the reputational capital of firms maybe an additional measure of supply chain contamination. Along with others, both these theoretical and practical implications are further discussed in the conclusion of the study in the subsequent text.

4.1.7. Conclusion

Through the analysis of 20 cases of negative corporate events, the present study investigated whether such events negatively affected suppliers and customers of the source firms. From a macro perspective, results show that, out of the 20 cases analysed, in 12 of them supply chain partners did indeed suffer market value losses. Beyond the empirical evidence provided, the addressing of distinct levels of analysis and the employment of dissimilar approaches represent innovative and provocative findings for the literature on supply chain management and on the efficient market hypothesis. More specifically, the exploratory investigation proposed that negative events are potentially destructive to these companies, with supplementary factors such as the nature of the events, the position of partners in supply chains and the relevance of negative effects on the source companies also being cogitated to influence the dissemination of negative events through supply chains.

These questions were empirically approached through the documentary research and event study methods. Within the 20 cases investigated, the sample procedures resulted in the identification of 307 companies (i.e. 21 source companies, 158 suppliers and 128 customers), within five distinct categorisations: environmental disasters, corporate social irresponsibility, operational failure, corporate fraud and corruption. Results suggest that supply chain partners

absorb, at least partially, the adverse outcomes of negative events. At the same time, the nature of the events seems to influence the collateral effects on supply chains, suppliers seem to be more willing to be affected when compared to customers. However, evidence also shows that supply chain partners are more prone to have their market value damaged in cases in which the source company was also affected. The empirical identification of the dissemination of negative events allowed for the development of the concept of supply chain contamination to address the phenomenon studied here. As discussed, the term is particularly useful for referring to the dissemination of negative events through customers and suppliers, in terms of either market value or any other perceivable and/or measurable factors.

Despite its contributions, some limitations emerged during the evolution of the present study, signalling opportunities for future research. As the documentary research developed, some supply chain partners may not have been identified, and hence not included in the final sample of the study. Other negative events may also have not been identified as, although intense, the procedures adopted in the research are not exhaustive. Nonetheless, as documentary research and publicly available data were considered, investors' perceptions were measured through market value variation. Further research could also examine them through other sources of primary data such as interviews, allowing for deeper insights into the investors' positioning and actions. Similarly, other stakeholders could also be assessed (e.g. clients, supply chain partners, employees) to enrich the analysis. Qualitative research in this direction may be particularly useful, in the form of either individual case studies, grounded theory or other approaches.

From a theoretical perspective, the main contribution to the efficient market hypothesis derives from the empirical demonstration that firms may indeed be affected by news related to other companies, opening up interesting avenues for a dialog with the present state of the

field. Considering that the efficient market hypothesis primarily relates to the adjustment of prices of individual securities, the present approach may offer progress in this respect as, ultimately, it seems to have broadened that comprehension. The study also supports the development of a new understanding of the conditions that may influence the absorption of outside events by companies. More in-depth study of the different scenarios in which companies are vulnerable to news from supply chain partners or even from competitors may help clarify the functioning of stock markets, notably on what concerns the understanding of the correlation between the prices of securities. In particular, a closer analysis of the reasons supporting eventual coordination in the behaviour of investors may add to the study of issues treated by Behavioural Finance researchers, such as herd behaviour, for example. Additionally, once the results have been built into the assumptions of the efficient market hypothesis, they could represent an additional block in the building of a more developed understanding between rationalist and behaviourist academics.

From a supply chain management angle, the proposition of supply chain contamination as a new concept may positively contribute to the building of a specific Supply Chain Theory, not necessarily subordinate to other better-established theoretical fields such as Strategy or Economics. This construction would be influenced by the fact that the term was coined to treat a specific supply chain phenomenon. Given the present proposition and the initial empirical demonstration, other studies may be conducted to build a solid theoretical base capable of transforming the concept into a theoretical development itself. More precisely, the study adds to the evolution of an arguably more detailed and comprehensive approach to supply chain risk management. Beyond the market value examination performed here, other sources of risk may also be treated through the concept of supply chain contamination. In large, the delimitation of the concept offers a proper denomination to the approach of eventually less tangible consequences of pertaining to a supply chain, as more distinctly evident questions

like operational glitches and supply chain disruption count on more significant attention from literature.

Concerning investors' point of view, the study evidences the increased risk to which individual stocks may be subjected. Pragmatically, as well as the traditional monitoring activities financial analysts perform on companies, additional control over the activities of supply chain partners would be necessary. If the possibility of a supply chain contamination does not get more seriously considered, investors must be surprised by severe losses due to disasters or misconduct occurring among supply chain partners. As the results suggest, the analysis of the environmental, social, operational, fraudulent or corruptive behaviour of partner companies must be more significantly included in the general risk analysis conducted on individual securities.

From a managerial perspective, the results call for the development of more rigorous approaches in the selection of supply chain partners. Classical criteria employed in such deliberations such as dependability, speed and cost efficiency must be considered in light of the potentially broadened risks that both suppliers and customers may pose to companies. Among other outcomes, new and potentially more sophisticated contractual tools may be developed with the aim of offering companies valid alternatives to financial compensation for damage from negative events related to their partners. As assessed in the 'Discussion' section, the demonstration of supply chain contamination in terms of market value does not exhaust the discussion. Instead, other factors such as the corporate reputation of firms may also be damaged, thus demanding proper assessment of risk. Reputational risks shall be seen as particularly sensitive, as the building of positive corporate reputations normally demands considerable investments in terms of time, energy and financial capital. Additionally, associations with issues like corruption, bribery, fraud, child labour and modern slavery,

among others, must be markedly costly to companies in terms of the reconstruction of their public image. The results evidence then the importance of closer monitoring by managers of the business conduct of customers and suppliers, under penalty of being associated with events of this kind, even when companies maintain strict standards in the conduction of their business.

Exposing the occurrence of collateral effects from events reinforces the idea that firms must not be seen as isolated bodies, but rather as part of a broader network of companies and systems which may influence each other. Within this view and in face of the results here presented, one may argue that at least part of firms' performance (positive or negative) may be attributed to the actions, behaviours, omissions and any other situation related to other companies. More than recognising the influence of generic elements such as the macroeconomic, political or social environment on organisations, the precise identification of supply chain partners as eventual sources of disturbances in that regard is significant. From this angle, it shall be recognised that circumstances residing out of the direct control of managers must be seriously considered as holding the potential to affect companies. In that way, the study of the factors leading to firms' superior performance in great measure the objective of fields such as Strategy may gain considerable complexity. Among the mainstream views of this terrain, none seems adequate to address the outcomes here observed. This must corroborate the idea that the reasoning supporting the concept of supply chain contamination represents a novel development, which may directly add to the understanding of the arrangement of companies in the form of supply chains.

Still on the distinctions of the current approach, attention is drawn to the fact that it is not related to the creation of value. Instead, the phenomenon discussed is closer related to the study of value destruction, and, particular to the approach employed, to its dissemination

through supply chains. Beyond that, the concept of supply chain contamination allows the construction of metaphorical transfer, borrowing from the medical and biological literature the idea that some diseases (i.e. negative events) are infectious, possibly spreading around those who get in direct or indirect contact with the disease carrier (i.e. supply chain partners and source firm, respectively). It is necessary, however, to advance the understanding of the conditions and means by which such contamination occurs, which may significantly contribute not only for the study of supply chains but also for the knowledge of how individuals, groups and systems interact.

Lastly, the answer to both the research questions proposed e (i) Do investors negatively react to announcements of negative corporate events related to a supply chain partner? and (ii) Do factors such as the nature of the event, the positioning of the partner in the supply chain and the fact of the source company itself be affected influence the reaction of investors? e is yes, as these conjectures are supported by the results here presented.

4.1.8. Appendix A. Additional Evidence for Supply Chain Relationship

Evidence #	Reference	Available at:
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4	The Guardian (2010)	https://www.theguardian.com/environment/2010/jun/29/bpoilspilltimelinedeepwaterhorizon
5	British Petroleum (2010)	http://www.bp.com/content/dam/bp-country/en_gb/uk/documents/scotland_Quad204_Project_EIA_Scoping_Report_Aug_2010.pdf
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7	GE (2003)	http://www.ge.com/files/usa/company/investor/downloads/ge_oil_gas_indonesia_lng.pdf
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129	Intel (2016)	http://www.intel.com/buy/us/en/catalog/laptops/2-in-1s/toshiba
130	Inventec (2016)	http://ebg.inventec.com/productData/K800G3/download/K800G3_AVL_Report_2016Q2.pdf
131	Toshiba (2016b)	http://www.toshiba.fr/generic/MS_SECURITY_SUPPORT/
132	Nvidia (2016)	http://www.nvidia.com/object/IO_9281.html
133	Panalpina World Transport (2016)	http://www.panalpina.com/content/dam/internet/industry_verticals/downloads/english/toshiba.pdf
134	SunPower Corporation (2012)	http://investors.sunpower.com/releasedetail.cfm?releaseid=724661

135	Synopsys (2016)	http://news.synopsys.com/index.php?item=122918
136	Toshiba (2016d)	http://www.toshiba.com/taec/ainfo/ffsa/fpga/
137	Costco (2016b)	https://www.costco.com/wcsstore/CostcoUSBCCatalogAssetStore/Attachment/recalls/Toshiba-Laptop-Battery+Recall.pdf
138	Toshiba (2016)	https://www.toshiba.com/tic/other-products/hybrid-electric-vehicle-motors
139	Kohl's (2016b)	http://www.kohls.com/catalog/toshiba-electronics.jsp?CN=Brand:Toshiba+Department:Electronics
140	Macy's (2016b)	http://www1.macys.com/shop/product/toshiba-blu-ray-dvd-player-3d-disc?ID=571315
141	Sears (2016b)	http://www.sears.com.mx/categoria/4603/laptops-y-2-en-1/
142	Staples (2016b)	http://www.staples.com/Toshiba-Laptops/cat_CL167289/0072g
143	Target (2016b)	http://intl.target.com/p/toshiba-40-class-1080p-120hz-led-tv-black-4013400u/-/A-15843416
144	Tesco (2016b)	http://www.tesco.com/direct/toshiba-satellite-c50d-156-laptop-amd-a4-8gb-ram-1tb-black/577-5608.prd?source=others
145	Wal Mart (2016b)	https://www.walmart.com/browse/electronics/all-laptop-computers/toshiba/3944_3951_1089430_132960/YnJhbmQ6VG9zaGliiYQieie
146	Ballard Power Systems (2015)	http://ballard.com/aboutballard/newsroom/newsreleases/news02111501.aspx
147	BASF (2015)	https://www.basf.com/en/company/newsandmedia/newsreleases/2015/06/p15253.html
148	Borg Warner (2015)	http://emissions.borgwarner.com/pt/borgwarnersuppliesadvancedignitiontechnologyforvolkswagenenginesbuiltinmexico
149	Hadi (2015)	http://uk.businessinsider.com/volkswagen-causes-widespread-auto-drop-2015-9?r=US&IR=T
150	T-Systems (2014)	https://servicenet.tsystems.com/tsystems/plmen/eetoolbar/926864?ticketId=863880472210028
151	Honeywell (2015)	https://turbo.honeywell.com/whatsnewinturbo/pressrelease/honeywellvntturbostoboostv-wandskodamodelsinindia/
152	IBM (2009)	ftp://public.dhe.ibm.com/software/emea/de/rational/neu/Volkswagen_IT_divisions_accelerate_process_improvement_EN_2009.pdf
153	Infineon Technologies (2015)	http://www.infineon.com/cms/en/aboutinfineon/press/pressreleases/2015/INFXX201506066.html
154	Kumho Tires (2014)	http://www.kumho.com.au/news-media/news/kumho-global/new-european-technical-centre-spearheads-kumho-r-d-in-germany
155	Volkswagen (2015a)	http://www.volkswagenag.com/content/vwcorp/info_center/en/news/2015/08/Powerful_battery_in_Audi_electric_car.html
156	Magna (2015)	http://www.magna.com/media/pressreleasesnews/releasesnews/2015/08/25/newsrelease-magnalistedasavolkswagenstrategicpartner
157	Autonews (2015)	http://www.autonews.com/article/20150626/COPY01/306269979/suzuki-vw-await-arbitration-decision-in-dispute
158	Ewing (2016)	http://www.nytimes.com/2016/04/27/business/international/vw-presentation-in-06-showed-how-to-foil-emissions-tests.html
159	Sherman; De Vynck (2015)	http://www.bloomberg.com/news/articles/20150402/motorolaissaidunabletofindbuyersaftermonthslongeffort
160	Nokia (2014)	http://company.nokia.com/sites/default/files/download/nokia_uk_ar14_here.pdf
161	Plastic Omnium (2015)	https://www.plasticomnium.com/en/automotive-equipment/22-news/automotive-equipment/inery/152-plastic-omnium-starts-production-of-its-scr-diesel-vehicle-emissions-reduction-systems-for-audi,-volkswagen-and-porsche.html
162	SAP (2014)	https://news.sap.com/sap-shell-volkswagen-co-innovate-lay-foundations-connected-vehicle/
163	Volkswagen (2015b)	https://www.volkswagen-vans.co.uk/about-us/press-releases/2014/20151216-siemens-turns-to-volkswagen-commercial-vehicles-for-turbine-engineering-fleet
164	Tupy (2012)	http://tupy.com.br/portugues/empresa/historia.php
165	Visteon (2015)	http://www.visteon.com/company/profile.html
166	Nvidia (2006)	http://www.nvidia.com/object/IO_29427.html
167	Qualcomm (2005)	https://www.qualcomm.com/news/releases/2005/05/02/marvin-blecker-promoted-president-qualcomm-technology-licensing
168	Siemens (2007b)	http://www.siemens.com/press/en/pressrelease/?press=en/pr_cc/2007/06_jun/ius03076115e_1453177.htm
169	HP (2009b)	http://www.hp.com/hpinfo/newsroom/press_kits/2009/virtualization09/HP-CitrixXenAppsSolutionBrief.pdf

170	HP (2009)	http://h20564.www2.hp.com/hpsc/swd/public/detail?swItemId=ob_132253_1
171	HP (2010)	http://h20564.www2.hp.com/hpsc/swd/public/detail?swItemId=vc_83049_1&swEnvOid=4053
172	Oracle (2010)	http://www.oracle.com/us/corporate/press/161333
173	Tovey (2015)	http://www.telegraph.co.uk/finance/newsbysector/industry/engineering/11855806/Rolls-Royce-lands-whale-of-a-deal-to-power-Airbuss-Beluga.html
174	Rolls-Royce (2015)	http://www.rolls-royce.com/media/press-releases/yr-2015/pr-160415a-boeing-names-rolls-royce-as-supplier-of-the-year.aspx
175	Mathew (2014)	https://uk.news.yahoo.com/glaxosmithkline-adaptimmune-reach-350m-deal-develop-cancer-drugs-060154022.html
176	Exelixis (2012)	http://www.exelixis.com/pipeline/x1880
177	Cabural (2013)	http://www.valuwalk.com/2013/01/gsk-extends-contract-with-genpact/
178	Express Pharma (2012)	http://archivepharma.expressbpd.com/specials/packaging-special/381-gsk-chooses-infosys-fabric-worldwide-for-digital-strategy
179	Outsourcing Pharma (2010)	http://www.outsourcing-pharma.com/Clinical-Development/GSK-selects-Parexel-and-PPD-as-strategic-CROs
180	Turner (2015)	https://www.indystar.com/story/money/2015/09/30/automotive-suppliers-likely-see-impact-vw-emissions-scandal/73090456/
181	Meritor (2014)	https://www.meritor.com/productsandservices/southamerica/pdfs/aftermarket/eixo/008_14%20-%20Lan%C3%A7amento%20Kit%20de%20Embuchamento%20sem%20Rolamento.pdf
182	Bosch (2015)	http://br.bosch-automotive.com/media/parts/download_2/velas/Catalogo-Velas-Cabos-Ignicao_2015-2016-LowRes.pdf
183	Volkswagen (2015)	http://www.vwbr.com.br/ImprensaVW/Release.aspx?id=a4422eb5-3458-44ce-b2e2-803e03f84b51
184	Gentex (2015)	http://ir.gentex.com/static-files/405fe8e6-c07c-4932-a081-ac1db6872d32
185	La Monica (2015)	http://money.cnn.com/2015/09/23/investing/volkswagen-vw-emissions-scandal-auto-stocks/
186	Citron Research (2015)	http://www.citronresearch.com/wp-content/uploads/2015/09/MBLY-Part-II-final-a.pdf
187	Lear (2015)	http://www.lear.com/blog/tag/lear-corporation/
188	American Axle (2014)	https://www.aam.com/docs/default-source/annual-reports/aam_2014-annual-report_10k.pdf?sfvrsn=6
189	Autoliv (2012)	https://www.autoliv.com/Investors/Financial%20Reports/AR2012.pdf
190	NGK (2013)	http://www.ngkntk.com.br/automotivo/ngk-e-premiada-pela-volkswagen-por-excelencia-em-velas-de-ignicao/
191	UPS (2016)	https://pressroom.ups.com/assets/pdf/pressroom/infographic/UPS_VehicleEvolution_Poster-Vertical-Final-FPO.p1.pdf
192	Intel (2012)	http://www.intel.com/content/dam/www/public/us/en/documents/supply-updates/itanium-9500-enabling-components-supplier-listing.pdf
193	Hille and Kwong (2010)	https://www.ft.com/content/8287fed0-68cd-11df-96f1-00144feab49a
194	Balfour and Culpan (2010)	https://www.bloomberg.com/news/articles/2010-09-09/the-man-who-makes-your-iphone
195	Jittapong and Dhanananphorn (2014)	http://www.reuters.com/article/us-charoen-pok-food-china-idUSKBN0GI0RF20140818
196	Lenovo (2012)	http://pcsupport.lenovo.com/fr/en/downloads/ds029490

4.2. Article Two – The Impact of Negative Social / Environmental Events on the Market Value of Supply Chain Partners

4.2.1. Background to the Article

As previously discussed, the second paper, entitled “The impact of negative social/environmental events on the market value of supply chain partners” is originated from my equally named Master’s thesis at Fundação Getulio Vargas – Escola de Administração de Empresas de São Paulo. The first version of the paper was presented at the 23rd European Operations Management Association (EurOMA) conference, hosted in Trondheim, Norway, in 2016, and was also accepted for presentation at the 5th World Conference on P&OM in Havana, Cuba, in 2016, although withdrawn. As a result from the paper’s presentation at the 23rd EurOMA conference, I was invited to contribute with a subsequent version to be featured in the book *Operations Management and Sustainability: New Research Perspectives*, edited by Dr. Luitzen de Boer and Dr. Poul Houman Andersen.

The article proposes theoretical discussions, among which the development of a *supply chain extended stakeholder model* and the concept of *incidental stakeholder*, both matured for the study of the dissemination of events in supply chain. Although enhanced on its theoretical contribution, this version reflects the original scope of the investigation, being confirmatory in nature and focused on the analysis of the impact of negative social / environmental events on the market value of supply chain partners. The earliest sampling procedures were maintained, allowing the analysis of emblematic cases, such as the Rana Plaza disaster, accusations of environmentalist group Greenpeace against multinational companies (e.g. Nestlé, Unilever and Procter & Gamble) and the consequences of fires in sewing workshops in Bangladesh, among others. The paper was object of two revision rounds. After the third

(re)submission it was published in the section dedicated to theory building in sustainable operations management of the referred book, (Chapter 9, Part II) comprehending nearly 20 months of editorial process. The printed version is also concluded.

“The Impact of Negative Social / Environmental Events on the Market Value of Supply Chain Partners”

Mauro Fracarolli Nunes

4.2.2. Abstract

Through the analysis of 15 negative social and environmental events, the effect of sustainability-related issues on the market value of supply chain partners is investigated. Event studies were conducted on 82 companies, valuing the market reaction to the stock price of a firm due to triggering events occurred in another. The results show that while some events have caused hard reactions on the market value of the studied companies, the assessment of the general effects of each event, as well as the analysis of the whole sample, did not allow for such conclusion. By adopting an incidental stakeholder perspective, this inquiry offers new insights into the substance of sustainability and sustainable operations management within supply chain frames.

4.2.3. Introduction

Corporate Social Responsibility (CSR) comprehends the belief that firms hold commitments to society beyond the creation of wealth for investors. Within this concept, along with environmental protection, the interests of a larger group of stakeholders must be taken into account in the development of businesses (Carroll, 1999). In order to certify that they operate under sustainable practices, firms have increasingly sought to be well ranked on their performance in CSR policies, as “governments, activists and the media have become adept at holding companies to account for the social consequences of their activities” (Porter and Kramer, 2006, pp. 1). Beyond that, several actions may be adopted by firms in the building and management of corporate social and environmental reputations, not necessarily coherent with real sustainable operations (Fracarolli Nunes and Lee Park, 2017).

From a sustainable supply chain management (SSCM) perspective, such issues have gained considerable relevance as the field has evolved from standalone research in social and environmental debates into a real CSR agenda (Carter and Easton, 2011). The development of outsourcing strategies (Quinn and Hilmer, 1994) and the exponential increase in the complexity of production, distribution and consumption networks that followed made the better understanding of the tangles of direct and indirect relationships created urgent. Due to this operational intricacy, pressing sustainability issues such as the employment of modern slavery, child labor, deforestation and general pollution, among others, may remain concealed, having the perception of their responsibility diluted through the many parties involved from raw material to consumption. In this set, the effects of firms’ actions and decisions may be analyzed within an extended perspective, considering the eventual repercussions for direct stakeholders, but also for stakeholders of stakeholders. While this task must demand a theoretical effort in the design of convoluted relations of immediate and more distant

counterparts, empirical investigations of the extended impact of sustainability-related issues must help clarify the actual relevance attributed to such matters by distinct groups of stakeholders. The present study concentrates then on the analysis of the consequences for the market value of a firm of a negative social / environmental event occurred in (or caused by) a member of its supply chain. The objective of the study is thus better represented by the following research question: *Do investors negatively react to announcements of negative social / environmental events related to a supply chain partner?*

The event study method is indicated to conduct such test as it allows for the perception and measurement of market value creation / destruction due to any new information available around firms. Through the examination of 15 cases, the variance of the market value of 82 supply chain partners was assessed at three levels of analysis: (1) individually, considering the isolated effect of each event on each partner; (2) combined effect through supply chains, comprehending the gathered effect of events on all supply chain partners identified; and (3) general effect of negative social / environmental events, measuring the overall impact of such events through the whole sample.

The study intends to offer theoretical and practical contributions. Regarding the former, it is relevant as it contributes to the Operations Management literature by addressing the link between sustainability matters and stakeholders' assessment. Beyond that, through the proposition of both the *supply chain extended stakeholder model* and the concept of *incidental stakeholder*, it also subsides the emergence of new questions around the critical role of Stakeholder Theory in Sustainable Operations Management (SOM). As for the practical contribution, the study offers empirical evidence that might be useful in guiding and valuing the importance of SSCM decisions, specifically on what relates to the potential impact on the market value of indirectly associated firms.

Following this foreword, the investigation is arranged into 6 further sections. The literature review proposes an integrative discussion on the main arguments of Stakeholder Theory, on the developments of the literatures on SSCM and on the Efficient Market Hypothesis, as well as on the main criticisms of the latter (Behavioral Finance, Institutionalism and the nature of investors). The subsequent section presents the proposition of a theoretical framework and the hypothesis of the study, both developed from the assimilation of previous debate. In turn, the method and sample section approaches the event study methodology as well as the sampling procedures adopted, succeeded by the results, discussion, conclusion, and limitations and suggestions for future research.

4.2.4. Literature Review

4.2.4.1. Stakeholder Theory

In contrast to more “shareholder-driven” understandings of the nature and objectives of firms (e.g. Friedman, 1970), Stakeholder Theory builds on the assumption that the practice of business must have the attention to values as one of its fundamental conceptions (Freeman, Wicks and Parmar, 2004). Accordingly, it would invite managers to explicit the way they intend to run operations, particularly regarding the sort of relationships they seek to build with related parties. Through this prism, the meeting of corporate aspirations would be more virtuous, as, in the vision of the authors, “truth and freedom are best served by seeing business and ethics as connected” (Freeman, Wicks and Parmar, 2004: 364). In a way, this call for recognition of and effective concern for all interrelated parties (Freeman, 1994) may be seen as a theoretical basis for the concept of sustainability in business, as further discussed ahead.

Nevertheless, although the notion that organizations count on stakeholders has been extensively incorporated, the definition of who or what indeed constitutes one has been the subject of a rich and sometimes confusing debate, with terms such as stakeholder, stakeholder model, stakeholder management, and Stakeholder Theory being employed in remarkably distinct forms (Donaldson and Preston, 1995). In that regard, Windsor (1992) highlights prevalent variations in the approaches, orbiting around broader and narrower perspectives. Within the first cluster would be the perception defended by authors such as Freeman and Reed (1983), for whom the notion of stakeholder would refer to those individuals or groups who may influence and/or be influenced by organizational accomplishments. Similarly, Freeman's (1984) "now-classic definition" (Mitchell, Agle and Wood, 1997: 856) – that "a stakeholder in an organization is (...) any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984: 46) – would be particularly generous once, beyond leaving the notion of stake and potential stakeholder unequivocally open to be fulfilled by nearly any actor, it also posits the perception of stakes as being possible in both an uni and a bidirectional sense (Mitchell, Agle and Wood, 1997). Accordingly, from this point of view the only agents excluded from eventual stakes would be those simultaneously unaffected by organizations and incapable of affecting them. Arguably more circumscribed perspectives, in turn, would lie on the notion of stakeholders as an adequate label for factions considered essential to the continued survival of organizations (Stanford Research Institute, 1963).

By linking the idea of stakes to risk, Clarkson (1994) offers a more compressed interpretation (Mitchell, Agle and Wood, 1997). Inner to his view, in face of their awareness and risk propensity, stakeholders shall be roughly classified as either voluntary or involuntary, offering what seems to be a distinction around the level of activeness or passivity one may have in relation to the operations of a company. More specifically, while the former would be

delineated as those stakeholders who “bear some form of risk as a result of having invested some form of capital, human or financial, something of value in a firm” (Clarkson, 1994, pp. 5), involuntary ones would be those indirectly “placed at risk as a result of a firm’s activities”. Besides the considerations over the definition and classification of stakeholders, a discussion of Stakeholder Theory from a processual perspective shall be also useful. In this way, according to Donaldson and Preston (1995), contrary to the previously conventional input-output view in which investors, employees and suppliers are understood as sources of inputs directed to firms, which then process them into output to customers, within the stakeholder model, all actors holding legitimate interests in an enterprise would expect benefits, in a way that there shall be no prioritization of the interests of one group over the others. More than the consideration of a broader set of actors, the angle proposed features two-way exchange flows between firms and their respective stakeholders. Figures 17 and 18 below illustrate these different conceptualizations.

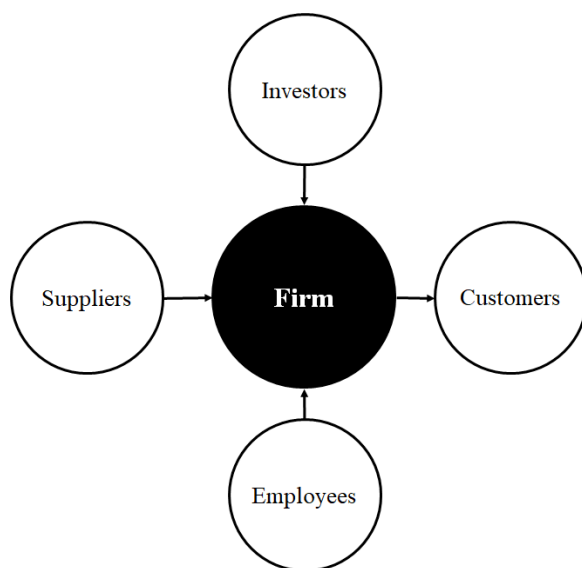


Figure 17: Conventional Input-Output View

Source: Adapted from Donaldson and Preston (1995)

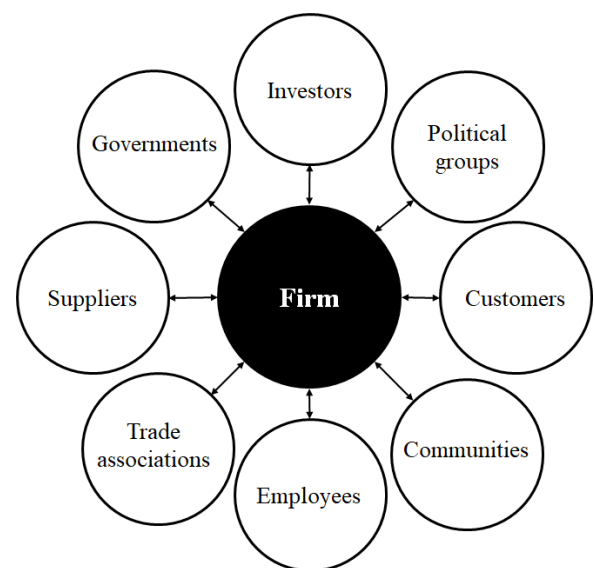


Figure 18: Stakeholder Model

Source: Adapted from Donaldson and Preston (1995)

The recognition of firms' relations and links to their numerous counterparts represents a key element of the ongoing investigation, as Stakeholder Theory offers the main postulates not only for the discernment of these ties, but also for their differentiation in terms of objectives. In addition to offering a visual perspective of the social architecture in which firms are embedded, the main arguments of the theory - along with the structure of the stakeholder model - may be seen as central to the development of SOM. Among other things, the reasoning would systematize firms' need to simultaneously meet the demands of a wide range of publics, which, coherently with Elkington's (1997) triple bottom line approach to sustainability, could be delimited in distinct social, environmental and economic perspectives.

Although pivotal to the relations of stakeholders and firms *per se*, the stakeholder model could possibly profit from a theoretical development encompassing the relation between firms and their eventual *incidental stakeholders*, here defined as the stakeholders of stakeholders, which, as such, may not be aware of their links with other companies, or even not consciously willing to take the risks associated with such a subsidiary connection. Aiming to offer additional guidance in that direction, the relation between firms composing supply chains and their direct and indirect counterparts (i.e. *incidental stakeholders*) are further addressed next within a SSCM perspective. The debate is markedly pertinent to the development of both the theoretical proposition and the hypothesis of the study.

4.2.4.2. *Sustainable Supply Chain Management: The link between firms, partners and stakeholders*

Supply chains have been traditionally understood as arrangements of companies organized around the efficient flow of materials (La Londe and Masters, 1994), information, products and services (Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia, 2001)), bringing the latter two to markets (Lambert, Stock and Ellram, 1998). As pointed by Mentzer, DeWitt,

Keebler, Min, Nix, Smith and Zacharia (2001), the basic grouping configuring a supply chain would consist of at least three elements: a firm, a buyer and a supplier. In this way, direct supply chains would account for the alignment of these three players, while extended ones would include suppliers of immediate suppliers and customers of immediate customers. Although nearly innate to the current comprehension of supply chains, the depiction of players and the links between them shall be helpful in the comprehension of contemporary matters firms forming these arrangements have faced. CSR issues, for instance, have been particularly critical, mainly for companies inserted in global configurations. With the emergence of several cases of negative social / environmental events in supply chains, ranging from accusations of environmental damage to forms of modern slavery, CSR policies managed in buyer-supplier relationships have been openly discussed, in both the traditional media and social networks. In this way, sustainability matters, once marginal in the supply chain debate, have now become part of its mainstream, including what has come to be known as the study of SSCM (Pagell and Shevchenko, 2014). In their quest to meet the demands of societies, firms, municipalities and countries have invested in the improvement of their processes around green procurement (Michelsen and De Boer, 2009) and socially responsible purchasing (Worthington, Ram, Boyal and Shah, 2008), among other SSCM practices.

As observed by Nidumolu, Prahalad and Rangaswani (2009: 2), “not surprisingly, the fight to save the planet has turned into a pitched battle between governments and companies, between companies and consumer activists, and sometimes between consumer activists and governments”. Within this logic, the discussions around CSR would encompass a much broader and more complex debate than that confined to the single firm, as all the chain partners may potentially affect each other in this regard. Yet, considering that partners may simultaneously hold joint and opposing goals (Ellegaard and Andersen, 2015), the link between CSR and supply chains may emerge in apparently much more discreet ways. As

specific industries (e.g. the fashion business) have largely relocated their production from economically developed areas to low-labor-cost zones, important “unsustainability symptoms” may arise on both sides. Beyond causing sudden unemployment among the unskilled workers of the deprecated areas, the transfer usually relegates newly employed personnel to precarious conditions of work (De Brito, Carbone, and Blanquart, 2008).

Tragedies such as the Rana Plaza Collapse, in which thousands of workers died (Hoskins, 2015), are contained in this category, as well as the fires in Bangladesh factories, which also victimized hundreds of people (Bajaj, 2012). These sorts of cases and events, along with those within an environmental context, offer the opportunity to test whether a given group of stakeholders (i.e. investors) negatively reacts to eventual disrespects or losses caused by firms to other groups (e.g. employees, communities), either directly or diffusely. Moreover, the approach also allows for the evaluation of investors’ responses to sustainability issues in the condition of *incidental stakeholders* of the firms responsible for social and environmental failures. In this sense, the approach is expected to offer insights into the critical role of Stakeholder Theory in SSCM and SOM as a whole. In advancing this debate, the following section concentrates on developments in the literature on the Efficient Market Hypothesis and the adjustment of stock prices to new information. The discussion presents additional basis for the comprehension of how negative social / environmental events may possibly impact the market value of supply chain partners.

4.2.4.3. Efficient Markets Hypothesis: The Adjustment of Stock Prices to New Information

The idea of efficiency seems to indicate the best possible way in which something may be accomplished, in terms of either minimized use of time and resources or any other related factor. In this way, the concept shows to be employed in the most distinct fields of study, generally in relation to the ideas of readiness and competence. From an Operations

Management angle, for instance, it is classically used in themes such as the assessment of logistics performance (e.g. Clarke and Gourding, 1991), inventory management (e.g. Småros, Lehtonen, Appelqvist and Holmström, 2003) and supply chain management (Kärkkäinen, 2003), among others. From a sustainability landscape, in turn, the idea of efficiency is usually related to the optimum use of water (Rogers, De Silva, and Bhatia, 2002) and energy (Ayres, Turton and Casten, 2007), along with a broad debate around the responsible use of other inputs, the generation of waste, as well as the general consequences of human activities for societies and the environment.

When it comes to the functioning of stock markets and the adjustment of stock prices to new information (Fama, Fisher, Jensen and Roll, 1969), the concept of efficiency assumes a particularly prominent aspect in the present study, as, depending on its fortitude as a premise, the beliefs around shareholders' reactions may be considerably distorted. Within this reasoning, the Finance literature disposes capital markets as efficient in case they fully and correctly represent all pertinent information in the determination of security prices (Malkiel, 1989). From this prospect, as observed by Beechey, Gruen and Vickery (2000), prices would be expected to be invariably coherent with 'fundamentals', or the logical and economic reasoning supporting their formation.

Based on these underlying conceptions, Fama (1970) proposes the division of works on market efficiency into three groups: weak-form tests, semi-strong-form tests, and strong-form-tests. While the first would relate to the assessment of past returns as predictors of the future, the second and third respectively refer to the speed with which the announcement of public information is reflected in prices and to the possibility of investors holding private information which may not be fully reproduced in market figures (Fama, 1991). In reviewing this classification, the author evolves the idea into a more comprehensive division: (1) tests for

return predictability (2) event studies, and (3) tests for private information. In this way, in its strong version, the Efficient Market Hypothesis would represent “the simple statement that security prices fully reflect all available information” (Fama, 1991: 1575), while in “a weaker and economically more sensible version”, information would be reflected in prices to the limit where the marginal benefits of such inputs would not outrun their marginal costs (Jensen, 1978).

Despite its prominence and arguably broad acceptance, the Efficient Market Hypothesis is not free of criticism. Westerlund and Narayan (2013), for instance, highlight that some of its predictions on the joint behavior of spot and future prices are not supported by most empirical evidence. Authors such as Basu (1977), in turn, stress the considerable questioning around the validity of the rationale, as, among other issues, many scholars would claim that the prices are actually biased for questions like the price-earnings (P/E) ratios of securities. Fama (1970, 1991) partially refutes these criticisms, evoking what he calls “the joint-hypothesis problem”, according to which market efficiency all alone would not be testable. Instead, it would be inescapably evaluated alongside equilibrium or asset-pricing models. From this angle, there should be ambiguity in eventual findings of anomalous behavior of returns, as it would not be evident whether they are indeed due to market inefficiency or to poor market equilibrium models. Nevertheless, in comparison to the other classifications, the implications of event studies for market efficiency would be less controversial, as they would near the distinction between market efficiency and equilibrium-pricing matters (Fama, 1991). Still, rooted in a semi-strong form of the Efficient Market Hypothesis, event studies would offer the most direct and supportive evidence around efficiency, and for this reason are adopted in the present investigation.

4.2.4.4. Behavioral Finance, Institutionalism and the Nature of Investors

Beyond the critics already addressed, severe arguments have been put forward to challenge the rationality premises underpinning the Efficient Market Hypothesis. Among the most significant questionings in that sense would be those within a behavioral finance perspective, which, as pointed by Barberis and Thaler (2003: 1053), “argues that some financial phenomena can plausibly be understood using models in which some agents are not fully rational”. Within the distinctions of the field to traditional Finance would be the general recognition that the human brain processes information through shortcuts and emotional filters, also called ‘psychological biases’ (Nofsinger, 2016). Depending on the myriad forms such psychological biases may assume, investors could be argued to hold a considerable level of heterogeneity on what relates to their decision-making processes and reactions.

Yet, it is also possible that the behavior of individual investors may come to significantly, or at least partially, differ from that of institutional ones, such as pension funds, for example. From this angle, while advances in Behavioral Finance might be particularly useful to analyses concentrated in the first group, institutional and sociological logics may add relevant insights to the investigation of behavior patterns and anomalies of the later. Gompers and Metrick (1998), for instance, contend that institutional investors tend to have preferences for securities holding greater market capitalization, liquidity and book-to-market ratios, as well as lower returns for the preceding year. Ferreira and Matos (2008), in turn, add that, beyond the preferences for the stocks of large firms, institutional investors would be also inclined to hold shares of firms with relatively higher levels of governance. Apart from these and other issues more directly related to the financial characteristics of businesses and managerial practices, less straightforward circumstances are also argued to influence the decisions of institutional players. In this way, Goetzmann, Kim, Kumar and Wang (2014) show the impact that weather-

based indicators of mood might have on institutional investors' decisions, as cloudier days would increase the perception of overpricing and thus the propensity to sell.

It is also possible that certain frames happen to be useful in the analysis of the investment decisions of both individual and institutional sets. Jun (2016: 487), for example, highlights the clout that socially responsible investing (i.e. "investment strategy that incorporates environmental, social and governance (ESG) issues in the decision-making process") may exercise on the two groups, representing an additional concern to that solely focused on financial aspects. Nevertheless, independently of the nature of these influences, it seems reasonable to recognize the relevance that psychological, social and institutional factors may have in the reaction of distinct categories of investors. From this angle, although the current investigation is grounded in the premises of the Efficient Market Hypothesis, the literature discussed in the present sub-section contributes to the recognition of its limitations, notably around the discernment that investors may not be seen as a homogeneous class.

4.2.5. Theoretical Framework and Hypothesis Development

Considering the theoretical background discussed in the previous section, the present study counsels that the interrelation between the stakeholders of different firms may be conjunctly analyzed in an integrating and, perhaps, more embracing theoretical proposition. In this way, alike Donaldson and Preston's (1995) stakeholder model, it seems that Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia's (2001) conception of direct supply chains places companies as central in relation to their near environment, at least on what relates to the trade of their inputs and outputs. While buyers and suppliers would be firms' immediate counterparts, from an extended view (i.e. extended supply chains), buyers of buyers and

suppliers of suppliers (as well as all their own related counterparts) would represent *incidental stakeholders*, as previously defined in the present study. This design suggests that, although these *incidental stakeholders* do not share immediate interfaces with firms, they may also be affected by their attitudes in an indirect manner. Such rationale theoretically supports then the developments of the *supply chain extended stakeholder model* depicted in Figure 19 below, where the firm’s stakeholders are presented in black and its *incidental stakeholders* in white:

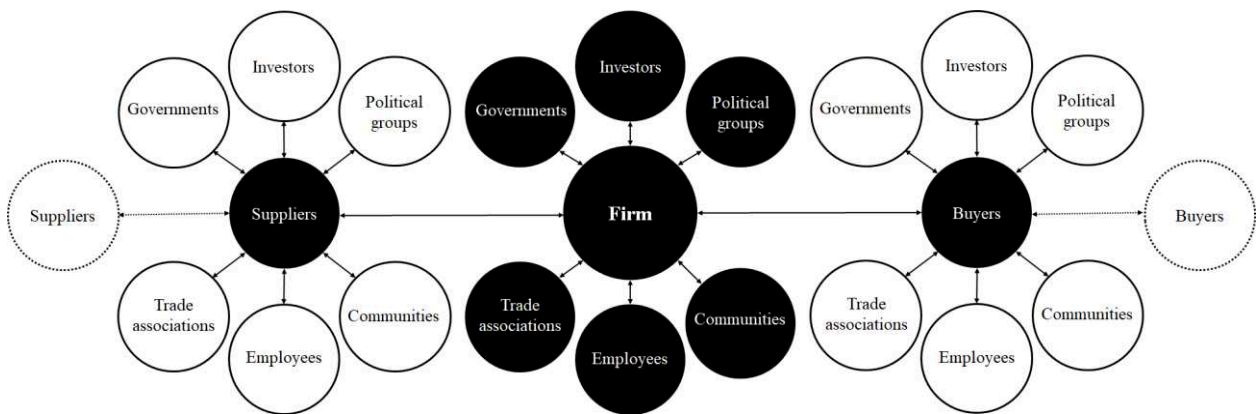


Figure 19: The Supply Chain Extended Stakeholder Model

The *supply chain extended stakeholder model* accounts for the prolonged consequences that the acts, behaviors, events, facts, crisis, fails, successes or virtually anything concerning a given firm may cause not only on its direct stakeholders, but also on the stakeholders of its immediate upstream and downstream partners. The development is based on the idea that, within supply chain contexts, the counterparts of firms may be grouped as first-, second- and third-order stakeholders, and so on. While the first order addresses the traditional stakeholder model, the second relates to the stakeholders of direct buyers and direct suppliers. The third order, in turn, regards the stakeholders of buyers of buyers and those of suppliers of suppliers. Simplistically, from the second-order stakeholders on, the indirect stakeholders of a firm would be classified as incidental. Likewise, more than one-handed paths, the influence that the stakeholders of a given firm shall exercise on other firms within this net is also lengthened,

what is illustrated by each of the two-way arrows in the framework. Within this reasoning, even if stakeholders and firms are not directly linked to each other, it is possible that they end up affecting one another, as they belong to a broader interconnection. While the framework is grounded on the two first topics discussed in the literature review, its alignment with the Efficient Market Hypothesis subsides the development of the hypothesis of this study:

H1: Investors negatively react to announcements of negative social / environmental events related to a supply chain partner.

The hypothesis is tested on three distinct levels: (1) The impact of each negative event on the market value of each supply chain partner identified; (2) The overall impact of each negative event on the conjunction of corresponding supply chain partners identified; and (3) The general impact of negative social / environmental events. While the first and the second levels aim to provide evidence on specific cases (i.e. offering a detailed assessment of the impact of specific events on specific partners and specific supply chains), the third level of analysis seeks to provide initial evidence for a possible generalization of the expected results of negative social / environmental events. The following section details the sampling procedures for the identification of the 15 different cases considered and the event study method applied, as well as its specificities to the conduction of each level of analysis.

4.2.6. Method and Sample: The Event Study Methodology

The event definition represents the initial task in the conduction of an event study and is divided into two main steps: the definition of the event of interest and the identification of the event window, defined as “the period over which the security prices of the firms involved in this event will be examined” (Campbell, Lo and MacKinlay, 1997: 151). For control purposes,

seven different event windows are examined. In this study, the definition of events was based on the disclosure of sustainability and CSR failures in supply chain contexts from January 2005 to September 2015. The relatively long period considered (more than 10 years) aims to capture both recent and earlier events, lessening eventual contextual or time bias in the results. In this way, the electronic databases of ten international newspapers and magazines were chosen as the object of the sampling procedure: The New York Times (www.nytimes.com), Washington Post (www.washingtonpost.com), The Guardian (www.theguardian.com), The Telegraph (www.telegraph.co.uk), The Economist (www.economist.com), Financial Times (www.ft.com), Le Monde (www.lemonde.fr), El País (www.elpais.com), O Estado de São Paulo (www.estadao.com.br) and Clarín (www.clarin.com). Aiming to select negative social and negative environmental events, the following words were applied in the search tools offered by the web sites: “buyer”, “catastrophe”, “child labor”, “client”, “corporate social responsibility”, “customer”, “failure”, “global warming”, “hazard”, “human rights”, “protest”, “pollution”, “infraction”, “servitude”, “supply chain”, “supplier”, “sustainability”, “tragedy”.

In face of the results of this initial search, the following steps of the sampling procedure consisted in reading the news collected in full, segregating cases into negative social and negative environmental events and identifying source companies and supply chain partners. Considered the objectives of the study and our methodological choice, companies which did not count on public prices of their shares were necessarily discarded from the final sample. Table 3 below briefly presents the 15 cases analyzed:

Table 3: Analyzed Cases, Respective Natures and Number of Suppliers

Case #	Case name	Nature of the case	Source Company	Number of Suppliers
1	Palm Oil – Unilever	Environmental	Multiple palm oil suppliers	2
2	Palm Oil - Nestlé	Environmental	Multiple palm oil suppliers	2
3	BP Oil Spill	Environmental	British Petroleum	6
4	Zara Brazil	Social	Small local suppliers	1
5	Foxconn	Social	Foxconn	12
6	Junking the Jungle	Environmental	Asia Pulp Paper	1
7	Bangladesh Fire	Social	Small local suppliers	6
8	Child Labor	Social	Multiple local suppliers	1
9	Zara Argentina	Social	Small local suppliers	1
10	Rana Plaza Collapse	Social	Small local suppliers	16
11	Pegatron	Social	Pegatron	1
12	Licence to Kill	Environmental	Multiple palm oil suppliers	3
13	Palm Oil – P&G	Environmental	Multiple palm oil suppliers	5
14	CP Foods	Social	CP Foods / Small local suppliers	5
15	Volkswagen Fraud	Environmental	Volkswagen	20

Daily closing prices adjusted for dividends and splits were collected from the website Yahoo Finance (see <http://finance.yahoo.com>). A measure of abnormal returns is required for the appraisal of the impact of the event (Brown and Warner, 1980). The method most often used for the estimation of normal returns (*ex ante*) in event studies is the Market Model proposed by Fama (1970) (Agrawal and Kamakura, 1995). Abnormal returns are then considered as the difference between actual and normal ones and are analyzed in the form of Cumulative Abnormal Returns (CARs) for individual firm analysis and Cumulative Average

Abnormal Returns (CAARs) when more than one company is considered for a given case (see Brown and Warner, 1980; Campbell, Lo and MacKinlay, 1997, for further references).

4.2.7. Results

The first analyzed event window (D-1, D0) shows that, among the 82 firms studied, 80 did not demonstrate significant negative returns at the 99% or 95% significance levels. In the second event window (D0, D1), none of the 82 firms yielded negative returns at the 99% significance level, and 81 also did not find confirmation for negative abnormal returns at the 95% significance level. The third event window (D0, D2), in turn, displays 78 non-affected companies at the 95% significance level. However, the analysis of the 99% significance level with two companies (Borg Warner and Plastic Omnium, both in Case 15 – Volkswagen Fraud) could possibly indicate negative reactions. For the fourth event window (D-1, D1), 81 companies did not present negative abnormal returns at the 99% significance level.

Similarly to the results found in event window 2, the fifth event window (D-1, D5) shows that 79 companies did not present negative reactions. At the 99% significance level, the fact that two firms (Apple in Case 8 – Child Labor and Honeywell in Case 15 – Volkswagen Fraud) yielded negative abnormal returns might suggest that negative reactions were detected for these companies. In the sixth event window (D-2, D2), 78 out of the 82 assessed companies did not present significant negative abnormal returns. Once more, at the 99% significance level the negative returns detected in two firms (Apple in Case 8 – Child Labor and BorgWarner in Case 15 – Volkswagen Fraud) might suggest a possible reaction.

Finally, the last and wider event window (D-5, D5) captured no reaction from 78 companies at the 95% significance level. However, at the 99% significance level, the negative abnormal

returns detected in two companies (Sears in Case 7 – Bangladesh Fire and Honeywell in Case 15 – Volkswagen Fraud) may also point to the possibility of a negative reaction. Table 4 below summarizes the findings, presenting the companies for which significantly negative market value losses were observed as a result of the negative social / environmental events considered:

Table 4: Summary of Results

Case No.	Case	Company	CAR	t-stat	Statistical Evidence
Case 5	Foxconn	Google	-9,22%	-1,99	95%
Case 7	Bangladesh Fire	Sears	-43,73%	-4,12	99%
Case 8	Child Labor	Apple	-12,21%	-4,92	99%
Case 15	Volkswagen Fraud	Magna	-4,90%	-2,15	95%
Case 15	Volkswagen Fraud	BorgWarner	-8,73%	-4,27	99%
Case 15	Volkswagen Fraud	Honeywell	-5,56%	-2,80	99%
Case 15	Volkswagen Fraud	Siemens	-2,05%	-2,18	95%
Case 15	Volkswagen Fraud	Plastic Omnium	-8,44%	-3,03	99%

Even though a compilation of all results indicates some negative effects, the majority of the firms studied (74 out of 82) did not demonstrate negative CARs in any of the event windows considered. The results suggest that, in general, investors do not react to negative social / environmental events in supply chains, as no significant negative CARs were detected in 74 companies. However, market value penalization observed in 8 companies suggests that further analysis may be useful, especially for case 15 – Volkswagen Fraud, which concentrated five companies in this situation.

As previously discussed, the second level of analysis aims to detect the effect of a given event through all the buyers and suppliers identified (i.e. the whole supply chain). However, some cases (e.g. cases 4, 6, 8, 9 and 11) count on only one identified buyer / supplier. For this reason, this level of analysis concentrates only on those cases in which two or more supply chain partners were found, as the analysis of single firms coincides with level of analysis one discussed above. None of the cases presented statistically negative CAARs.

For the third level of analysis, the overall impact of negative social / environmental events is assessed. Table 5 below presents the calculated CAARs and their respective statistics for each period considered. None of the CAARs calculated presented statistical significance, meaning that the negative social / environmental events analyzed did not impact the market value of supply chain partners when observed through this view. The results suggest that, in general, investors do not react to negative social / environmental events in supply chains, as significant negative CAARs were not detected in any of the seven different event windows considered. In other words, the market value of supply chain partners was not penalized by the announcement of negative events of social / environmental practices held by chain partners.

Table 5: CAARs for the Seven Event Windows

	CAAR	t-stat
Event Window 1	-0,09%	-0,04
Event Window 2	0,01%	0,00
Event Window 3	0,01%	0,01
Event Window 4	-0,27%	-0,11
Event Window 5	0,38%	0,09
Event Window 6	-0,16%	-0,05
Event Window 7	-0,04%	-0,01

4.2.8. Discussion

We first assess the cases that relate to environmental practices. Cases 1 - Palm Oil Unilever, 2 - Palm Oil Nestlé, 6 - Junking the Jungle, 12 - License to Kill and 13 - Palm Oil P&G demonstrate various similarities, as they all comprehend environmental accusations by Greenpeace around deforestation in tropical areas (Blewitt, 2014; Golgowski, 2012; Mainwaring, 2011). Beyond that, they also share the fact that the market value of the companies involved did not accuse significant negative reaction in any of the event windows considered. This corroborates the idea that damages to corporate image or to reputational matters do not affect the market value of firms. Also related to environmental issues, the BP Oil Spill case (Case 3) did not cause negative reactions for any of its supply chain partners. Moving along to workforce conditions, despite several protests around the globe, the considerable attention from the traditional media to the tenth case (i.e. Case 10 – Rana Plaza collapse) and the great impact it had on social networks (Hahn, 2017), none of the companies linked to the episode suffered market value losses. That possibly means that, from an

operational perspective, the incident may have been interpreted as presenting no major impact on the firms involved, as the production addressed in the sweatshops could arguably be easily and rapidly redirected to other suppliers.

The Bangladesh Fire (Case 7), in turn, showed that out of the six supply chain partners linked to the case, only Sears saw its market value negatively impacted. It is possible that a higher portion of Sears' production was concentrated in the factory. Nevertheless, the analysis of the case did not allow for such conclusion. Previous to the event day itself, Sears' market value already presented abnormal behavior, with high volatility. Even though the fourth case (Zara Brazil) is also within the fashion business, unlike the cases discussed above, it does not relate to a tragedy with a high death count. Moreover, it focuses on a single company, instead of diverse supply chain partners. The absence of negative reactions from investors to slavery practices suggests that reputational issues were not relevant for them either. Zara's case in Argentina (Case 9), linking the company to poor working conditions in the country (Root, 2014), holds great similarity to the case in Brazil (Shankar and Das, 2015). The results of the empirical study were the same, with investors presenting no negative reaction to the disclosure of such practices.

In the Foxconn case (Case 5), out of the 12 companies analyzed, only Google presented a negative reaction from investors. Unlike the other 11 companies, Google's most representative relation with Foxconn is not around the electronic goods manufacturing. Instead, both companies are close Research and Development partners in the field of robotics, with Foxconn being responsible for new product development (Luk, 2014). It is possible that investors perceived a greater threat to this kind of long-term partnership, presumably more sophisticated and riskier.

Similarly to the Foxconn case, the announcement of extreme working conditions in China in Case 11 - Pegatron did not trigger any reaction from Apple's investors. The Child Labor case (Case 8) carries the particularity that Apple itself announced severe abuses of working conditions in several of its supply chain partners (Gupta and Randewich, 2013). This may have led investors to anticipate operational problems, as the companies involved carried out a significant portion of Apple's production (mainly in China). Moreover, investors' negative reactions may also have been driven by the expectation that compensation would have to be paid, as the case concerned a large number of employees. Another possibility is that higher control costs were expected, as Apple announced multiple measures to be adopted in that respect.

Case 14 - CP Foods brought to light the announcement of extreme working conditions, human traffic, slavery, torture and death of employees (Fishwick, Hondal, Kelly and Trent, 2014). Yet no negative reaction from investors was detected in the case. Finally, and more recently, the Volkswagen Fraud (Case 15) is the most representative case of a negative reaction from investors. Five out of the twenty identified supply chain partners presented significant losses in their market value. Volkswagen is a relevant client of many of these firms (Bolduc, 2016; Tomesco, 2015), which may reflect investors' concerns on their sales being seriously affected. Despite not comprehending the objective of the study, in order to provide an additional perspective on this case, the same event study analysis was conducted to test the impact of the event on the market value of Volkswagen itself. The results show that the company suffered harsh market value losses (significant at the 99% confidence level) in event windows 2, 3, 4, 5, 6 and 7, as follows:

Table 6: Event Study for Volkswagen

	Event Window			Event Impact		
	Number of Days	Initial Day	Final Day	Estimation Window	Calculated CAR	t-stat
Event Window 1	2	D-1	D0	200	-0,31%	-0,209
Event Window 2	2	D0	D1	200	-17,71%	-12,000
Event Window 3	3	D0	D2	200	-30,39%	-16,769
Event Window 4	3	D-1	D1	200	-17,76%	-9,825
Event Window 5	7	D-1	D5	200	-27,61%	-9,974
Event Window 6	5	D-2	D2	200	-30,43%	-13,006
Event Window 7	11	D-5	D5	200	-27,29%	-7,839

The gravity of the market value loss in the company may be an additional factor for the comprehension of the impact its supply chain partners experienced.

4.2.9. Conclusion

The present study proposed the assessment of investors' reactions to negative social / environmental events within supply chains contexts. In other terms, it investigates whether stakeholders of a company are affected by and / or react to sustainability issues related to a chain partner. Along with the discussion of the pertinent facets of Stakeholder Theory, such hypothesis is supported by the literatures on SSCM and the Efficient Market Hypothesis. Likewise, the link between firms and their *incidental stakeholders* is depicted in the form of the proposed *supply chain extended stakeholder model*. These developments theoretically support the idea that sustainability failures in business levels may destroy value to not directly observable stakeholders. Over the identification of 15 cases, the variation in the market value

of 82 supply chain partners was analyzed. The results suggest that, in the majority of the assessed companies (74/82), no statistically significant reaction was detected.

Each case was individually analyzed. Considering operational consequences, the results show that cases concentrated on small suppliers (i.e. small source firms) did not cause a negative reaction from investors. In other cases, in turn, despite the source firms were expressive in transactional volumes, operations do not seem to have been severely affected, translated in no major consequences to partners. A second category refers to those cases where the source firms concentrated a strategic portion of supply chain partners' operations, with some of the identified supply chain partners being markedly penalized (e.g. Volkswagen Fraud). The delimitation of these two categories suggests that investors' decisions may not be directly based on the social / environmental consequences of firms' operations for stakeholders. Instead, as long as no major operational consequences emerge, investors' positions remain apparently unaffected. Although logical within a profit-oriented rationale, results happen to be surprising and somehow counterintuitive to the initial expectations.

As discussed throughout the study, sustainability, CSR and SSCM seem to be not only valued by stakeholders, but also worthy of considerable investments by companies in the construction of positive associations in that direction. Moreover, most of the cases discussed received great attention of the media, linking large firms to cases of extremely poor working conditions, social abuse and environmental damage, among other negative consequences of their operations. This unfavorable publicity would be expected to cause reputational damages to companies, as they would be related to a lack of respect for nature and human rights. The results, however, suggest that damages to corporate images, identities, or reputations around the sustainability of firms do not seem to be relevant to investors, or at least did not cause a reevaluation of the fair stock price of the analyzed firms. The outcomes deserve a deeper

appraisal, as they could potentially present a new perspective of stakeholders' expectations and values towards firms.

From a theoretical perspective, the results may present a questioning of the main arguments of Stakeholder Theory. This means that the concern of firms around their operations may not be directly related to the consequences suffered by the environment, clients, employees, communities and society in general. The value creation logic would be stronger in that sense. This would be aligned with the mainstream Strategic and Operations Management literatures, which ultimately search for the sources of competitive advantage and differential performance among firms, supporting shareholder-oriented approaches rooted in more classical Economics literature. In a nutshell, once more the results suggest that investors' decisions might be mainly driven by profit maximization, and that negative social / environmental events in supply chains in general do not affect them. However, due to the limitations of the present study, such conclusions count on its own shortcomings. In that sense, it would not be possible to say that investors do not value sustainability at the business level, as they may have perceived the negative events discussed as punctual failures, not related to the policies and practices normally employed by firms. In order to assess their actual judgement of the issue, further research would be necessary. The limitations in question as well as the suggestions for future research are better addressed in the next and final section.

The study contributes to the SOM literature, providing empirical support for the joint assessment of sustainability issues and on the analysis of the effects that members of supply chains may cause on each other, a promising and still underdeveloped field of research. In this sense, although the results - when jointly analyzed - do not suggest such effect, they do not invalidate the *supply chain extended stakeholder model* proposed, as it may serve as a theoretical basis for future research. In fact, it may prove useful in the theorization of multiple

sorts, linking firms and their diverse direct and *incidental stakeholders*. This contribution ultimately adds to the development of the Operations Management literature and Stakeholder Theory itself. All in all, the main conclusion of the study is that, apparently, investors do not react to negative social / environmental issues in supply chains. Therefore, the answer to the research question proposed - Do investors negatively react to announcements of negative social / environmental events related to a supply chain partner? – is no, as the results do not allow for the rejection of the null hypothesis.

4.2.10. Limitations and Suggestions for Future Research

Albeit its contributions, the present work counts on its own limitations, which, if by one side might represent constraints to its improvements, from the other provide convenience for future research. In this way, despite allowing for the direct measure of effects, the concentration of the investigation on market-value data limits the perception of more subtle aspects, such as the reasons for the (lack) of reactions observed. Qualitative research conducted with different groups of investors could be useful in advancing such comprehension. Beyond that, as previously addressed, other groups of stakeholders could be assessed, as well as the effects of negative social / environmental events on dimensions other than market value (e.g. corporate images, identities and reputations). These distinct approaches would be likely to contribute to the testing and development of the *supply chain extended stakeholder model*, and to the conceptual reinforcement of the notion of *incidental stakeholder* as valid paths to treat similar issues.

In addition, overcoming the restriction to the analysis of sustainability-related events shall be also considerably profitable. More than stretching the scope and contribute to similar

comprehensions in other areas, the eventual recognition of the similitudes and idiosyncrasies of negative social / environmental events in relation to cases of distinct natures may greatly contribute to a better comprehension of the influence of sustainability matters on stakeholders' perception, contributing to the SOM debate as a whole, as well as to the other aspects treated in the present work.

4.3. Article Three – Caught Red-Handed: The Cost of the Volkswagen Dieselgate

Mauro Fracarolli Nunes

Camila Lee Park

4.3.1. Background to the Article

The third article, named “Caught red-handed: The cost of the Volkswagen Dieselgate”, was the third one to be entirely developed, although its central idea came as a deepening of the first and second paper’s early stages. It was submitted for the *Journal of Global Responsibility* and was accepted for publication in its current form in July of 2016.

The study introduces the conceptualization of the *inertial effect* as an initial theorization of the process through which negative corporate events may disseminate throughout the supply chain and industry levels of analysis. It also proposes to empirically demonstrate such effect, by analyzing the impact of the Volkswagen Dieselgate in the American automotive industry and supply chain partners. This article was co-authored with Camila Lee Park. While a significant portion of the work relied under my responsibility, we each proceeded with separate data collection, treatment and empirical analysis, comparing results at the end. She also contributed with innumerable insights as for the development of the paper, worked with me on results presentation and to make the method section more approachable.

“Caught Red-Handed: The Cost of the Volkswagen Dieselgate”

Mauro Fracarolli Nunes

Camila Lee Park

4.3.2. Abstract

Purpose – With the investigation of the US stock market response to the Volkswagen Dieselgate, this paper aims to empirically demonstrate a case of dissemination of corporate scandals and events through industries and supply chains (i.e. inertial effect).

Design/methodology/approach – Individual event studies were conducted in the analysis of the market value fluctuations of 33 companies of the American automotive industry upon the disclosure of the scandal.

Findings – Results show that the fraud held by the German automaker spread to surrounding companies within the industry and supply chain levels of analysis, contaminating market values and costing around 6.44 billion dollars to American firms.

Originality/value – Building on the efficient market hypothesis and on the literature on supply chain management, empirical evidences support the conceptualization of the inertial effect as a valid rationale to address the dissemination of events through companies not directly involved. In that sense, the study contributes to an emerging and promising research field within the supply chain management literature. Beyond that, its interdisciplinary approach may inspire future research in the applicability of the event study methodology in similar contexts, as well as of alternative forms to empirically test other theoretical constructs.

Keywords: Corporate scandals, Environmental fraud, Inertial effect, Volkswagen Dieselgate

4.3.3. Introduction

By associating companies with negative and undesirable issues, corporate scandals may be severely noxious to businesses. Depending on factors such as their nature, consequences and level of repercussion, the disclosure of negative corporate practices or behaviors may seriously compromise corporate reputations built over decades (or even centuries). Not surprisingly, some of the most solid and admired companies have seen large portions of their reputational capital disappear, as their names were associated with cases of fraud, corruption, environmental disasters, disrespect to human rights, among others. With the expansion of media channels and mass communication technologies, the damages that corporate scandals may cause are highly potentiated (Wilburn and Wilburn, 2015). As consumers intensively address these questions on social networks, information is even more speedily processed by a particular group of stakeholders: investors do not hesitate to penalize firms involved in corporate scandals, leading the disclosure of negative events to be almost immediately reflected in possibly acute losses on market value.

That seems to be the logics behind the Volkswagen Dieselgate (Maynard, 2015), which has been considered one “of the most outrageous white-collar crimes and corporate scandals of recent times” (Kottasova, 2015). In the search to become the global leader of the automotive industry by 2018, Volkswagen implemented an aggressive growth strategy, particularly in the USA. Through the promotion of the diesel technology, the company expected to triple its sales in the country (Muller, 2013). However, in September 2015, the German automaker was accused by the Environmental Protection Agency (EPA) of defrauding emission tests through softwares illegally installed on its cars (Davenport and Ewing, 2015). Other reputable German brands such as Audi, Porsche (Volkswagen Group) and Bosch also had their names associated to the case (Yeomans, 2015). In that sense, beyond directly affecting the corporate image

(Preston, 2015) and the market value of Volkswagen itself (Snyder and Jones, 2015), it has also called into question the legacy of the “made in Germany” brand for high-level engineering (Löhr, 2015a) and general quality (Chambers, 2015). From an even broader perspective, the scandal is believed to have also affected the assessment of consumers on the environmental viability of the whole diesel automotive technology (Löhr, 2015b), especially in North America.

An aggressive strategy of growth of one of the biggest automakers of the world is not held in isolation though. Ultimately, it affects other players of the industry, either through direct increased concurrence or in the form of complex strategic options, where established players may be seen as potential targets for takeovers, mergers and acquisitions. The arrival of a new giant calls for the development of a whole supply chain, with potential suppliers necessarily searching to align their operations to the needs of the newcomer. These adaptations generally mean the investment of non-negligible sums of money in the reconfiguration of plants, increasing of sales work force and channels, research and development and so on. Inner to this view, further studies on the impact the Volkswagen Dieselgate may have caused on other companies may be particularly useful.

In the context of the present work, the consequences of the disclosure of practices or behaviors configured as corporate scandals are addressed within the logics of events. Based on the developments of the efficient market hypothesis (EFM) (Fama, 1970), the link between events and the reactions of stock markets is addressed. Moreover, the analysis of the potential effect of corporate scandals (or events) in companies other than those on which they emerged leads to the conceptualization of the inertial effect in both industries and supply chains. Building on the examples of corporate scandals such as the BP deepwater oil spill, Unilever palm oil, Enron, as well as on other empirical studies, the inertial effect is theoretically

delimited, supplying the ground for the comprehension of the outcomes of the Volkswagen Dieselgate. The objectives of the research may then be summed up into the following research question:

RQ1. Is the disclosure of an environmental fraud capable of triggering an inertial effect on other companies?

In that sense, based on the event study methodology (Fama, 1970; Brown and Warner, 1980), we analyze investors' reaction in two distinct groups. Results show that while two companies within the industry level of analysis presented severe negative effects, three within the supply chain level had their market value also strongly compromised by the scandal. The results of the study suggest also that these companies have suffered market value penalizations of around 6.44 billion dollars upon the disclosure of the case. In answering the RQ1 proposed, the investigation offers empirical data that contribute to the comprehension of the inertial effect in both industries and supply chains.

The following sections develop a literature review on corporate scandals and corporate fraud, on the Volkswagen Dieselgate scandal and on the theoretical framework of the study. The method of event study is also discussed as the appropriate tool to be applied. Beyond that, results are presented and discussed. Practical and theoretical implications are addressed, followed by conclusions and the limitations and suggestion for future research.

4.3.4. Literature Review

4.3.4.1. Corporate Scandals and Corporate Fraud

Corporate scandals may be defined as the disclosure of any information capable to compromise the image of firms, negatively impacting the manner how stakeholders shape their perception and expectations on past, present and future behavior of companies. Inner to this view, the exposure of unethical or socially condemnable corporate practices or behaviors may decisively contribute to the building of negative assessments, and, thus, seriously compromise the overall performance of businesses. In face of the fast development of media channels and mass communication technologies, the outcomes of negative news around firms may be particularly risky. Considering the current reach of global internet access and the mass connectivity it allows, information shall quickly spread throughout markets. Depending on the repercussion of this sort of issue, online campaigns may emerge, organizing the boycott of costumers to brands and products, among other actions.

Within this context, firms might see themselves involved in scandals of several natures. The most common are those related to environmental disasters, condemnable environmental practices, poor work force conditions and work force slavery. Some of the most famous corporate scandals fit into one of these categories. Back in 2010, for instance, upon one of the biggest oil spills of all times (The Telegraph, 2011), several players of the oil industry, such as British Petroleum, Anadarko, Transocean, Halliburton (Guardian Research, 2010), among others, were directly or indirectly involved in an environmental scandal of the highest proportions, considering the great impact the incident caused to the fauna of the Gulf of Mexico and to the environment as a whole (Rushe, 2015).

From a supply chain perspective, in turn, firms such as Nestlé, Unilever and Procter & Gamble have been associated with the destruction of tropical forests due to the extraction of

palm oil. Moreover, several firms have been recently linked to cases of poor conditions of work, modern slavery, sexism and discrimination of employees, particularly those inserted in global supply chains. In some of these cases, beyond the detrimental association of these companies to negative events, the disclosure of such news has also driven them to spend high sums of money in the reconfiguration of processes, in the implementation of more rigid controls, as well as on the rebuilding of their corporate reputation.

However, the rational use of practices or behaviors intended to consciously deceive stakeholders seems to be particularly harmful to companies. Corporate frauds may assume diverse forms and be used in the search of the most different outcomes. Enron, “one of the world’s dominant energy companies” (Oppel and Sorkin, 2001) of the early 2000s, for instance, was caught in the conduction of diverse fraudulent practices (Watkins, 2003). Accordingly, “not only did Enron’s management and consultants fail the company’s shareholders and employees, but the market and watchdog agencies also failed to protect shareholder interests as well” (Watkins, 2003, p. 6). The case became famous as one of the biggest corporate scandals ever known (Kottasova, 2015). Beyond that, clients of auditing companies were also indirectly affected, with the integrity of their financial numbers being severely questioned (Chaney and Philipich, 2002; Asthana, Balsam and Kim, 2009; Reitenga, Linthicum and Sanchez, 2010).

As the cases discussed illustrate, negative events related to environmental and ethical issues indeed have the potential to be spread through surrounding companies. In that sense, the Volkswagen Dieselgate offers a valuable opportunity for the study of corporate scandals, as it relies precisely on the frontier of these apparently distinct dimensions, as discussed next.

4.3.4.2. *The Volkswagen Dieselgate Scandal*

Back in 2008, Volkswagen's global CEO, Martin Winterkorn, announced the plans of the company to become the leader of the global automotive industry by 2018 (Muller,2013). Yet accordingly, however:

“[...] skeptics may snicker that Winterkorn's grandiosity is delusional, especially his plan for the USA, where VW would need to triple its 2008 volume to meet his target of one million cars a year (800,000 Volkswagens and 200,000 Audis). Competitors like Toyota, Honda and Hyundai aren't about to yield; neither will the domestics. VW had ignored the USA market for decades after stumbling badly in the 1980s and remains saddled with a reputation here for high prices, mediocre quality and a tin ear for American tastes.” (Muller, 2013).

As part of its strategy, the German automaker initiated a “large-scale promotion of diesel vehicles in the USA in 2005” (Volkswagen,2015a). Ironically, one of these actions included a “Dieselution Tour to educate USA consumers and lawmakers about the advantages of clean diesel” (Bernestein, 2007). As stated by Volkswagen of America's CEO by the time, Stefan Jacoby:

Volkswagen of America considers the Dieselution Tour an important informational resource for everyone concerned about the environment and improved fuel economy standards. This tour aims to change any outdated perception about diesel technology (Bernestein,2007).

In 2014, prior to the disclosure of the Dieselgate scandal, Volkswagen's sales in the USA accounted for a total of 366,970 units (Volkswagen, 2015b), far behind the 1MM targeted for 2018. However, apart from its business performance, what really puzzled its competitors was the fact that Volkswagen diesel cars were able to regularly pass emission tests, while theirs did not. Automakers such as General Motors, Mazda and Honda, all interested in strengthening their position in the diesel business, frequently put into question the capacity of the German company to consistently meet California's environmental demands (Kiley, 2016). In this sense, despite the intense investigation held on Volkswagen cars, General Motors' engineers just could not figure out how the diesel technology of the company was able to do

it. As stated by Robert Lutz, vice chairman of the company and responsible for product development between 2001 and 2009, “our people told me that they had studied the Volkswagen products and that they could not get the hardware to perform the same way to satisfy California’s emissions standards” (Kiley, 2016).

Further investigations on Volkswagen cars were then financed by the International Council on Clean Transportation (ICCT). Through extensive road tests conducted by the West Virginia University, huge discrepancies between real emissions and those measured on tests were found. The results offered empirical evidences that Volkswagen was indeed cheating emission tests in the USA. Later, the studies were corroborated by the US EPA and by the California Air Resource Board, giving rise to the scandal (Morgan, 2015). The discovery of a “defeat device” used to circumvent emission tests [The International Council on Clean Transportation (ICCT), 2015] lead the EPA to order Volkswagen to immediately recall almost 500,000 cars sold in the USA (Neate, 2015). A mass coverage followed on the media.

According to Volkswagen itself, the fraud was motivated to the impossibility of its EA 189 diesel engine to meet the strict levels of nitrogen oxide emission required in the USA. As a way to deal with this issue, the company opted for the incorporation of a software designed to adjust the levels of emissions when tests were conducted (Volkswagen, 2015a). The scandal brought the diesel technology to be even more questioned in the USA. Inner to this view, “the damage done by Volkswagen’s cynical and ethically challenged behavior could well prove fatal to the future of the diesel technology in the USA” (The Economist, 2016). Studies have estimated the loss in the market value of the German company to be around 30 percent upon the disclosure of the scandal (Snyder and Jones, 2015). Moreover, suppliers that have bet in the development of diesel driven auto parts also saw their plans and eventually their whole business models suddenly under threat. The side effects of the Volkswagen Dieselgate in both

the diesel industry and the diesel supply chain of the USA ground the development of the inertial effect, discussed next.

4.3.4.3. The Inertial Effect

Beyond the impact on the market value of firms directly involved, studies have analyzed the effect of corporate scandals to surrounding companies, with interesting results. As previously discussed, the Enron case has received particular attention, as companies of the auditing sector as well as their clients also absorbed, at least partially, the negative outcomes of the case. From a supply chain perspective, the effect of negative social and negative environmental events on the market value of buyers and suppliers has also been analyzed (Fracarolli Nunes, 2015). In that sense, empirical evidence has been provided that commercial partners of companies involved in this sort of scandals may also face considerable losses on the evaluation of investors.

The negative effect of events on companies other than those which have originally sourced them is here conceptualized as the inertial effect. The inertial effect is precisely the property of these events to be spread throughout industries and supply chains, like the waves caused by a stone that hits the water previously rested. Despite negative events may impact surrounding firms in distinct dimensions, the analysis of their effect on the market value offers an important opportunity to the detection and measurement of the inertial effect. In this sense, the discussion of the link between events and investors' reactions is particularly useful.

Through the developments of the EFM (Fama, 1970), the concepts supporting the adjustment of stock prices to new information is a well-sedimented concept on the theory of finance. From a broad perspective, it states that, in face of any new relevant information, the market value of firms is instantaneously adjusted to reflect the renewed expectations of

investors around the future cash flows of companies. While on its weak version, stock prices are expected to fully reflect all past available information, on its semi-strong version, the price of these assets is also expected to reflect any new publicly available data. The strong version, in turn, extends the concept, addressing that even privately held or insider information are instantaneously reflected on prices. Inner to this view, in case a scandal or any other event is believed to affect the capacity of a firm to generate future cash flows (positively or negatively), the stock market is expected to automatically adjust the value of this given company to its new fair level. Consequently, stock prices would reflect an accurate estimation, making it impossible to investors to profit from eventual arbitrages or distortions between stock prices and their due value.

As they allow the detection of eventual changes due to the disclosure of new data and their respective variations, event studies represent a direct test of the EMH. For this reason, the method represents the appropriate tool to test the inertial effect of the Volkswagen scandal in both industry and supply chain levels, being further discussed ahead in the text.

4.3.5. Method, Sample and Data

4.3.5.1. Event Study Methodology

Originally developed for empirical studies of finance and accounting (Corrado, 2011), the event study methodology has been used in the assessment of the impact of a diverse and broad set of events on firms' market value. Through the comparison of a company's actual returns to those that would be expected in the hypothetical absence of a given event, the method allows for the detection and the measurement of its potential outcomes on publicly traded stocks' prices. In other words, event studies enable the comparison between a firm's market

return (actual returns) – disturbed by the occurrence of an event–and the return that would be considered normal. The difference between actual and normal returns results on what is conceptualized as abnormal returns (Campbell, Lo and MacKinlay, 1997).

Abnormal returns are the main interest of event studies and may be analyzed in different manners. In case abnormal returns or their accumulation come to present statistical significance, one may claim that a given event has produced a variation on the market value of a company within a given significance level. Event windows represent the period over which the effect of the event is measured. Traditionally, it comprises the event day itself, a certain number of days prior to it and a certain number of days after it. The extension of the period around the event is used to properly capture eventual anticipations or latter responses of the market. Considering that the Volkswagen Dieselgate emerged in result of academic investigations conducted since 2013 (Ewing, 2016) and, moreover, that in the days following the initial exposure of the fraud new potentially negative information were made available – for instance, Volkswagen’s admission that 11 million cars around the world were equipped with the defeat devices and the banishment of Volkswagen’s diesel car sales in Switzerland, respectively, three and eight days after the disclosure of the fraud (Kollewe, 2015) – the results of the present study are comprehended within an 11-day event window, addressing five days prior to the event, the event day itself and five days after it. For robustness purposes, an additional five-day event window was also analyzed, comprehending the event day itself, two days prior to it and two days after it, in a way that only companies presenting statistically significant negative abnormal returns in both event windows are considered to present evidences of a possible impact generated by the Volkswagen Dieselgatescandal.

The calculation of normal returns demands the choice of an appropriate model (Brown and Warner, 1980). For the present study, the Market Model (Fama, 1970) is chosen, as it is the

most commonly used method for that task (Agrawal and Kamakura, 1995). The model posts that normal returns (r_{it}) are based on the returns of the market (r_{mt}), as well as on the estimation of parameters α_i and β_i [equation(1)]:

$$r_{it} = \alpha_i + \beta_i r_{mt} \quad (1)$$

While r_{mt} is represented by proxies of the returns on the market portfolio (S&P 500), α_i and β_i result from a linear regression between the returns of the market and those of the stock of interest within a period called estimation window, presently considering 200 days prior to the event windows. Once actual (r_{it}) and normal ($E_{i,t}$) returns are calculated, abnormal return for any day t (AR_{it}) is obtained by the difference between them [equation(2)]:

$$AR_{it} = r_{it} - E_{i,t} \quad (2)$$

After abnormal returns have been calculated to each day within the event window, they are aggregated in the form of cumulative abnormal returns (CAR). CARs represent the cumulative effect of an event through the whole event window considered, as presented in equation (3):

$$CAR_T = \sum_{t=1}^T AR_t \quad (3)$$

The statistical inference of CARs is calculated through the ratio between each CAR itself and its estimated standard deviation as follows:

$$\text{Statistic of Cumulative Abnormal Returns} = \frac{\text{Cumulative Abnormal Return}}{\text{CAR Estimated Standard Deviation}} \quad (4)$$

For all the companies on which statistical significant impact were detected for both event windows, market value losses in terms of USD were calculated through the multiplication of the initial market value of each company (previous to the event window) to the respective negative CAR calculated. The initial market value is calculated through the multiplication of

the number of outstanding shares of each company by its respective stock price on the day immediately before the event window considered.

4.3.5.2. Sample and Data Collection

As discussed, the objectives of the study are centered around the analysis of the impact of the Volkswagen Dieselgate on American companies. In this sense, the assessment of investors' reactions on the American market is interesting due to four main reasons. First, despite Volkswagen being a German company, the scandal relates to automobiles sold in the USA and was triggered due to fraud used against the environmental laws of the country; second, along with the Chinese, the American automobile market is one of the biggest of the world, representing approximately 6.2 percent of its global production and 10.5 per cent of global sales (Statista, 2016); third, the American market is not predominantly based on diesel technology (Lussenhop, 2015), what introduces a control variable and adds to the complexity of the analysis; and fourth, as part of its global strategy, Volkswagen intended to strengthen its participation on the American market, strongly supporting its diesel technology as a viable solution to meet the long run strategic plans of the company.

The sample is then limited to the listed companies on the three main stock exchanges of the USA:

- (1) The New York Stock Exchange (NYSE);
- (2) The National Association of Securities Dealers Automatic Quotation System (Nasdaq);
and
- (3) The American Stock Exchange (AMEX).

To further delimit the scope within the Automobile industries, two Standard Industrial Classification (SIC) codes were chosen—3711 (motor vehicles and passenger car bodies) and

3714 (motor vehicle parts and accessories) –as they allow for a double evaluation on both the industry and the supply chain. The application of these criteria led the final sample of the study to result in seven American companies from the industry level and 26 from the supply chain level. For a matter of discretion, companies' names were substituted by codes and referred to as I1 to I7 and S1 to S26 for industry and supply chain level, respectively.

Daily stock returns without dividends were collected from the Center of Research in Security Prices database for each firm of the final sample. Additionally, the returns on S&P 500 were also collected from the same data base and used as the proxies for the returns of the market.

4.3.6. Results

The results suggest that two companies of the industry level of analysis were negatively impacted by the event. As presented in Table II, Firm I4 accounted for a cumulative retraction in the order of 24.89 percent in the first event window (D-5 to D5) and of 20.45 per cent in the second, both within the 99 per cent statistical significance level. In absolute terms, these figures represent losses around 372 million dollars. Firm I6, in turn, presented cumulative percentage losses of 5.83 and 3.48 per cent in the first and second event windows, respectively, both within a 90 per cent statistical significance level. In absolute terms, however, the losses account for 1.19 billion dollars. This suggests that the Volkswagen Dieselgate represented then a total loss of 1.59 billion dollars within the industry level of analysis (Table 7).

Table 7: CAR Results for the Sectorial Level

Company	Event Window 1 (D-5, 5)		Event Window 2 (D-2, 2)	
	CAR	t-stat	CAR	t-stat
I1	-1,835%	-0,384	-1,886%	-0,587
I2	0,057%	0,019	-0,777%	-0,374
I3	-0,833%	-0,209	-1,323%	-0,489
I4	-24,897%	-2,901 *	20,451%	-3,505 *
I5	-7,309%	-1,240	-5,351%	-1,348
I6	-5,830%	-1,870 ***	-3,478%	-1,663 ***
I7	-0,208%	-0,034	-0,293%	-0,070

Notes:

* $p < 0.01$

*** $p < 0.10$

As shown in Table 8, three companies of the supply chain level of analysis suffered market value losses in both event windows. Within a 90 and 95 per cent statistical significance levels, firm S2 reports CARs of 5.85 and 4.82 per cent for the periods analyzed, what in absolute values represents a loss on its market capitalization of approximately 292 million dollars. Firm S6, in turn, presented CARs of 11.80 and 12.98 percent for Event Windows 1 and 2 (within a 99 percent significance level), translating in losses of approximately 326 million dollars. Firm S13 stands for CARs of 5.48 percent in Event Window 1 and of 2.58 per cent in Event Window 2 (with 99 and 90 per cent significance levels, respectively). In terms of absolute value, these figures represent an estimated loss around 4.26 billion dollars in terms of market value. The aggregated figures result in a calculated loss to the companies of group two of 4.88 billion dollars (Table 9).

Table 8: CAR Results for the Supply Chain Level

Company	Event Window 1 (D-5, 5)		Event Window 2 (D-2, 2)		
	CAR	t-stat	CAR	t-stat	
S1	-12,346%	-1,439	-11,558%	-2,007	**
S2	-5,855%	-1,750	-4,820%	-2,147	**
S3	0,582%	0,123	-2,387%	-0,740	
S4	-6,174%	-1,582	-7,108%	-2,698	*
S5	-0,399%	-0,099	-1,604%	-0,589	
S6	-11,799%	-4,687	-12,983%	-7,685	*
S7	-14,490%	-1,825	-7,526%	-1,409	**
S8	-2,841%	-0,509	-2,183%	-0,581	
S9	-6,845%	-1,877	-2,139%	-0,874	**
S10	-2,197%	-0,498	0,161%	0,054	
S11	-8,784%	-1,113	-2,678%	-0,507	
S12	-6,913%	-0,878	-8,175%	-1,542	
S13	-5,481%	-2,753	-2,576%	-1,923	***
S14	0,371%	0,110	-0,965%	-0,422	
S15	310,214%	10,233	332,254%	16,439	*
S16	11,975%	2,031	3,151%	0,781	**
S17	-10,750%	-1,721	-6,861%	-1,628	***
S18	-5,875%	-1,217	1,430%	0,435	
S19	-10,762%	-0,609	12,454%	1,043	
S20	-10,523%	-1,543	-4,638%	-1,013	
S21	1,780%	0,239	-1,092%	-0,217	
S22	0,172%	0,036	-3,173%	-0,995	
S23	-5,181%	-1,399	-6,540%	-2,643	*
S24	-11,377%	-1,324	-3,295%	-0,569	
S25	-6,178%	-0,969	-2,777%	-0,646	
S26	-0,952%	-0,281	1,310%	0,580	

Notes:

* p < 0.01

** p < 0.05

*** p < 0.10

As presented in Table 9 below, when the results for the industry and the supply chain levels are analyzed together, the results suggest that the cost of the Volkswagen Dieselgate scandal was of approximately 6.44 billion dollars. These results are discussed in further details in the next session (Table 9).

Table 9: Volkswagen Dieselgate's Implicated Losses

Company	CAR	USD Millions
I4	- 24.89%	-372
I6	- 5.83%	-1,187
S2	- 5.85%	-292
S6	- 11.80%	-326
S13	- 5.48%	-4,265
Total		-6,440

4.3.7. Discussion

Based on the empirical results, the analysis focuses on the affected companies of each group, starting on the industry level. As discussed, the Volkswagen Dieselgate is claimed to have affected not only Volkswagen itself but also the whole diesel industry. Within this logic, companies concentrated around the diesel technology would be expected to be more intensively affected by the case. In that sense, despite the American automobile industry being not centered on the fuel, all the seven companies analyzed carry diesel-driven products in their portfolio. It is possible that the different results obtained are linked to the strength with which each company is associated with the diesel technology. In contrast with the other five companies of the sample, the negative variation in the market value of firms I4 and I6 could be due to a more adherent association to the production of diesel related products in the USA, as they concentrate on heavier trucks and engines.

However, considering Volkswagen's aggressive growth strategy for the American market, the negative results may also be rooted in distinct reasons. Within a hypothesized strategy held by the German brand to "buy", a consolidated position in the American truck market, both companies have been pointed as potential merger and acquisition targets. Speculations

in this sense brought firm I4 to the spotlight of this discussion in 2012. The possibility of a transaction, however, was denied by both companies (Bimmer, 2012). In 2014, in turn, rumors had been that firm I6 and Volkswagen were engaged in a merger negotiation. By the time, the operation was seen as a plausible move for a global player such as Volkswagen, aiming to enter the American market of heavy trucks (Tita, 2014). In both cases, it is possible that investors were betting in the success of future negotiations between Volkswagen and the American companies. Nevertheless, the disclosure of the Volkswagen Dieselgate scandal would have led these expectations to be frustrated, what, according to the EFM, could explain the abrupt adjustment in the market value of both companies. However, despite the empirical demonstration of the losses, the scope of the present investigation does not allow for such conclusions. At best, it suggests these factors as a possible explanation for the results observed. Further analysis on the characteristics of the companies as well as on the relations they kept with Volkswagen would be necessary.

Even more interesting are the results within the supply chain level of analysis. As shown in the previous section, 3 of the 26 companies of this group faced losses in their market value. In that sense, companies that compose Volkswagen's supply chain are inherently expected to be more strongly affected, as investors may expect a direct retraction in their sales forecasts to the German company. According to the EMH, this framing shall be translated into an adjustment of the stock price of these firms. Most of the companies analyzed were identified to fit this criterion, not having been impacted though. Moreover, firms such as S3, S9 and S11 were identified to supply parts not only to Volkswagen but also to firms I4 and I6, both in the industry level of analysis and affected by the scandal. Within this logic, still according to the developments of the EMH, they were expected to present strong negative returns, which were not confirmed by the empirical results.

In turn, firms S2, S6, and S13 seem to have accounted for a total joint loss of about 4.88 billion dollars, with firm S13 representing 87.4 per cent of this value. On what regards the first two companies, the dimension of the losses may suggest a relatively reasonable adjustment of projections for both, following the rational of a decreased activity of its client. The expectation of the difficulties to be faced by Volkswagen would have also led investors to revalue their prospects to the sales of these suppliers. Apparently, the revaluations were worth 292 and 326 million dollars, respectively. Possibly, this is the clearest example of the inertial effect in the present study, as no other major reason for the observed impact were identified during the research process.

The results for S13 are particularly intriguing. Right after the emergence of the scandal, market analysts stated that the impact on the market value of the company would be limited to a minimum (Graf, 2015). Accordingly, the expectation was due to the low level of trade between the two companies, with Volkswagen representing around 1 per cent of Honeywell's sales (Moskowitz, 2015). As the empirical results demonstrate, they could not be more wrong. Despite the limitations of the present research do not allow for such conclusion, it is possible that optimistic expectations of future sales of firm S13 for the German company may have been revalued by investors, as the American company had intensively invested in the development of auto parts for the diesel industry.

4.3.8. Practical and Theoretical Implications

From a practical perspective, the study offers additional comprehension around the consequences of one of the greatest corporate scandals of recent times (Kollewe, 2015). In this sense, instead of concentrating its investigation on the effect of the case on the most

evident players, the assessment of the impact on the American automotive industry offers valuable insights to managers and investors operating in the USA. The demonstration in terms of US\$ lost by American companies presents a tangible comprehension of the consequences of the Volkswagen Dieselgate, which might be useful in discussing and determining not only future strategic choices but also a more comprehensive analysis of past performance of these firms.

When it comes to its theoretical contribution, the proposition and the empirical test of the inertial effect may represent the main tribute of the study to the management literature. The delimitation of the construct for both industry and supply chain levels of analysis may be of great relevance in the parametrization of future research, being notably convenient in the description and deeper analysis of similar phenomena. The design of the concept has the potential to gather future developments around them, possibly contributing to the foundation of a promising research field.

4.3.9. Conclusion

Given its distinctive institutional, legal, social and cultural contexts, American society has been claimed to give greater importance to corporate scandals and business ethics issues when compared to other capitalist economies (Vogel, 1992). Beyond the reasons previously discussed, this claim highlights the relevance of analyzing the reactions of the American stock market. In that sense, the present study proposed the assessment of the impacts of the Volkswagen Dieselgate on the market value of American companies of the automotive industry. Building on a literature review around corporate scandals and the EFM, the concept of inertial effect is introduced. Based on this debate, the Volkswagen Dieselgate was

hypothesized as having caused negative impacts on the market value of American companies. Thirty-three individual event studies were conducted in both industry and supply chain levels. The variations of the market value of American firms listed on the NYSE, the Nasdaq and the AMEX under the SIC 3711 (motor vehicles and passenger car bodies) and 3714 (motor vehicle parts and accessories) were measured.

Results suggest that the inertial effect was perceived in the two groups, with two companies of the first having suffered losses on their market value (i.e. firms 1.4 and 1.6), as well as three companies of the second (i.e. firms 2.2, 2.6 and 2.13). Within this reasoning, the answer to the proposed RQ1 is YES, as statistically significant CARs were detected and measured in five companies of the sample. Additionally, results also suggest that the event would have caused a total loss of 6.44 billion dollars in the market value of the companies comprehended on the sample, divided in 1.56 billion for the two companies within the industry level of analysis and 4.88 billion for the three of the supply chain level.

Ultimately, the impacts observed state for a revaluation of investors for reasons other than those directly linked to the scandal. As discussed on the previous section, on what regards Navistar and Paccar, both within an industry level of analysis, the severe losses seem to account for the frustration of a possible future corporate transaction with Volkswagen. This dimension may be further explored through the analysis of the inertial effect within the M&A literature. In turn, the results observed for the supply chain level for S2, S6 and S13 seem to indicate the detection of the inertial effect in a more easily perceivable form. As Volkswagen was believed to have its sales compromised by the scandal, it would be expected for partner companies to also have their projections revised, what shall be translated in terms of losses in their market value. These aspects are further discussed as a possibility for future research on the next session.

In sum, it seems that investors have seen in the Volkswagen Dieselgate a frustration, or at least a hard withdraw on the intentions of Volkswagen to strengthen its position on the American market. As a consequence, possible targeting companies for eventual mergers and acquisitions at the industry level lost a portion of their value. In turn, suppliers that had bet on the development of Volkswagen and the diesel technology in the USA were also penalized, as the expectation of their sales had to be adjusted. In that sense, beyond answering the RQ1 proposed, the observation of the empirical results leads the study to be successful in proposing and confirming the concept of the inertial effect to address the mechanism through which the effects of corporate events spread throughout surrounding companies.

4.3.10. Limitations and Suggestions for Future Research

The study is limited to the assessment of the inertial effect on the American automotive industry. However, it is possible that beyond the two levels of analysis considered, other firms may have presented similar results. Beyond that, due to the method chosen, the study may forcibly be restricted to listed companies. Broader studies that seek to detect the impact of the scandal in private companies are certainly welcome. Additionally, a further comprehension of how corporate reputations are impacted may extend the analysis of the inertial effect as a whole. Future research could offer important contributions to the M&A literature. Qualitative research with managers, as well as with investors, could elucidate the reasons why firms were penalized for the scandal. The same rationale is valid for the companies that did not present losses, as the comparison between contaminated and non-contaminated companies may bring extra perceptions.

Part V – General Discussion, Contributions, Limitations and Future Perspectives

5.1. General Discussion

As discussed, the intensification of competition and the globalization of markets in the 1980s and 1990s reinforced the perception that the improvement of operational performance within organizational borders would no longer be enough to guarantee the competitiveness of firms. Following the increased pressure for cost and time reductions, companies sought to specialize, in a way that they became at the same time competitive and dependent on external processes. The development of partnerships seemed to become then the paradigm of modern competition, with companies investing in the building of more structured collaborative relationships. Along with the potential benefits of such arrangements, a series of risk must emerge as the relations between organizations become more complex. It must be considered, for instance, the possibility that problems occurred in a given company come to negatively spread, affecting supply chain partners in an unpredictable form. Within this angle, risk management may become more critical, as sources of instability must rest beyond firms' areas of control. Still, with the development of global trade and the transition to increasingly complex business models, supply chains generally comprehended different cultural and legal environments, enhancing the chances that practices considered unacceptable in consumer markets come to take place in earlier parts of the production processes.

The disclosure of gaps between consumers' expectations and operational practices around social and environmental practices, for instance, may represent additional levels of risk to the reputation of transnational companies, particularly when morally and ethically debatable issues are considered. On that regard, Furrer, Egri, Ralston, Danis, Reynaud, Naoumova, Molteni, Starkus, Darder, Dabic and Furrer-Perrinjaquet (2010) show that attitudes towards social, economic and environmental corporate responsibilities significantly differ between Western and Central and Eastern European countries. Likewise, Bageac, Furrer and Reynaud

(2011) point to differences in the perception of business ethics between France and Romania. Within this reasoning, a further comprehension of the impacts of negative events in supply chain becomes necessary, particularly for those that extend across distinct cultural zones.

As argued throughout the text, however, the investigation of negative corporate events is relatively broad in Management literature. Within a positivist perspective, authors have analyzed the effects of a wide range of incidents, establishing casual relations between business facts and their impacts in assorted dimensions. Due to the vastness of both dependent and independent variables considered, several relationships have been tested, in a way that the study of corporate events (and their consequences) is present in different disciplines (e.g. finance, marketing, organizational studies, operations management). With analyses been developed in most of the cases under no apparent, or at least not easily identifiable correlation, authors approaching the subject do not seem to constitute a clearly delimited field of study. This possible lack of self-identification or recognition of scholars that they might belong and indeed be contributing to a specific body of knowledge may partially explain the relatively weak level of convergence, not only around the issues addressed, but also over the concepts employed. The same might be considered around the theoretical frameworks supporting models and conclusions.

At the same time this sort of disorientation may pose difficulties in the recognition of the eventual paths to follow – meaning complications in identifying directions and values accepted by an (in)existent community –, the epistemological position of which efforts on that sense seem to commune allows the development of the distinct experimentations observed, particularly around the different methodological approaches employed. Even though most of the analysis identified with event-based research seems to focus on variations of the event study method, one may find a multitude of tools such as experiments, surveys, and even

qualitative approaches, particularly when a deeper comprehension of the consequences of a given corporate movement or happening is preferred over the generalization of results. In that way, the operationalization of the event study method in different contexts other than those in which it has emerged and is more traditionally used (i.e. finance literature) shall contribute to the expansion of its applications and to the sedimentation of its techniques. Along with the use of the event-study method is the recognition of the Efficient Market Hypothesis as a potential theoretical basis for this sort of analysis. Although technically not a theory in itself – it is rather a hypothesis indeed –, and contradicted by many proponents of behavioral approaches, the Efficient Market Hypothesis is argued to count on robust empirical evidence (Jensen, 1978), in a way it has been largely accepted in the explanation and anticipation of investors' reactions to new information. In that way, by relying on the Efficient Market Hypothesis, the present study may also add to the theoretical consolidation of event-based investigation as discussed ahead.

As previously seen, although the dissemination of negative corporate events across supply chain partners has been documented in literature (e.g. Hendricks and Sighal, 2003, 2005), it remains largely restricted to the discontinuation of physical flows. Despite relevant for the study of forms of supply chain risk, the limitation to this category of events may prevent the development of a broader comprehension around the many sources of instability that shall emerge within the intricate contemporary supply chain networks. Beyond that, it seems that the focus on traditional operational issues does not capture the many different relations companies may keep with one another, particularly if short-term and even eventual supply chain management relationships are considered. In that way, the extension of the analysis towards events of different natures has been in the center of our efforts as, beyond advancing the factual knowledge on the issue, it would permit the building of arguably more solid conceptual and theoretical developments. Within this reasoning, the widening of the empirical

tests may be considered the dissertation's main empirical contribution once it allows the comparison among events of different sorts and adds to the construction of a body of literature on the matter. Not restricted to the supply chain management literature though, contributions may be useful for scholars approaching, among other things, the management of acute corporate crisis, as our results may corroborate companies' need to invest in this type of communication.

Beyond the divergence in methods and theoretical assumptions, there seems to be some variation in the unity of analysis considered. While most studies addressing negative events refer to their impacts on source firms themselves, others are not restricted by organizational borders. That would be the case of articles focusing on the consequences of negative corporate events to competitors, and, more rarely, to supply chain partners. Considering that the later actually concentrates on the reaction of investors, or stakeholders of stakeholders, the concept of *incidental stakeholder* is developed to account for these more comprehensive investigations. This advancement is here argued to support the employment of the Stakeholder Theory as the major theoretical basis for the analysis of the *collateral effects* of negative events within supply chain contexts. Such methodological and theoretical contributions are further explored in the following sub-sections.

In a more specific frame, however, the three articles of the dissertation may be seen as a set of studies proposing empirical tests for the dissemination of negative corporate events across supply chain partners. Departing from the implicit hypothesis that disclosures of adverse news could have their effects perceived beyond the organizational borders of source firms, the collection of events and relative data was organized in a way that, beyond the eventual generalization of results, cases could be further investigated, having their particularities considered in the comprehension of the empirical results. In that way, despite

the developments are primarily oriented towards the quantitative results of the event studies performed, contexts could not be ignored, as different characteristics such as the nature of each event, the relation companies kept with one another and even the temporal aspect of each situation (i.e. when they happened), among others, seem to be influential to the outcomes observed. Building on these main objectives, each individual inquiry was designed to allow new, yet complementary, perspectives.

In that way, differently from the work of Hendricks and Singhal (2003, 2005), the present work extends the analysis to cases concerning issues other than supply chain glitches and disruptions. The choice of focusing in types of events which may not be within a traditional supply chain management setting is intended to provide original understandings on the issue. Beyond that, both conceptual and theoretical developments showed to be necessary in the comprehension of the empirical evidence of the present and previous investigations. As shown in the articles, results suggest that different types of events may indeed negatively impact supply chain partners. This confirmation adds to the understanding of supply chains as more than the rational alignment of companies searching to maximize their operational efficiency. In fact, the perception that both upstream and downstream partners must be negatively affected by decisions, conducts, practices, and even negligence of distinct natures held in a given focal company contribute to the comprehension that supply chain risk must assume complex and sometimes unexpected forms.

From a methodological angle, the use of the event study method seemed to be not only suitable, but actually necessary as, beyond allowing for the comparison of results from different cases, the employment of the same method used by Hendricks and Singhal (2003) – even if with some variation of technical order – would contribute to the building of the discussion within the supply chain management literature, and, possibly, to the sedimentation

of the debate in the study of modern forms of supply chain risk. Yet, although the three articles are focused on the analysis of market value fluctuations, this variable is here argued to be symptomatic. In other words, losses in market value shall not be understood as direct consequence of a given circumstance. Instead, they must be analyzed as an indirect result or the final outcome of investors' discernment around the possible effects of negative events. This reinforces the need for a more detailed contextualization of shareholders' reactions observed. In that way, along with the discussion of the immediate results of the event studies performed, this section also seeks to debate their possible antecedents.

Along notional and general considerations, a more direct discussion over the results obtained across each of the 30 cases investigated may be useful, particularly when their differences and similitudes are contrasted. Table 10 below presents then a compilation of the 30 cases investigated in the three articles of the dissertation gathered by their nature, and, within each category, organized by date, from the oldest to the most recent. The results observed for each of these categories and the cases composing them are individually discussed next.

Table 10: Cases Analysed in the Dissertation, Respective Categories, Articles, Event Date, and Observed Results

Category	Case No.	Case (Event)	Article(s)	Event Date	No. of suppliers investigated	No. of customers investigated	Supply chain contamination?	No. of suppliers contaminated	No. of customers contaminated
Environmental Disaster	1	Exxon Valdez	1	27-Mar-1989	1				
Environmental Disaster	2	BP Oil Spill	1 and 2	20-Apr-2010	15	1	Yes	1	
Environmental Disaster	3	Rena Oil Spill	1	05-Oct-2011		1			
Environmental Disaster	4	Samarco Tailings Dam Collapse	1	05-Nov-2015	21	1	Yes	3	
Corporate Environmental Irresponsibility	5	Palm Oil - Unilever	2	21-Apr-2008		2			
Corporate Environmental Irresponsibility	6	Palm Oil - Nestlé	2	17-Mar-2010		2			
Corporate Environmental Irresponsibility	7	Shell Nigeria	1	04-Aug-2011	10	4	Yes	2	
Corporate Environmental Irresponsibility	8	Junking the Jungle	2	14-Mai-2012		1			

Corporate Environmental Irresponsibility	9	Licence to Kill	2	21-Oct-2013		3		
Corporate Environmental Irresponsibility	10	Palm Oil - P&G	2	26-Feb-2014		5		
Corporate Social Irresponsibility	11	Zara Brazil	2	17-Aug-2011		1		
Corporate Social Irresponsibility	12	Foxconn Riots	1 and 2	11-Jan-2012		16	Yes	2
Corporate Social Irresponsibility	13	Bangladesh Fire	2	26-Nov-2012		6	Yes	1
Corporate Social Irresponsibility	14	Child Labor	2	25-Jan-2013		1	Yes	1
Corporate Social Irresponsibility	15	Zara Argentina	2	25-Mar-2013		1		
Corporate Social Irresponsibility	16	Rana Plaza Collapse	2	23-Apr-2013		16		
Corporate Social Irresponsibility	17	Pegatron	1 and 2	29-Jul-2013		4	Yes	1
Corporate Social Irresponsibility	18	CP Foods	1 and 2	10-Jun-2014		7	Yes	1
Corporate Social Irresponsibility	19	Samsung Malaysia	1	21-Nov-2016	20	27	Yes	2
Operational Failure	20	A380 Delay	1	13-Jun-2005		6		

Operational Failure	21	Boeing 787 Dreamliner	1	16-Jan - 2013	12	14			
Operational Failure	22	Samsung Galaxy Note 7	1	11-Oct-2016	20	27	Yes	4	1
Corporate Fraud	23	Dynegy Fraud	1	3-Apr-2002	4				
Corporate Fraud	24	Olympus Fraud	1	14-Oct-2011		6			
Corporate Fraud	25	Toshiba Fraud	1	7-Apr-2015	10	11	Yes		1
Corporate Fraud	26	Volkswagen Fraud	1, 2 and 3	18-Sep-2015	34	1	Yes	13	
Corporate Corruption	27	Siemens	1	16-Nov-2016	2	1			
Corporate Corruption	28	HP	1	14-Apr-2010	4		Yes	1	
Corporate Corruption	29	Rolls-Royce	1	06-Dez-2012		2			
Corporate Corruption	30	GlaxoSmith Kline	1	22-Jul-2013	5		Yes	1	
Total					158	167	14	27	8

5.2. Discussion of Results

5.2.1. Environmental Disasters

We start by the analysis of the four cases classified as environmental disasters, and more specifically, by the discussion of cases 1 – Exxon Valdez, 2 – BP Oil Spill, and 3 – Rena Oil Spill. The joint analysis of these three events may be convenient as they all stand for operational incidents that produced maritime oil spills, even though in different proportions. Case 1, for instance, dates back to March 1989, and resulted from the crash of the oil tanker Exxon Valdez – owned by American oil company Exxon (Goldenberg, 2010) – into a reef in Alaska’s Prince William Sound (Holleman, 2014). Following the incident, around 42 million liters of crude oil were spilled (Peterson, Rice, Short, Esler, Bodkin, Ballachey and Irons 2003), contaminating nearly 1,900 km of the Alaskan coast (Hadhazy, 2009) and 28,000 square kilometers of oceanic area (Richardson, 2017). Although no direct human losses were reported, the death toll from the incident accounted for “250,000 seabirds, almost 3,000 sea otters, 300 harbour seals, 250 bald eagles, 22 killer whales and billions of salmon eggs” (Barley, 2012). A drunk captain was pointed as the main cause of the crash (The Times, 2010).

In face of the harsh consequences of the spill and the poor reaction of the company in fastly treating the issue, Exxon, which in 1998 merged with Mobil (Goldenberg, 2010), is claimed to have suffered a serious deterioration of its reputational capital (Holusha, 1989). On that regard, Daley and O’Neill (1991: 42) point to the massive media coverage the case received, stating that “in 1989 no topic other than the politics of Eastern Europe and the Soviet Union commanded as much sustained U.S. press attention as did the oil spill of the Exxon Valdez (...)”. While the cleanup was declared complete by the U.S. Coast Guard in 1992 (Exxon Mobil, 2018), social issues are claimed to last, as the incident would have seriously compromised the fishing industry (Pitts, 2009). The total cost of the oil spill to Exxon Mobil is estimated in US\$

4.3 billion, including compensatory and cleanup payments, settlements and fines (Exxon Mobil, 2018). Results of the event studies performed show that the negative impact of the incident was restricted to the source firm (i.e. Exxon Mobil), meaning that, beyond Exxon Mobil itself, the supply chain partner considered in the investigation (Parker Drilling Company) was not affected.

Case 2 – BP Oil spill, in turn, followed an explosion in the Deepwater Horizon drilling rig in 2010 in the Macondo well, operated by British Petroleum (Broder, 2011). The incident led to the spill of approximately 780 million liters of crude oil in the Gulf of Mexico (Osterath, 2017), resulting in the contamination of more than 2,100 km of coast (Beyer, Trannum, Bakke, Hodson and Collier, 2016), and around 180,000 square kilometers of oceanic area (Barron, 2013). Considered the worst environmental disaster in the American history (Sherwell and Lawler, 2015), the case resulted in the death of 11 workers and of thousands of wild animals (Independent, 2010). Reports associated the death of more than 900 bottlenose dolphins to the spill, as well as hundreds of sea turtles annually (Della'Amore, 2014), while the U.S. Fish and Wildlife Service estimates that the number of birds killed are between 65,000 and 102,000 across 93 different species (Regalado, 2016). Along with a series of human and mechanical errors, a fail in the cement in the base of the 18,000-foot-deep well was pointed by a federal investigation as the main causes of the explosion (Broder, 2011). The consequences of the oil spill extended across the American states of Alabama, Florida, Louisiana, Mississippi, and Texas (McGill, Santana and Kunzelma, 2015). As discussed by the authors, in 2015 British Petroleum and the affected states settled a US\$18.7 billion deal to end judiciary claims on the issue. With the agreement, it is estimated that the total obligations of the company reached US\$ 53.8 billion by the time. Differently from case 1, results of the event studies conducted show that, beyond the source firm itself (British Petroleum), one supply chain partner (ABB) was penalized upon the incident, standing then for a case of *supply chain contamination*.

Although considered New Zealand's worst maritime environmental disaster (Manhire, 2011), the episode of the Rena Oil Spill (case 3) accounted for a much more modest accident in terms of volume. Officials have reported the leak of 350 tons of oil from the container ship Rena as it crashed in the Astrolabe Reef in New Zealand (BBC, 2011). Hundreds of sea birds were found dead in consequence of their contact with the oil, but the long-term impact of the incident is uncertain (WWF, 2011). The clean-up costs have been estimated in US\$ 235 million. As in case 1, negative impacts of the incident were restricted to the source firm (Costamare), not having contaminated the only supply chain partner considered in the investigation (A.P. Moller-Maersk).

Possibly relevant for the comprehension of the distinct outcomes may be the considerably different proportions of each incident, and particularly, their total costs for companies. As presented above, the direct financial impact of case 2 – BP Oil Spill (USD 53.8 billion) is more than 12 times higher than that of Case 1 – Exxon Valdez (USD 4.3 billion), and nearly 230 times higher than that of case 3 – Rena Oil Spill (USD 235 million). In face of the magnitude of each incident, it is possible that investors of supply chain partners have analyzed the expected financial impact for source companies differently, judging that, in cases 1 and 3, they would not be enough to significantly harm the operations of other companies in the supply chain. In case 2 - BP Oil Spill, in turn, investors may have predicted that the incident would have a more profound financial impact, potentially harming the operational capacity of the source company, and, by consequence, of its purchasing intentions. That would explain the loss in market value experienced by a supplier of the company (ABB). From this reasoning, the causes of the *supply chain contamination* observed would relate to an expected decrease in the future cash flow of the supplier.

Yet it must be considered the different sample sizes of each case. The identification of supply chain partners showed to be considerably challenging throughout the process, particularly for more ancient events and for those involving companies for which information was more restricted. As shown in Table 10, while cases 1 – Exxon Valdez and 3 – Rena Oil Spill had only one supply chain partner considered and tested, case 2 – BP Oil spill gathered 16 supply chain partners, being 15 suppliers and one customer, meaning that the power of the test for the later may be considerably higher. It is possible, for instance, that *supply chain contamination* has indeed taken place in the other cases, not being, however, evidenced by the study. The difficulties for identifying buyers and suppliers of companies, and for providing evidence that they exchanged by the time of the incidents has been present in all the categories of cases investigated, configuring a limitation of the study. This issue is discussed in greater details ahead in the text.

From a less direct perspective, the distinct results observed may also be rooted in the time gap between the incidents. The fact that only Case 2 – BP Oil spill caused *collateral effects* within the supply chain might be related to the evolution and sedimentation of the environmental debate and the construction of an eco-conscience among consumers, investors, and regulators. From this angle, not only stakeholders may be more sensitive to environmental issues as time advances, but companies' promises on that direction are, in general, more vigorous. Still on the temporal factor, the presence and strength of the internet and social media, more specifically, considerably vary from one event to the other. Back in 1989 when the Exxon Valdez case took place, access to internet was restricted to a “technological, academic and research elite” (Naughton, 2016: 5). In consideration of its modest reach, the internet of those times could barely be compared to that of 2010 and 2011. Thus, the public debate on both traditional and social media around the cases seems to have exponentially grown, fact that may have contributed to the *supply chain contamination* observed in the BP Oil spill case. Future

research on the cases would be necessary to elucidate these questions, which, by now, remain, at best, speculative explanations.

Still inside the classification of environmental disasters, case 4 – Samarco Tailings Dam Collapse is the only one in this category that does not related to an oil spill. In fact, the incident that happened in 5 November 2015 in the state of Minas Gerais, Brazil, refers to the downfall of a dam that released 40 million liters of water and sediment from iron ore extraction, creating a wave that killed 19 people, contaminated the water supply of a vast population, decimated wild life, and polluted Rio Doce (i.e. an important river of the region) with a great amount of a rust-red plume of mud (The Guardian, 2018). Considered Brazil's worst-ever environmental disaster (Nogueira and Eisenhammer, 2016), the incident also caused severe damage to historical cities, adding to its immaterial impact (Salinas, 2016). In August 2016, Samarco and its parent companies Vale and BHP Billiton presented the conclusion of an internal investigation, in which the companies admitted that the rupture of the reservoir occurred in the top of the structure where works were being conducted (Bertoni, 2016). Among other causes pointed by external parties are flaws in the design of the structure (BBC, 2016) and negligence (Thomson, 2015). In 2016, a US\$ 2.2 billion loss was reported by BHP Billiton as a result of the dam failure, and, in June 2018, the company, its partner Vale, and Brazilian authorities entered into a framework agreement settling a US\$5.26 billion (R\$ 20 billion) agreement (Pash, 2018).

The case counted on a relatively large sample of supply chain partners to be tested, being 21 suppliers and one customer (Table 10). The comprehensive identification of Samarco's partners may enhance the power of the analysis in comparison to the other cases of environmental disasters, particularly in relation to cases 1 – Exxon Valdez and 3 – Rena Oil Spill. The fact that the case is more recent and that Samarco itself provides more information around the

companies it exchanges with may have contributed to this more successful data collection. As the results of the event studies conducted in Article 1 show, the disaster led to *supply chain contamination* as, beyond BHP Billiton, three of Samarco's supply chain partners accused market value losses upon the incident: Ultrapar, FLSmidth, and Caterpillar. Similarly to case 2 – BP Oil Spill, investors may have expected Samarco to go through both financial and operational difficulties, limiting its purchasing capacity and, by consequence, the expected sales of suppliers. Considering that the case happened in 2015, it is also possible that the outcomes observed are related to its open discussion in social media, what may have aggravated the outcomes from a reputational point of view. The possibility of negative reputational spillovers may have also contributed to the negative reactions from investors, as the assessment of stakeholders around a company may be influenced by the corporate image and identity of its partners. In this sense, the reaction of investors would translate a concern of a potential loss of reputational capital, even if indirectly.

5.2.2. Corporate Environmental Irresponsibilities

The second category to be discussed is that of corporate environmental irresponsibilities. Differently from the cases of environmental disasters discussed above, events classified in this category do not represent punctual failures that ended up causing major environmental calamities. Instead, they relate to continuous procedures that have eventually been revealed or disclosed, typically by third parties invigilating operations. As previously argued, negative environmental practices involving supply chain partners have brought the corporate image of well-known global firms into severe questioning, both within traditional and social media. Along with the erosion of reputational capital, companies not directly involved in issues such as deforestation and pollution experienced important operational and regulatory problems as

they were pushed to redesign their production processes. These supply chain issues shall reflect the tendency observed by Kovács (2008), according to which customers and legislators would be willing to extend companies' environmental responsibility to the operations of its buyers and suppliers as a manner to remedy the matter.

Some of the most uproarious campaigns released by the environmentalist group Greenpeace seem to fit this reasoning. Under the argument that palm oil production entails in the deforestation of tropical forests and threatens the continuity of endangered species, the organisation pointed in different times to global companies as responsible entities for treating the issue – despite the environmental misconducts in questions being operated by initial upstream supply chain partners. In fact, as discussed throughout the text, cases 5 – Palm Oil – Unilever, 6 – Palm Oil – Nestlé, 8 – Junking the Jungle, 9 – Licence to Kill, and 10 – Palm Oil – P&G shall be grouped within this category in consideration of the important similarities they keep, mainly around the nature of the accusations made by Greenpeace. More specifically, in such cases environmental fails practiced in early stages of the supply chains were exposed, being the multinational companies held responsible for their solution. Beyond that, with exception of case 8 – Junking the Jungle, environmental issues were conducted by relatively small suppliers with nearly no reputational capital. This suggests that, even though not directly responsible for the problems, large multinational companies were deliberately chosen to be blamed as a manner to boost the media attraction to the case.

None of these cases resulted in market value losses to supply chain partners though. It is possible that the relatively small sample of these cases has contributed to such result. As shown in Table 10, none of them had more than five supply chain partners tested. In any case, this lack of reaction is still surprising as all the cases took place after 2008, period in which the internet and social media were relatively well developed, and so was the building of the

environmentalist debate. Also, given the strong reaction of these companies, including press releases, declarations of executives, the development of more robust sustainability reports, the adoption of transparency policies, and reconfiguration of their supply chains, among others, results have shown to be to some point counterintuitive.

In turn, also classified as a case of corporate environmental irresponsibility, case 7 - Shell Nigeria resulted in *supply chain contamination*, as beyond the source firm itself, two suppliers of the oil company were penalized in terms of market value: MAN SE and Noble Corporation. The event of interest is the release of the United Nations Environment Program (UNEP) report entitled “Environmental Assessment of Ogoniland”, in which the local communities in the Niger Delta are claimed to have been exposed to oil contamination for decades (Amnesty International, 2011). Three years before that, Shell admitted responsibility on two oil spills (Mason, 2011). As discussed by the author, the Bodo community in the Niger Delta would have absorbed between 9 and 13 million barrels of oil spilled by several companies along the years, a volume that more than doubles that of the British Petroleum Oil spill in 2010 (case 2). Still accordingly, the United Nations figures account for more than 6,800 different oil spills between the years of 1976 and 2001. In this sense, the disclosure of the report suggests a long-term polluting practice, what must also have aggravated the assessment around the company, and, by consequence, around its suppliers. The fact that the report came to public in 2011 may also have added to its open discussion in social media, contributing to the *supply chain contamination* observed. It is possible, for instance, that investors have feared that the negative exposition of Shell and the eventual compromise of its reputational capital could spill over, dragging the image of its suppliers along. Also, given that the report relates to the disclosure of long-term polluting practices partially admitted by Shell, investors may have considered the possibility of new accusations to be triggered, pointing to other spills. In this case, potential fines, sanctions, legal expenses, and settlement agreements could eventually compromise the

operations of the company in Africa, as well as in other parts of the world, and, by consequence, that of its supply chain partners. The range of negative possibilities and the consequent rise in uncertainty (i.e. risk) may explain the more conservative position of shareholders. Still, contrary to the other cases of this category, a relatively large sample of supply chain partners was built for this analysis. As displayed in Table 10, a total of 14 partners were identified (10 suppliers and four buyers), what may considerably enhance the probability of detecting eventual *contaminations*.

5.2.3. Corporate Social Irresponsibilities

Among the nine cases classified as corporate social irresponsibilities (cases 11 to 19), in six of them companies were negatively affected by fails occurred inside their supply chains. Case 12 – Foxconn riots refers to protests conducted by employees of Foxconn in response to extremely poor working conditions (Lubman, 2012). In September 2012 the Chinese company was forced to temporarily close one of its factories as a riot erupted (Barboza and Bradsher, 2012). According to comments on the Chinese internet bulletin board, workers broke out after an employee was hit by a security guard (Vinter, 2012). As pointed by the author, the disturbance involved around 2,000 of the 79,000 workers employed in the factory and demanded nearly 5,000 policemen and four hours to be controlled. The episode did not cause market value damage to important clients of the company such as Apple, Cisco, Amazon, Acer, Sony, Nokia, Motorola, Toshiba, Nintendo, Microsoft, and Hewlett-Packard, all identified and analyzed in the current investigation. The evidence of *supply chain contamination* was limited to Google, which upon the incident presented a -9,22% market value loss. It is possible that the different results are due to the specificities of the relations between the companies. While, in general, Foxconn concentrates on the manufacturing of electronic products to international brands, it

keeps an arguably more strategic relationship with Google, focusing on the development of robotics (Luk, 2014). At the same time manufacturing processes could be possibly more easily relocated to other factories, the development of long-term partnerships would be more static, factors that might have influenced investors' analysis. Nevertheless, the fact that the factory was closed upon the riot may be considered a case of supply chain glitch or disruption. From that angle, the absence of losses to major customers contradicts Hendricks and Singhal's (2003, 2005) evidence on the issue. In any case, it seems that the analysis was restricted to the potential operational losses, having the issue of poor working conditions offered to employees being apparently ignored. Adds to that the relatively large sample considered in this case. As shown in Table 10, 16 customers of Foxconn were investigated, enhancing the power of the analysis. In other words, the fact that the detection of *supply chain contamination* was an exception (i.e. evidenced in only one out of the 16 partners investigated) contributes to the understanding that, beyond the politically correct discourse, stakeholders may not be so sensitive to severe corporate social responsibility fails.

Case 13 – Bangladesh Fire, in turn, relates to the death of 112 workers in result of a fire in the Tazreen Fashions factory in Bangladesh, in November 2012 (Clean Clothes Campaign, 2017). Possibly due to a short circuit on the ground floor, the fire quickly spread throughout the building, leaving workers trapped by narrow or blocked fire escapes (Prentice and De Neve, 2017). Global brands were claimed to have production orders on the factory. Among the customers identified, only Sears accused market value losses upon the incident (-43,73%). A closer analysis of the stock price of the company, however, reveals that it already presented an abnormal fluctuation before the tragedy. The unusual behavior suggests that the reaction of investors may not be directly linked to the case. Yet, the lack of reaction for other companies is somehow intriguing, as the destruction of the factory and the consequent interruption of the production may be considered an example of permanent supply chain glitch or disruption. It

must be considered though the relatively small sample of the case. As shown in Table 10, six customers were tested, meaning that situations of *supply chain contamination* may have dodged the analysis. Once more, the neutrality of investors contradicts previous evidence on the issue. It is possible, however, that in face of the atomicity of production (i.e. the distribution of the production among a large number of small producers), the situation was not considered sufficiently relevant, and thus not capable to negatively affect the operation of customers. Within this reasoning, investors may have considered that future cash flows would not be negatively affected as no major operational problems such as a lower availability of products in stores were expected. The consideration of the incident as a minor supply chain glitch may at least partially explain investors' lack of response, even though a large number of people lost their lives and serious safety conditions came to public. It seems that possible consumers' boycotts to the brands linked to the case were also not priced, meaning that the revelation of calamitous safety conditions offered to employees was not considered relevant to alter the behavior of fast-fashion shoppers. The case corroborates the argument that consumers – as well as other stakeholders – may not be particularly concerned with corporate social irresponsibility issues, as long as they do not affect the availability, the price or the quality of the products they desire.

This logic may also possibly explain the lack of investors' reaction following the episode known as the Rana Plaza collapse (case 16), in which thousands of workers perished in consequence of extremely poor safety conditions (Manik and Yardley, 2013). Once more, global fashion brands were linked to the incident, putting the sustainability of fast-fashion business models into questioning. The investigation revealed that, despite the considerable media coverage, the release of several protests around the world, and the open debate on both traditional and social media, none of the identified customers suffered market value losses. Differently from case 13 – Bangladesh fire previously discussed, a relatively large sample of

16 customers was investigated (Table 10), what enhances the power of our conclusions. Once more, the lack of investors' reaction may denote consumers' indifference around the case.

Likewise, cases 11 – Zara Brazil and 15 – Zara Argentina both relate to the disclosure of poor working conditions held in Zara's suppliers in South America. Differently from the cases in which tragedies resulted in the death of a great number of workers (case 13 – Bangladesh fire and case 16 – Rana Plaza Collapse), these situations refer to continuous corporate social irresponsibility practices, which, despite conducted in the operations of a supplier, were associated to the Spanish company (Antunes, 2011; Roper, 2013). The two cases are similar as they both comprehend foreigners working under modern-day slavery conditions and underage labor (Burgen and Philips, 2011; Osborne, 2013). Despite the charges imposed by local governments (Govan, 2011), the engagement of non-governmental efforts (Rebossio, 2013), and the negative reaction of the media, none of the cases resulted in market value losses to Inditex (i.e. Zara's parent company). The consideration of a single customer in both cases (Table 10) may, however, limit the validity of our conclusions. Anyhow, cases 11 – Zara Brazil and 15 – Zara Argentina also endorse the view that stakeholders may not penalize corporate social irresponsibilities held by supply chain partners.

Still around the disclosure of corporate social irresponsibility practices, case 18 – CP Foods is associated to an investigation of British newspaper The Guardian, according to which shrimp sold in retailing chains in Europe and in the United States was linked to slavery practices in Asia (Hodal, Kelly and Lawrence, 2014). More specifically, distribution chains such as Walmart, Carrefour, Costco, and Tesco were claimed to supply shrimp products from Charoen Pokphand Foods (CP Foods), which, in turn, was argued to source sea food fished under slavery practices to feed part of their shrimp products. Still accordingly, the degrading slavery practices held by some of CP Foods' suppliers (small local fishers) included human traffic, physical

violence, and hunger regimes, among others. Despite the repercussion of the case, neither the retailing companies, nor Charoen Pokphand Foods suffered market value losses. Fast food chain McDonald's, however, was negatively impacted. The company that sources chicken products from the CP foods stands then as the only company affected by the case. Seven customers were analyzed (Table 10).

Supply chain contamination was also detected in cases 14 – Child labor, 17 – Pegatron and 19 – Samsung Malaysia. Case 14 – Child labor relates to the recognition by Apple that underage work was a common practice on its supply chain. Following an internal audit conducted along with the Fair Labor Association, Apple itself pointed to 11 different supplying factories which, all together, employed 106 children or teenagers under the minimum legal working age. Upon the revelation, the company suffered a -12,21% loss in its market value. The company was the only partner considered in the case (Table 10). Also involving Apples' supply chain, case 17 – Pegatron accounts for the communication of severe working conditions held in the production line of iPhones in the Pegatron factory, in China. An investigation held by British broadcast channel BBC in 2014 argued that employees facing 16 hours shifts were forced to work up to 18 days without the right to a day off. Beyond that, overcrowded dormitory rooms and child labor were also revealed. Apple, however, did not accuse market value losses. In fact, among the four Pegatron customers identified – Apple, Lenovo, Microsoft and Sony –, only the later was penalized upon the disclosure of the case, accounting for a loss of -9,12% of its market value. Due to the difficulty in identifying supply chain partners of the focal company, it is possible that other cases of *supply chain contamination* have not been revealed. Finally, case 19 – Samsung Malaysia regards the accusations faced by the Korean company of illegal confiscation of passports of Nepalese employees working in its Malaysian factory. Along that, allegations of exploration and underpayment were also raised against the company. Following the disclosure of the case, *supply chain contamination* was detected in two suppliers: Lot

Vacuum and Namuga, both headquartered in South-Korea (Bloomberg, 2018a, 2018b). While the former engages mainly in the provision of dry vacuum pumps for semiconductor manufacturing (Reuters, 2018a), the later focuses on the production of camera modules (Reuters, 2018b). In this sense, it seems that the geographic coincidences and the expertise of each company may contribute to their dependence in relation to Samsung. Despite the event does not have an operational nature, it is possible that this level of identification among companies shall facilitate eventual reputational spill overs, and, thus, contribute to investors' assessment that stock prices should be adjusted. Still, it is possible that investors have considered eventual sanctions to the operations of Samsung in Malaysia. In this scenario, the operational volume of suppliers could be indirectly affected, also justifying the decrease on their market value. The fact that 20 suppliers and 27 customers were investigated (Table 10) – representing, along with case 22 - Samsung Galaxy Note 7, the biggest sample for a single case – may have also contributed to the detection of the *supply chain contaminations* observed.

5.2.4. Operational Failure

Among the three cases classified as operational failure, in turn, only case 22 – Samsung Galaxy Note 7 negatively affected both the source company and supply chain partners. Following a series of explosions and combustion of the then newly released smartphone Samsung Galaxy Note 7, 26 reports of burns (up to second-degree) and 55 of property damage were linked to the malfunctioning of the battery of the product (Wang, 2016). The incidents triggered intensive attention in both traditional and social media. Beyond the negative publicity in newspapers, magazines, and television shows, several memes circulated on the internet, ridiculing the company. In response to the risks, security measures adopted by authorities included the prohibition of the Galaxy Note 7 in airplanes (Jansen, 2016) and the recall of the product (Wang,

2016). After some weeks of vacillation, Samsung opted to definitively end the production of the device (Cook, 2016). The announcement of the interruption resulted in a -7.44% decrease in the stock price of the company, and an estimated US\$ 5.5 billion loss in operating profits between the third quarter of 2016 and the first quarter of 2017 (Reuters, 2016).

In predicting the extended negative impact of the episode, Samsung promised to compensate component suppliers. The remittance measures proposed included the full payment for the parts already manufactured, unfinished components, and raw material bought to produce Galaxy Note 7 parts, beyond the eventual redirection of orders for other models (Reuters, 2016). The decisions, which may have aggravated the financial impact of the case, seems to denote Samsung's intentions to preserve its long-term relationship with its supply chain partners. Considered what seems to be a great level of interdependence among firms, a drawback of such proportions, however, would be indeed expected to disseminate. Results of the event studies conducted in Article 1 of the dissertation show that the Taiwanese touch panels company (Bloomberg, 2018c) Hanns Touch Solutions, for instance, experienced a -9.57% loss. Likewise, other Taiwanese technology suppliers such as Silicom Motion and Radiant Opto-Electronic suffered losses of -12.36% and -8.03%, respectively, while California-based Xilinx accounted for -5.37% on its stock price. In addition, Bed Bath and Beyond, a customer company of the retailing industry also lost -7.35% of its market value. Interestingly, however, none of the two suppliers previously affected by case – 19 Samsung Malaysia 11 (Lot Vacuum and Namuga), showed to be *contaminated* in this situation, even though they seem to have their expertises aligned with Samsung. The comparison between cases 19 – Samsung Malaysia and 22 – Samsung Galaxy Note 7 may be indeed useful, as both cases consider the same source company (i.e. Samsung), and the same sample of supply chain partners (20 suppliers and 27 customers, as shown in Table 10). Additionally, both events are temporarily close to each other, what adds

to the control of this possible variable, being, apparently, the sort of event the only relevant distinction between the two cases.

As previously discussed, the fact that both Lot Vacuum and Namuga are headquartered in South Korea may contribute to a stronger association with Samsung. The fact that these companies were affected upon the revelation of corporate social irresponsibility practices, and not when a flagship smartphone is discontinued, argues for an eventual reputational spill over in Case 19 – Samsung Malaysia, as investors may have considered a potential negative association to Korean companies in general. Similar mechanics seem to have taken place in the Volkswagen Dieselgate, in which the brand “Made in Germany” is argued to have been threatened (McGuinness, 2015). Within this perspective, the *supply chain contamination* observed would have a reputational nature. The argument is reinforced by the fact that it was restricted to Korean companies in case 19 – Samsung Malaysia and to non-Korean ones in case 22 – Samsung Galaxy Note 7. It is also possible that neither Lot Vacuum nor Namuga supplied parts specifically to the discontinued smartphone, or at least not at a significant volume. In this scenario, the lack of investors’ reaction in case 22 – Samsung Galaxy Note 7 would be due to the expectation that cash flows of these companies would not be affected. The evidence collected on the present investigation do not allow for such conclusion though, remaining the discussion within a speculative sphere.

Also inside the operational failure category, Case 20 – A380 accounts for the announcement by Airbus in May 2005 that the A380 superjumbo project was six months late for delivery (Deutsche Welle, 2005). Linked to operational difficulties in one of the main plants of the company in Hamburg, Germany, the announcement provoked reactions from some of the main customers of the company (Phillips, 2005). As pointed by the author, Singapore Airlines, Qantas, and Emirates signed that they expected compensations from Airbus. Despite the

complaints of airline companies, the communication did not cause negative reactions from investors. In turn, case 21 – Boeing 787 Dreamliner refers to the temporary interruption of the operations of all 787 Dreamliner, in January 2013. After a series of issues, the worldwide fleet of 787 Dreamliner was ordered to ground due to problems in the distribution system and electric power of the model (Ewalt, 2013). While Boeing suffered a -3,41% market value loss, the incident did not affect supply chain partners, including airline companies. The fact that these two cases involving the airline industry did not result in *supply chain contamination* is, at some measure, surprising. It is possible, for instance, that investors had already anticipated the operational problems, meaning they would be already priced.

5.2.5. Corporate Fraud

Gathered in the fifth category investigated, cases of corporate fraud have demonstrated mixed results. While *supply chain contamination* was perceived in cases 25 – Toshiba fraud and 26 – Volkswagen Fraud, negative impacts were restricted to the source firm in case 24 – Olympus fraud, and no impact on market value was observed neither for the source firm nor for supply chain partners in case 23 – Dynegy fraud. Even though these four cases represent types of fraud, they are structurally different. While the cases involving Toshiba, Dynegy, and Olympus are closer related to accounting manipulations, the issues involving Volkswagen comprehend what seems to be a rational handling of illegal features in the attempt to deceive consumers and authorities.

More specifically, case 25 – Toshiba fraud comprehends the overestimation of operating profits in around US\$ 1.2 billion between 2008 and 2014 (Du, 2015). On its initial statements on the issue, Toshiba recognized that they may had underreported the costs of some of its

infrastructure projects (Reuters, 2015), what was later detailed by an external audit (Carpenter, 2015). Toshiba, which was recognized for its apparent capacity to align profitability and corporate governance, is argued to have suffered serious damage to its reputation upon the revelation of the misconducts (Soble, 2015). The company accounted a -5.43% loss upon the scandal. The case, however, did not impact any of Toshiba`s suppliers, having the extended effects of the fraud been limited to Costco, a retailing customer accounting for a -3.58% deterioration on its market value. Results are intriguing as, while Toshiba was expected to be penalized, it seems that investors did not consider the disclosure of the case problematic to the operations or to the future cash flow of supply chain partners. Indeed, considering the arguable limited relevance of Toshiba in the portfolio of products of a large retail chain, it is possible that the losses observed in Costco stocks are not directly related to the fraud in the Japanese company. In that way, even though the empirical evidence allows for the classification of the case as a situation of *supply chain contamination*, it seems that its negative impacts were restricted to the source company. The relatively large sample of the case (10 suppliers and 11 customers) adds to the strength of our results. As discussed in the three articles of the dissertation, Case 26 – Volkswagen Fraud, in turn, caused a harsh effect not only for Volkswagen itself, but also to several supply chain partners and industry players. Possibly in reflex to the considerable repercussion of the case, the disclosure of the fraud sharply disseminated, having caused a wave of market value destruction. The case was discussed in greater details in article 3.

Case 24 – Olympus fraud stands for the admission of the Japanese company to have hidden losses on security investments for decades, situation revealed by its former CEO Michael Woodford after his resignation (Layne and Reynolds, 2011). In the occasion, Olympus claimed that the case related to the purchase of Gyrus, a British medical equipment maker in 2008. The US\$ 2.2 billion transaction would have involved US\$ 687 million in fees and payments that

summed US\$ 773 million for small domestic firms, values used for covering up losses (Layne and Reynolds, 2011). While the company suffered an outstanding market value loss of -62.89%, supply chain partners were not *contaminated*. Still within the corporate fraud category, Case 23 – Dynegy fraud refers to shareholders claims that, following severe financial problems after the collapse of Enron Inc., the American company disguised loans as energy trades in 2001 (Keoun, 2005). Results, however, show that neither Dynegy nor its supply chain partner were negatively affected upon the disclosure of the situation. Once more, the relatively small sample of the two cases (six customers and four suppliers, respectively) may have possibly prevented the detection of negative effects in supply chain partners not identified.

5.2.6. Corporate Corruption

Events related to the disclosure of corporate corruption have also shown mixed results, with case 30 – GlaxoSmithKline being the only one in which *supply chain contamination* was observed. The case comprehends accusations raised by Chinese investigators that the British pharmaceutical company had bribed doctors and hospitals to promote their products. The company was fined in US\$ 490 million after being convicted by the Chinese justice (BBC, 2014). Results show that, upon the emergence of the case, the company lost -2,97% of its market value, while supplier Exelxis accounted for a loss of -12,39%. It is possible that the issues have signed serious difficulties for GlaxoSmithKline in the Chinese market. In that way, the decrease in sales would be indeed expected to disseminate in the supply chain, as the diminishment of production volumes would be shared by distinct players. The reasoning would at least partially explain the *supply chain contamination* observed.

In Case 29 – Rolls-royce, the British aerospace and defense company was accused of having bribed the son of Indonesia's former president general Suharto, with US\$ 20 million and a Rolls-Royce car in the 1980s and 1990s (Neate, 2013). As discussed by the author, the initiative was held to facilitate the sale of 700 airplane engines to the Indonesian national airline Garuda. Results show that Rolls-Royce lost -6.34% of its market value, having the damage, however, not *contaminated* any of the supply chain partners investigated. In Case 28 – HP, employees of the American technology company were accused to have bribed governmental officials in Poland, Russia and Mexico to win and retain public contracts (Garside, 2014). Accordingly, the company agreed to pay US\$ 108 million to US regulators to settle the case. The disclosure of the corruption scheme, however, did not affect the market value of Hewlett-Packard. Nevertheless, Nvidia, one of its suppliers, presented losses of -8.62% The case tested 4 suppliers. Finally, the accusations of bribery against Siemens in 2006 did not cause negative effects neither to the company nor to its supply chain partners. Results are surprising, considered that a couple of years later the company agreed to pay US\$ 1.6 billion to settle the case that comprehended accusations of corruptive behavior in different parts of the world, in countries such as Iraq, Venezuela, Bangladesh, Israel, and Russia (O'Reilly and Matussek, 2008).

5.3. Contributions

As discussed throughout the text, supply chain management literature seems to favor the study of factors that either contribute or disturb the efficient flows of goods, funds, and information across partners. A differentiation between traditional and event-based approaches may be drawn, however, particularly around the distinct time dimensions concerned. While elements relating to the adoption and exercise of operational practices (i.e. traditional approaches) might contribute to performance in the long run, corporate events may have a sudden and immediate impact. The virtually inexistent time gap between causes and effects may, in that way, favor cross-sectional investigations for the latter. Not by chance, the studies of Hendricks and Singhal (2003, 2005) have focused on measuring the effects of supply chain glitches and disruptions to shareholders' wealth as a form to evaluate the impact of those incidents. In face of the potential unpredictability of such happenings, it must be argued that considerations on these matters do not properly refer to the planning and implementation of well established supply chain management recommendations, but rather, to the exploration of a source of instability to firms. From this reasoning, event-based investigations shall be positioned as a specific sub-field within the supply chain risk management literature, just as the contributions of this dissertation.

Within this set, this study contributes by stretching the scope of such sort of analysis beyond the interruption of physical flows. The investigation of cases of corporate social and environmental irresponsibilities, for instance, encompasses some of the most pressing issues faced by firms, particularly in supply chain contexts. Not necessarily related to glitches and disruptions, the issues arising from these cases are, apparently, of a reputational nature. Likewise, cases of fraud and corruption shall be also linked to potential damages to the reputation of companies involved. The focus on less immediate issues add to the view that supply chains stand for more than the complex arrangement of companies towards common

operational goals. In fact, the demonstration that different sorts of negative corporate events may disseminate across partners extends the analysis of risk to which companies inserted in supply chain contexts must be exposed.

In parallel with this extension, the dissertation also contributes to the comprehension of supply chain structures as potential antecedents of uncertainty. Traditionally linked to oscillations in demand and inventory orders, the complexity of supply chain systems, for example, is argued to cause loss in operational performance, leading to “late deliveries, order cancellations and an increased reliance on inventory to buffer these effects” (Wilding, 1998: 599). As discussed by Bode and Wagner (2015), in turn, the frequency of upstream supply chain disruption would be favored by the horizontal, vertical, and spatial complexities of such arrangements. A similar vision is offered by Craighead, Blackhurst, Rungtusanatham and Handfield (2007), who link supply chain complexity to the severity of disruptions. In that direction, Serdarasan (2013) highlights the distinction between static and dynamic supply chain complexity. As pointed by the author, while the former relates to the structural aspects of the supply chain (i.e. the number and the diversity of its constituents, and the strength of the interactions between them), the latter refers to uncertainty, encompassing the aspects of time and randomness. The division would be useful in the classification of supply chain complexity drivers, as they would have different origins and effects in distinct types of arrangements.

From this reasoning, it must be argued that the grouping of the 30 events investigated by nature contributes to the understanding of the static aspects of supply chain complexity. Considering, for instance, that relatively similar cases of corporate social irresponsibility caused markedly distinctive results in supply chains of different industries (i.e. fast fashion and electronics), results suggest that instability in supply chain contexts is not limited to a specific sort of fail, but actually to the structure of supply chains, the nature of relations kept by its

members, and the market in which they are inserted, among other factors. Yet, from the dynamic aspect, the study contributes as it analyzes negative events, which, by definition, are not predictable. It must be argued then that the disclosure of poor working conditions by newspapers and TV broadcast, the collapse of factories, oil spills, riots, as well as all the other different origins of negative events, are, to some degree, aleatory and random. The approach of the dissertation may be seen thus as an initial step on the study of new forms of supply chain complexity.

As also discussed before, the three articles of the dissertation propose empirical tests over the extended effects of negative events. Considered the intrinsic hypothesis that the disclosure of adverse news or incidents involving a company may indirectly affect its supply chain partners, this investigation was primarily focused on the detection and measurement of such effects. Within a positivist perspective and under the premises of the Efficient Market Hypothesis, the method of event study was employed as, through the examination of stock price returns, it may provide evidence on that direction. While the employment of the event study method is typical in studies of finance, its application on investigations focused on other disciplines, particularly operations management, is relatively less common. In that way, its utilization in assorted contexts may add to its diffusion, and eventually to its augmented application in the future. It is possible, for instance, that supply chain management scholars find in the event study method a valuable tool for tests of distinct natures, adding to its present applications in the field.

Advancements on the development of the method, however, have not been on the scope the present investigations, with no direct innovation on its operationalization being proposed. Instead, the method was applied following relatively clear directions (e.g. Fama, 1970; Brown and Warner, 1980; Campbell, Lo and MacKinlay, 1997). The specific contribution of the

dissertation to the application of the method relies then to its use within a supply chain management context, in the hope that, just like Hendricks and Singhal (2003, 2005) have previously done, it comes to serve as an antecedent for future research. It must be noted, however, that the use of a sedimented and well-accepted method in an investigation may contribute to the significance of its results, as the techniques have been largely stressed in different studies, and thus improved. In this vein, even though none of the three articles contribute directly to the technical development of the event study method, a close application of its procedures and routines renders arguably solid empirical evidence.

A significant methodological contribution of the dissertation rests though on the application of the documentary research in the identification of supply chain partners to be tested. Potentially one of the main difficulties in conducting studies that have supply chains as the unit of analysis, the determination of the links between companies has shown to be particularly laborious. The use of a method more commonly employed in studies of History (i.e. documentary research) proved to be useful for the recognition of both upstream and downstream partners, for the documentation of evidence of their linkages, and for the comprehension of the events analyzed. Along with that, the sampling procedures adopted may be convenient for future research, mainly considered the employment of electronic data bases of newspapers. Even if relatively simple, the techniques and specially the words (and combination of words) used may serve as a reference for studies searching to gather secondary data on the effects of negative corporate events in supply chains.

As the results emerged and the analysis advanced, however, the lack of conceptual and theoretical developments seemed to become progressively evident. In face of the perception that these gaps could hamper the understanding of results and the dialogue with previous works, the objectives of the investigation, although secondarily, were extended to the proposition of

both conceptual and theoretical developments. The comprehension that improvements on that direction would be necessary may reflect the fact that the event-based literature seems to be constructed on an empirical basis, in a way that the assorted analysis on the theme remain, in general, focused on the provision of factual observation. This situation shall make it difficult for a more directed debate to emerge, as the absence of a language accepted and shared among researches shall result in the impossibility to classify the observed phenomena in a standardized form. This lack of convergence, which might be expected in emerging fields, prevents the comparison between different situations, relegating the investigations around the impact of corporate events to isolated disciplines, or, academic silos. The situation must be particularly critical to studies within supply chain contexts, as analysis on these frameworks count on their own specificities. Nevertheless, at the same time the investigation of *collateral effects* of events on supply chain partners must be also considered a sub-field within the event-based literature, this condition may favor the development of a more easily accepted terminology. In that way, beyond the extension of empirical evidence, the present dissertation contributes to the conceptual development of the literature, proposing terminologies, analogies and a metaphorical transfer that may be useful in the future reference to the identified consequences of corporate events for not directly related companies.

The concept of *supply chain contamination* is here developed then to account for situations in which a given company is affected by an event occurred in or caused by a member of its supply chain. The concept makes reference to the possibility of a company to be indirectly affected by a fact originated beyond its organizational borders, and thus, theoretically outside of its control. By employing the word “contamination”, the concept makes reference to the possibility of living beings to acquire a disease as they get in contact with other affected individuals. When considered inside a supply chain context, the contact between companies would relate to the fact of pertaining to the same supply chain. The concept was developed in

the first article of the dissertation, in referring to those cases in which at least one company had its market value affected by the disclosure of a negative event occurred in or caused by a supply chain partner (i.e. source firm). The respect to these conditions allows the analogy with the transmission of illnesses between human beings, for example. The perception that one firm must be “contaminated” by another may lead to the development of new perceptions around supply chain risk. In refereeing to this possible instability, future studies on the theme may employ the concept of *supply chain contamination* to denominate results. In fact, depending on the scope of the study in question, the reduced term *contamination* must be also useful. That would be the case for studies investigating the dissemination of negative events to companies other than supply chain partner, such as competitors, for instance.

Along with the notion that a *contamination* is intrinsically negative and, beyond that, an undesirable and possibly uncontrollable outcome, it is classified in the first article as a *collateral effect*. The concept is developed to represent the indirect consequences that a negative event may trigger beyond the organization sourcing it. Indeed, any consequence that has not been planned and / or predicted may be classified in the same way, even if consecutions remain inside the company originating it. Although specifically developed to adjectivize the phenomenon within supply chain contexts, the concept may be convenient in the classification of assorted situations. Still, considering that risk is linked to variability of outcomes, the term may be useful for the risk management literature in general, with future studies possibly employing the terminology in reference to instabilities or deviations to predicted results.

While the concepts of *supply chain contamination* and *collateral effect* must be useful in pointing the consequences of a negative event within supply chain contexts, the conceptualization of the *inertial effect* refers to the process through which a negative event occurred in a company may evolve to affect others. As previously discussed, this notion is

developed through the analogy of “the waves caused by a stone that hits the water previously rested” (Fracarolli Nunes and Lee Park, 2016: 292), being formalized as a metaphorical transfer. By linking the dissemination of a negative event to an image that shall be relatively easily constructed, the conceptualization of the *inertial effect* may contribute to the comprehension of a process that is not yet fully understood. If, by one side, the conditions allowing for such dissemination are still not clear, the attachment of its dynamics to that of a well-known phenomenon may support investigations on the issue, even if the detailed sequence of events and the contextual conditions allowing for its occurrence remain unclear. It is possible that the study of the ways through which negative events disseminate come to be extremely complex, demanding a more intense analysis of contexts. While this step is certainly necessary and must significantly add to the comprehension of the phenomenon, it shall stretch for a considerable period, preventing the development of the literature. From this angle, the analogy and the respective metaphorical transfer proposed may be seen as a temporary bridge, which must be useful while the details of the process remain relatively obscure.

In turn, proposing that distinct players may be considered stakeholders of a company even if they do not have the intention to be one, the concept of *incidental stakeholder* is developed in the second article of the dissertation. Building on Freeman’s (1984) proposition that the notion of stakeholder represents any person or entity capable to either affect or be affected by the operations of a company, the rationale that investors of supply chain partners must configure *incidental stakeholders* is built. In this sense, beyond the development of the concept all alone, the idea supports the use of an alternative version of the stakeholder model (i.e. Supply Chain Extended Stakeholder Model), as an initial theoretical comprehension over the dynamics leading negative events to cause *collateral effects* across supply chains. The empirical tests proposed in the three articles may thus be considered a confirmation of this possibility. In face

of the results of the study and considering these contributions, we answer the main and the subsidiary overarching research questions of the dissertation as follows:

(1) Beyond the interruption of physical flows (i.e. supply chain glitches and disruptions), do negative events disseminate across supply chain partners (i.e. supply chain contamination)?

As shown in Table 10, of the 30 cases investigated, supply chain partners were affected by negative events occurred in or caused by another company in 14, representing 46,67% of the total. Table 10 also shows that from the 325 supply chain partners considered, 35 were negatively affected (10.37%). The evidence allows the conclusion that negative events not directly related to glitches and disruptions may indeed disseminate across supply chains. In this sense, **the answer to the main research question of the dissertation is positive**. Nevertheless, two main limitations must be anticipated. Firstly, the relatively small sample investigated does not allow for the generalization of results, in a way that it is not yet possible to propose a general theory for the phenomenon observed. It is arguable, for instance, that results have been determined by specific aspects of each case. This restriction shall only be overcome as new studies com to be conducted in the building of a more robust body of literature, including qualitative analyzes. As more cases are investigated and new perspectives are proposed, the specific and general dimensions of each case tend to be segregated, allowing the sketch of a general theory in the future, if that is the case. From this side, our positive answer signs to the possibility of dissemination, more than to a comprehensive and rigid rule of its happening.

Secondly, it must be considered that, strictly, the term *contamination* is only valid for the allusion of anything negative being transmitted from on individual to another. When brought to the context of our study, this could be interpreted as if only cases in which both the source firm and at least one partner were adversely affected were to be considered forms of *supply*

chain contamination. On that regard, the first article considers four types of possible outcomes: (1) both source firms and supply chain partners are negatively affected; (2) only source firms are negatively affected; (3) only supply chain partners are negatively affected; and (4) neither source firms, nor supply chain partners are negatively affected. These situations, along with the cases fitting each, are presented in Figure 15, classified as groups 1, 2, 3 and 4 respectively.

Still, although not using the term directly, by focusing only on the Volkswagen Dieselgate, the third article also fits this rule. As previously discussed, however, the paper concentrates on the impact of the case to the American automotive industry, meaning that the supply chain level considered is not necessarily composed by suppliers of Volkswagen. Instead, the sampling criteria was based on the Standard Industrial Classification (SIC) codes 3711 (motor vehicle and passenger car bodies) and 3714 (motor vehicle parts and accessories), with the first standing as the industry level and the latter as the supply chain level of analysis. Based on the evidence of relationship provided in the Appendix A of Article 1, out of the 26 companies under SIC code 3714 considered, only six were suppliers of Volkswagen (American Axle & Mfg Hlgs Inc, Borgwarner Inc, Honeywell International Inc, Lear Corp, Meritor Inc and Visteon Corp). From these sub-sample, only Honeywell International Inc. showed to be *contaminated*.

If this more rigorous criterion for classifying cases of *supply chain contamination* is adopted, only the results of the first and third studies can be considered, since in the second article the premise of testing only cases in which source firms were publicly traded was relaxed. In this situation we would have seven out of the 20 cases (removed the 10 cases exclusive of Article 2) presenting *supply chain contamination* (35%), being, along with the eight source firms considered, 25 out of the 287 supply chain partners investigated negatively affected (8.71%). It must be noted that one supplier of Volkswagen was found to be contaminated in the second article, but not in the first because of the different event windows considered.

Nevertheless, results of the second article may not be neglected, particularly those which focus on negative events emerging from small supply chain partners with little or no reputational capital. Instead, these conditions must work as a potential contrast to the cases in which source firms are large and publicly listed, leading to the suggestion of factors that might lead to *supply chain contamination*, as pointed next in the answer to the dissertation's first subsidiary research question.

(2) *What are the factors influencing the occurrence of supply chain contamination?*

The discussion of each individual case, as well as of the categories in which they are inserted led to the identification of some factors which seem to contribute to the dissemination of negative events across supply chain partners. It must be noted, however, that these analyses are not statistically tested, mainly due to the relatively small sample of the study. The answers to both subsidiary questions are based then on the perception of the researcher, or, in other words, on a subjective approach. Initially, it might be considered the nature of the events. Even though a comparison between the different types of events is not direct, the distinct proportions of partners affected in each category might allow an initial debate on that matter. Based on our results, Table 11 ahead presents the different proportions of *supply chain contamination* across the categories analyzed, considering the ratios for total number of cases, supply chain partners, suppliers, and customers.

Table 11: Supply Chain Contamination Proportion across Studied Categories

Category	Proportions of cases – Supply chain contamination	Proportion of Supply Chain Partners Contaminated	Proportions of suppliers contaminated	Proportions of customers contaminated
Environmental Disaster	50.00% (2/4)	10.00% (4/40)	10.81% (4/37)	0.00% (0/3)
Corporate Environmental Irresponsibility	16.67% (1/6)	7.41% (2/27)	20.00% (2/10)	0.00% (0/17)
Corporate Social Irresponsibility	66.67% (6/9)	8.08% (8/99)	10.00% (2/20)	7.59% (6/79)
Operational Failure	33.33% (1/3)	6.33% (5/79)	12.50% (4/32)	2.13% (1/47)
Corporate Fraud	50.00% (2/4)	21.21% (14/66)	27.08% (13/48)	5.56% (1/18)
Corporate Corruption	50.00% (2/4)	14.29% (2/14)	18.18% (2/11)	0.00% (0/3)

From the data, it seems that cases of corporate social irresponsibility are the most likely to cause negative effects in supply chain partners. Given the publicity of the cases, this perception is not surprising, even if cases of *supply chain contamination* are more concentrated on companies of the electronic industry. As discussed, it is possible that consumers of this specific market happen to be more sensible to the issue, as most of the cases within the fast fashion business model did not cause negative reactions from investors of supply chain partners. On the other hand, proportions also show the mixed results in cases comprehending environmental disasters, corporate fraud and corporate corruption, all with 50% of the cases representing situations of *supply chain contamination*. *A priori*, the fact that *supply chain contamination* was detected in half of the cases within these categories suggests a neutrality of their nature, with possibly no distinguishable pattern or tendency. In turn, cases of operational failures seem to be less prone to disseminate across supply chains, with one third of the cases being on this situation. Such result is intriguing as this category is the closest to cases of supply chain glitches

and disruptions, which, as previously discussed, represent a significant portion of the event-based literature on supply chain management. These results also justify the present dissertation, as they show the relevance of other types of events. Finally, cases of environmental irresponsibility figure as the least likely to cause *supply chain contamination*, as only one of the six events within these categories negatively affected supply chain partners. The results are in fact unforeseen, particularly if the strength of the campaigns held by environmentalist group Greenpeace are considered. In face of the distinct results presented in each of the six categories analyzed, we propose that **nature of the event** as the first factor capable to influence the occurrence of *supply chain contamination*.

Next, it must be considered the different impact of each incident, even when they are classified within the same category. Considering an apparent correlation between the level of the damage caused and the reaction of investors, it seems that the **severity of effects** may be one factor influencing the *contamination* of supply chain partners. That may be one of the reasons for the different results observed in the category of environmental disasters, in which, despite the similarities of the incidents, *supply chain contamination* was detected in cases 2 - BP Oil spill and 4 - Samarco Tailings Dam Collapse, but not in cases 1 - Exxon Valdez and 3 - Rena Oil spill. As discussed, the environmental damage of cases 2 and 4 are considerably more intense than those of cases 1 and 3. Within this set, it is possible that the different results are related to the degree of the damage caused in each case. As also discussed, **the estimated cost of the incidents for the source company** considerably differs among the cases: case 1 - Exxon Valdez: USD 4.3 billion; case 2 - BP Oil Spill - USD 53.8 billion, case 3 - Rena Oil Spill: USD 235 million; case 4 - Samarco Tailings Dam Collapse: US\$5.26 billion. *Supply chain contamination* was observed in the two incidents with the highest estimated cost. It is possible that this discrepancy also influenced the different reactions of investors of supply chain partners.

When it comes to cases of corporate environmental irresponsibility, one major difference between cases 7 – Shell Nigeria (in which *supply chain contamination* was observed) and all the others is that, while case 7 refers to menaces to human health, cases related to the use of palm oil (case 5 – Palm Oil – Unilever; case 6 – Palm Oil – Nestlé; case 10 – Palm Oil – P&G), and to other issues associated with the deforestation of tropical forests (case 8 – Junking the Jungle; case 9 – Licence to Kill) refer to the risk to wildlife. It is possible that the **risk to human health / life** is then another factor influencing the reaction of investors. This perception is reinforced by the fact that human lives were lost in both cases of environmental disaster that resulted in *supply chain contamination*.

This factor is, however, challenged by the cases of corporate social irresponsibility investigated. As discussed, despite causing the death and injury of more than 3,600 people, case 16 – Rana Plaza Collapse did not result in losses to any of the 16 customers identified. Likewise, cases of modern slavery in the fast fashion industry (case 11 – Zara Brazil and case 15 – Zara Argentina) also did not lead to market value depreciation. In fact, only case 13 – Bangladesh Fire – which resulted in the death of 112 people – resulted in losses to supply chain partners within fast fashion business models. Nevertheless, when it comes to similar situations in the electronics industry, supply chain partners have been markedly more impacted, as shown in cases 12 – Foxconn Riots, 14 – Child Labor, 17 – Pegatron, and 19 – Samsung Malaysia. This suggests that, more than the type of offense to corporate social responsibility principles (modern slavery, child labour, poor safety conditions), the **industry** in which they occur seems to be a factor leading to impacts in the supply chain.

This argument may be useful in the comprehension of the different results observed for cases of operational failure. While cases 20 – A380 Delay and 21 – Boeing 787 Dreamliner – both within the airline industry – did not cause negative effects to supply chain partners, case 22 –

Samsung Galaxy Note 7, in the electronics industry, is representative of *supply chain contamination*. Indeed, it seems that companies directly or indirectly linked to the production of electronic products are more willing to be contaminated, as results for cases 25 – Toshiba Fraud and 28 - HP also negatively affected supply chain partners. The exception within the electronic industry is case 24 – Olympus fraud which had its impact restricted to the source firm. Likewise, the factors of the **severity of consequences, the estimated cost of the incidents for the companies** and **risk to human health / life** seem to be all present in the case 26 - Volkswagen Fraud, possibly explaining the harsh reaction of investors of supply chain partners. It is not possible to analyze it around the **industry** factor, as the case is the only one inside the automotive industry. In that way, in answer to the first subsidiary research question, five factors possibly influencing the dissemination of negative events in supply chains are here proposed: **the nature of the event, the severity of consequences, the estimated cost of the incident for the source company, the risk to human health / life and industry**. Beyond that, three additional factors (disclosure, supply chain relation and crisis management) are proposed as being influent in that direction, even if their consideration is not systematically anchored in the analysis of our results. In face of the relevance they demonstrated to have throughout the investigation process though, they are here argued to add to a more complete understanding of contamination in supply chains. Along with the presentation of these eight factors altogether, elements composing them are suggested in Table 12 below, anticipating potentially relevant topics to be treated in future research (further detailed in the sub-section dedicated to this issue ahead in the text).

Table 12: Factors and Elements Influencing Contamination in Supply Chain Contexts

Factors influencing supply chain contamination	Elements
Factor 1 – Nature of the event	Element 1.1 – Causes Element 1.2 – Predictability Element 1.3 – Preventability Element 1.4 – Ineditism / Recurrence Element 1.5 – Ethical Assessment
Factor 2 – Severity of effects	Element 2.1 – Permanent / Repairable Element 2.2 – Time of reparation
Factor 3 – Estimated cost of the incidents for the source company	Element 3.1 – Legal consequences Element 3.2 – Tangible costs (infrastructure, assets) Element 3.3 – Intangible costs (corporate image, reputation, credibility, trustworthiness)
Factor 4 – Risk to human health / life	Element 4.1 – Short-term (immediate losses) Element 4.2 – Long-term (soil and water contamination)
Factor 5 – Industry	Element 5.1 – Attitude towards firms of specific industries
Factor 6 – Disclosure	Element 6.1 – Disclosure vehicle (traditional / social media) Element 6.2 – Obscure interests Element 6.3 – Rumors
Factor 7 – Supply chain relation	Element 7.1 – Proximity of partners Element 7.2 – Association between partners
Factor 8 – Crisis management	Element 8.1 – Response used (e.g. apology, justification, scapegoating, denial, excuse (Coombs, 2006)) Element 8.2 – Speed of response

(3) *What sort of supply chain players (i.e. buyers and suppliers) are more willing to be contaminated?*

As shown in Table 11, the 325 supply chain partners investigated in the 30 cases are divided in 158 suppliers (48.62%) and 167 customers (51.38%). Within the suppliers' group, 27 were contaminated (17.09%), while in the customers group only eight were negatively affected (4.79%). Considering that the proportion of suppliers and customers is relatively balanced in the total sample of the study, the different percentage of *contamination* between the two groups

suggests that suppliers are more likely to be *contaminated* by negative events in supply chains. When analyzed within categories, it seems that the nature of the event does not influence these outcomes. Suppliers have thus been proportionally more affected in all the six categories analyzed, what reinforces our conclusions.

In fact, the dissertation is built in the intersection of fields and theories which are not usually contrasted, what may turn the comprehension of its positioning and the identification of the literatures it dialogues with less discernible. We argue, however, that all the distinct frames and methods employed (e.g. Stakeholder Theory, corporate social and environmental responsibility, Efficient Market Hypothesis, event study, documentary research, formalization of metaphorical transfer) were supportive to the investigation of the extended consequences of negative corporate events among upstream and downstream partners of a source firm. In this same orientation, diverse literatures were also addressed, including that dedicated to the current relevance of social networks and peer-to-peer communication and the insertion of outsourcing strategies in the historical and geopolitical dynamics post-cold war, as these debates were necessary for both an adequate contextualization of the present investigation and the understanding of its motivations.

Likewise, the connection of the research to the environmental conditions surrounding it is also intended to link theory and practice, in a way that the impacts of the dissertation to managers and scholars become more accessible. Yet, at the same time the construction of this more extended view of the relations kept between our specific interests and the general context they are inserted in must be useful in the understanding of the reasons justifying the investigation, it may also demand the determination and clarification of the scope of the work at the academic level, task that we seek to fulfill with the present discussion. In any case, independently of the multitude of theories, concepts, methods and literatures accessed in the

conduction of the present work, it must be noted that our interest and main focus remained limited to the investigation of a phenomenon in a supply chain context, being thus our contributions and main dialogue directed to the supply chain management literature.

More specifically, the dissertation (as well as the three articles composing it) relayed on a series of distinct debates in order to provide the pillars for two main objectives: (1) testing for the extended effects of negative events (beyond glitches and disruptions) in supply chain partners (main overarching research question); and (2) build an initial comprehension of the process through which these extended effects may take place (subsidiary overarching research questions). While this first objective represents an intrinsically empirical analysis of a cause-effect relation, the second demands a further discussion of the outcomes, with the specificities of the cases investigated being important in the explanation of the reality observed. In other words, if the detection and measure of negative effects (objective 1) is direct, the explanation of the results (objective 2) is dependent on the assessment of the researcher, being thus, to some point, the result of his own interpretation.

Strictly, one may argue that these two goals are coherent with the ontological positioning of the dissertation, once an external reality is considered to exist in both. Nevertheless, it is possible that inside the objectivist tradition, only the first objective would be considered a valid scientific inquiry, with the results of the second figuring as speculative. Indeed, at the same time the pursuit of the first objective would stand for a deductive approach (a test of the implicit hypothesis that negative events disseminate across supply chains), the second would be rather inductive, as generalizations, such as that of the inertial effect, are created from the specific cases studied. In this way, the dissertation would somehow occupy a "grey area" between confirmation and proposition, with this tension possibly contributing to the difficulties in the comprehension of its contributions.

So, even if its main discussion and structural positioning is around supply chains and supply chain management in general, it treats situations that are unusual and punctual in the operations of such arrangements. The specificities of negative events (and that of their consequences) do not seem to compose the mainstream supply chain management literature, as this, as discussed throughout the text, would be primarily concerned with the enhancement and synchronization of flows (e.g. physical, informational, financial), the definition of what a supply chain is (and is not), the forms of relationships between companies, the equalization of economic, social and environmental goals (i.e. sustainable supply chain management), and broadly, the search for operational performance. Even if the evolution of the field has brought important developments in terms of risk management, the consequences of negative events are still basically restricted to the interruption of physical flows and to other operational related instances. This arguably narrow scope is illustrated in the works of Hendricks and Singhal (2003, 2005), as well as in the other studies presented in Chart 2.

From this angle, the empirical contribution of the dissertation would be mainly related to the extension of this sphere of themes and subjects. The investigation of issues usually neglected, or at least not intensively treated by the traditional supply chain management literature (i.e. environmental disasters, corporate social and environmental irresponsibilities, operational failures, corporate fraud, and corruption) would add then to the insertion of more holistic perspectives. The extension of purely operational matters to other more aligned with the diverse interests of societies calls then for the consideration of theoretical developments capable to support it. From this need, the main elements of the Stakeholder Theory are revised, and re-interpreted in the figure of the Supply Chain Extended Stakeholder model proposed. In this direction, the joint consideration of classic supply chain architectures proposed by Mentzer, DeWitt, Keebler, Min, Nix, Smith and Zacharia (2001) and the Stakeholder Model developed by Donaldson and Preston (1995) led to what may be understood as a theoretical contribution

to the literatures of supply chain management and that associated with a stakeholder perspective.

As discussed, beyond testing for and providing empirical evidence of such effects, the dissertation intended to offer initial theorization over the process leading an event occurred in or caused by a source firm to affect its supply chain partners. The concepts of *supply chain contamination*, *the inertial effect*, *collateral effects* and *incidental stakeholders* were developed to accommodate this idea. As also stressed in the articles and in body of the text, the demonstration of such effects was possible through the application of the event study method. The preference was motivated, among other reasons, by its strong empirical basis and its large acceptance in the literatures of finance and economics as the adequate apparatus to be employed in the investigation of the impact of relevant news (positive and negative). As previously discussed, even if no contribution was particularly added to the method, its employment represents an additional evidence in the consolidation of the Efficient Market Hypothesis, and particularly around its use in the present work, may be useful for supply chain management scholars in future applications.

5.4. Practical Relevance

In addition to the developments discussed above, the present dissertation seeks to offer perspectives of practical utility. Along with the translation of the results into a pragmatic view, the concern with this functional aspect comes from the understanding of research as an instrument of social transformation. Despite this goal may be also served by purely theoretical and abstract conclusions, the focus on the immediate contributions of a study shortens the period between the investment and the return to society. The desire to contribute to practical applications stems then from author's recognition that the conditions for the performance of his work were given by the commonality. Within this perception, it is important that his contributions are generous and not directed at a specific group more directly interested. In that way, beyond the contributions to managers and investors, the results and the discussions proposed here are also directed at consumers, regulators, politicians, and society in general. Indeed, based on the primary factual nature of the research data – both with regard to the information of the cases studied and the market data analyzed – the translation of results into contributions that may be useful to the various social agents should be facilitated. The focus of this session is thus multidisciplinary, with the discussion being built around the aspects that may be more directly related to the improvement of management practices and to the comprehension of the consequences of business activities.

In that way, this study contributes to the understanding of emblematic cases within the Management literature, in a way that the evidence proposed here may be useful in the conduction of similar business situations in the future. The investigation of the 30 events through new angles may thus add to their historical recovery, facilitating their incorporation in business debate. Although the dissertation does not stand as a detailed reconstruction of the contexts in which each situation occurred – what would be expected from a more

comprehensive qualitative study – its results provide arguments intended to go beyond the more direct aspects associated to the negative events analyzed.

With regard to case 1 – Exxon Valdez, for example, media considerations around the incident were more closely linked to its environmental impact and to the company's response to remedy the damage. Despite issues related to the economic impact to local populations emerged over time, public debate seems to have focused on sustainability related issues, although several other issues were present. The same seems to be true for the other cases of environmental disasters investigated, which all had the analysis of their impacts restricted to those more obvious outcomes. The demonstration, however, that supply chain partners were negatively affected in cases 2 – BP Oil Spill and 4 – Samarco Tailings Dam Collapse adds a new dimension on the matter. In this way, the investigation of the consequences of the incidents may be extended, with the gravity of each one being possibly reconsidered. It must be weighed, for example, that the dissemination of negative events may compromise the capacity of supply chain partners to maintain their operational levels. The diminishment in their production shall, among other things, result in the dismissal of employees, deepening the social consequences of disasters beyond the geographical region where they took place. The consideration of this sort of consequence may be useful for a more accurate scheme of indemnities, which could, for example, include the compensation of upstream and downstream players.

Still on the category of environmental disaster, it is somehow curious that most of the attention dedicated to the incidents was directed to their results, while causes were relatively ignored. The fact that case 1 – Exxon Valdez was probably caused by an alcoholic captain, for example, did not receive so much consideration. Likewise, the interest on the fails that led to the other incidents seem to be restricted to authorities investigating them. A better understanding of the factors concurring for such happenings would be certainly useful so that

similar situations can be avoided in the future. Although also focused on the detection and measurement of effects, the conducted documentary analysis gathered information around the causes of the incidents. Even if based on secondary data, this may have an important contribution for practitioners interested in a more approachable view of the cases.

In turn, the demonstration that cases of corporate social and environmental irresponsibilities are, in general, less damaging to supply chain partners than expected suggests that these issues may not be so relevant for some stakeholders. In that direction, the fact that cases of modern slavery, child labor, and poor working conditions triggered *supply chain contamination* in the electronics industry but not in the fast-fashion one signs that the effect of these issues is mediated by the industry where they take place. Still, among other reasons, this may represent the different perception of the stakeholders of each market, with consumers of electronics being apparently more sensible to these matters. The evidence may be useful for more accurate investments in the building of consumer awareness. Possibly, with the continuous expositions of the conditions in which many of the workers of the fast fashion industry are inserted, consumers will be less willing to profit from the low cost of this products.

The recognition that consumers may be ultimately responsible for the poor working conditions would be important in the solution of the issue. As previously discussed, however, the present study does not allow for such conclusion. The provision of this sort of result would be important to avoid the building of narratives which sometimes place companies as the only entities responsible for the disrespect of human rights. The notion that consumers' self-interests for low-cost products may drive them to ignore the degrading conditions offered to workers may be somehow disturbing, yet important in overcoming the problem.

Considering that, in general, the negative events here approached are extreme business situations, the analysis of their consequences may be useful for the evaluation of companies'

responses. In this sense, the results and discussions may be also useful for the improvement of crisis management. Yet, by approaching cases of corporate fraud and corruption, for instance, the study inserts in the supply chain management literature issues usually neglected by the field.

Beyond this more immediate considerations, the aggregated results demonstrated previously must also contribute to players indirectly related to the examination of business activities. It is possible, for instance, that upon the financial modeling of new projects or investments, analysts may consider the possibility of *supply chain contamination*. Although the presented results do not allow the determination of more refined measures, such as the probability of occurrence of negative events, it offers initial evidence on the different ranges of collateral damage that they might cause. The recognition of these sources of risk may contribute to the refinement of investment pricing, and then to the assertiveness of decisions. Likewise, the consideration may be useful for players of the financial market such as private and retail banks. While the former may consider the risk of negative supply chain events on the pricing of a range of operations (e.g. issue of new stocks, mergers and acquisitions), the latter may adjust its demanded rates of return for the financing of investments. Moreover, the empirical demonstration that firms may absorb fails from their supply chain partners might be useful for insurance companies to recalculate both the premium and the price of their policies. It is also possible that the recognition of the *contamination* risk will require the reformulation of contracts so that reimbursement clauses are more specific. This sort of change or adaptation would be part of a larger context of revision of the relational behavior between partners, what may affect the conditions of collaboration more broadly. It is possible, for example, that efforts towards the increase of information sharing between buyers and suppliers will be more concentrated in forms of supervision or audit of the operations of each.

Results may be useful to politicians and regulators, as they show that the economic effects of negative events may be greater than those more easily perceived. It is therefore important that forms of compensation to supply chain partners are proposed. This may be important not only for the protection of investors, but also for the safety of all possible *incidental stakeholders*. As pointed in the discussion of case 1 – Exxon Valdez, for example, beyond the acute environmental damage, important disturbances were absorbed by the fishing industry. The impossibility of maintaining commercial activities in the region impacted local communities which suddenly lost their capacity to provide for their livelihoods. Likewise, cases in which human losses were lost should have considered their short and long-term impacts, specially in the social sphere. Along with the immediate negative economic impact for families, which must extend from losses in nutritional quality until shortened educational periods for children, the disappearance of people in productive working age must cause serious damage to communities. While the compensations are generally part of the settlement agreements, it must be noted that indemnities generally take years, sometimes decades to be reached.

In this sense, the present study contributes to evidence that companies in the supply chain can suffer significant economic impacts. Beyond the loss of investors, it must be noted the consequences that these effects may have on the generation and maintenance of jobs in the affected company. Considered that fluctuations in market value may represent a thermometer of firms' capacity to generate future free cash flows, variations in this sense denote the perspective of operational difficulties to come. It is then possible that the impact initially absorbed by investors will eventually be reflected in the dismissal of employees, the cancelation of new hires, or in the withdraw of new investments. In either case the workforce will be collaterally affected, having not really been responsible for the negative event in question. Thus, it is important that policymakers and regulators consider these widespread effects, so that they can create mechanisms to expedite the compensation of affected parties.

In general, given that negative events represent unexpected and often undesirable happenings, one must consider their potential to deviate firms from their normal activities. As shown by the results of the articles, different types of events can lead to markedly different consequences. In the contexts of supply chain management, more specifically, that would represent additional sources of risks to which companies must be exposed. In this vein, the study contributes primarily to the assessment of managerial instability, as considerations on negative events would be linked, among other things, to the administration of adverse situations.

Finally, the study must have consequences for the teaching of supply chain management. As long as future research confirms the results observed here and the concepts developed are well received by academic literature, the teaching of Management, and in particular that of supply chain management, may incorporate the possibility of *supply chain contamination*, thus adjusting the risk perspectives that students are exposed to. If, by any chance, this consolidation indeed happens to take place in the future, a hybridization of supply chain finance courses may occur, with finance and operations management concepts forming the basis of the new developments.

5.5. Limitations and Extensions

Although standing as an obligation of every researcher, the pursuit of academic excellence will be inevitably frustrated as no investigation is capable to fully overcome its intrinsic limitations. While the search for truth is noble, the complexities and the dynamic nature of reality may prevent its clear understanding, in a way that no study is capable to completely explain or predict. The present dissertation represents no exception to that. This section is dedicated then to detail the constraints recognized throughout the development of our investigation. Beyond that, propositions for extensions of the research are provided.

Initially, it must be acknowledged that the consideration of a single type of evidence of *supply chain contamination* stands as an important reserve of the dissertation, as, despite offering an objective measure and allowing for the comparison of results among all the cases investigated, the analysis of market value variation constrains the study to the perception of investor. From this limitation, two others immediately emerge: firstly, the value maximization logics under which businesses must be embedded (Jensen, 2010) implies in the potential observation of *supply chain contamination* only for events that could somehow jeopardize profits, ignoring potential negative ethical and moral outcomes (unless they also lead to profit losses). Secondly, the focus on a homogenous class of stakeholders may be imprecise, as under a hypothetical pattern of herd behavior (Bikhchandani and Sharma, 2000), market value variations may be either intensified or mitigated, depending on triggering acts not fully comprehended. It must be admitted then the possibility of both under and over reactions, which, in any case, would compromise the accuracy of the results. Ultimately, it seems that doubts around the nature of human behavior – in this case around investors' behavior – are at the heart of the question, being the reasons, the dynamics and the intensity of their reactions to negative events fundamental factors to be clarified. Beyond issues purely related to the nature of the

individual, it is necessary to observe the influences of the surrounding environment. Perhaps a combined perspective of investors' psychology with their sociology may be useful, efforts to which the fields of classic and behavior finance seem to engage, albeit sometimes in isolation. Future research should seek then to decompose investors' motivations, separating rational and irrational purposes.

In addition, it must be considered that the market value of a company is a resultant measure, that is, it expresses the balance of a series of other sub-measures. Thus, the analysis of stock prices does not allow an individual assessment of all the dimensions potentially damaged by a negative event. Instead, it offers a "bottom line" perspective, ignoring singularities and the processes leading to it. In other words, the results do not provide details around the reasons behind investors' reactions. It is not clear, for instance, if the cases of *supply chain contamination* observed are due to expected operations difficulties, to eventual negative reputational spillovers, the expectation of enhanced regulation, or to any other reason. It is also possible that they represent a combination of different causes, which may, by the way, interact with each other. The conjectures in this sense are restricted to the discussion of each case, remaining, however, speculative. On the bases of these speculations, future studies may search to deepen the understanding of the reasons why investors reacted the way they did, asking them, among other things, the relative importance of each possible factor in their decision-making process. On what relates specifically to the potential deterioration of reputational capital as an antecedent of market value destruction, the extension of the investigation to other categories of stakeholders could be interesting. The analysis of consumers' perspectives could offer understanding on the eventual damages to the corporate images of both source firms and supply chain partners, with the investigation of related dimensions such as purchase intention and trust complementing the perspectives. Likewise, impacts on corporate identity could be captured with the consideration of employees' point of view around the incidents.

Still, the analysis of market value fluctuation limits the investigation to the impacts observed in publicly traded companies, meaning that it is likely that both negative events and supply chain partners have not been retained by the sampling criteria adopted. The extension of the research to other stakeholders and the eventual relaxation of the necessity to all players to be publicly traded may increase the number of cases investigated. If on the one hand this extension shall make the comparison between the empirical results difficult, it may allow the analysis of new events, possibly revealing other situations and cases of *supply chain contamination*. Also, sampling procedures, as well as the collection of documents around each case were made, in part, with the use of search sites such as google.com, yahoo.com, and bing.com., among others, being therefore, subject to the algorithms applied by each of these tools. It is possible that some events or information about them were not captured, among other reasons, due to the architecture of these algorithms. Withal, a considerable portion of the information collected comes from publications that are identified as ideologically biased. Despite our efforts to mitigate these effects, information on some cases may have been exaggerated by authors and editors in order to support an ideological agenda. It is also possible that some cases have received more prominence than others in the media, thus influencing the perception of stakeholders. In addition, market value information was, in a great measure, taken from open and free internet databases. It is possible that the availability of these data also suffers the influence of obscure ideological or economic influences, although nothing has justified this suspicion during the investigation. Future studies should ideally refrain from media influence in data collection, with primary data sources being privileged whenever possible.

As the number of cases increase in future research, statistical tests shall be conducted, particularly around the comprehension of the factors leading to *supply chain contamination*. As pointed in the discussion of the subsidiary research questions, the proportions used in the interpretation of results are not statistically tested, as the sample of the study is relatively small.

In that way, conclusions have remained restricted to a subjective analysis. Provided a more comprehensive sample of cases, statistical tests around the proportions observed (e.g. Chi-Squared) may be conducted, strengthening the power of the current conclusions. Alternatively, or in parallel, qualitative methods should be implemented in the further comprehension of the differences.

As also previously pointed, some variations in the application of the event study were adopted, especially on what relates to the different number of event windows considered in each study. While in the first study, five event windows were investigated (Table 1), the second and third articles considered seven and two, respectively (Tables 5 and 7). Even though studies of finance seem to typically use two event windows, there is no apparent rule around a fixed number, remaining the choice in a subjective sphere. It is possible that the more restrictive number in studies of finance is due to the marked time of the events traditionally analyzed in the field (e.g. dividend payments, stock splits, earnings announcements). Differently from the cases investigated here, these events tend to take place in dates previously settled. In this sense, the flexibilization to the use of more event windows in the first and second articles searches to account for this distinction as the events investigated may have a higher chance to be disclosed to market agents before their public communication. If on the one hand this risk shall be mitigated, the consideration of results using different event windows may turn their comparison less viable, and eventually less significant. This is illustrated by the fact that one supplier (Siemens) of the same case (Case 26 – Volkswagen Dieselpgate / Fraud) was found to be *contaminated* in one study in not in the other. Results, however, do not allow a conclusion around the validity of our strategy. Future studies should ideally apply the same event window for all comparable events or, advance the benefits of flexibilization.

Apart from these specific limitations, a debate over the nature and constraints of a research(er) may be also useful. Foremost, one must recognize the human – and therefore – imperfect condition of its author, who, through his biases and prejudices, must not be capable to be analyze and interpret his own contributions with total impartiality. On that regard, in discussing the historical continuity of mankind, Cooley (1902: 14) claims that “every word we say, every movement we make, every idea we have, and every feeling, is, in one way or another, an outcome of what our predecessors have said or done or thought or felt in past ages”. In stressing the influence of the ancient on new thought, the position seems to point to a limited freedom of our creativity, in a way that we would be all constrained by previous developments. Within this set, all the steps of present research – from its design to its closure – may be a function of the personal path of its author, incorporating not only his previous experiences, but that of all his predecessors. All in all, the limitations of the study must represent opportunities for future developments, which, in proposing solutions, must enhance the value of our contribution.

Indeed, the idea that companies must be affected by events occurred in or caused by a supply chain partner instigates a series of future developments, particularly around the conditions and process(es) that may lead to contamination. More than the diagnosis or the supply of empirical evidence that these outcomes are possible, investigation to come must clarify the relationship between factors leading to supply chain contamination (nature of the event, severity of effects, estimated cost of the incident for the source company, risk to human health / life, industry, disclosure, supply chain relation, crisis management, ideally identifying the influence that they have in one another (Table 12). Along with the theoretical development that this construction may offer, from a practical angle it may allow firms to develop both medicines to *supply chain contamination*, as well as better mechanisms to predict and avoid it. While the treatment of damage must demand new insights in crisis management, mechanisms of prevention may be

more connected to the literature of supply chain risk management. In fact, the concept of *incidental stakeholders* may be applied in the evolution of both perspectives.

Being crisis management an *ex post* approach, the recognition of all the stakeholders being potentially affected by a negative event must be determinant to the success of strategies designed to eliminate or to mitigate losses from environmental disasters, corporate social and environmental irresponsibilities, operational failures, corporate fraud and corruption, or any other form that negative corporate news may assume. In this sense, the transition from the traditional stakeholder model to the Supply Chain Extended Stakeholder model proposed here would conceptually support reconfigurations and reinterpretations of the adequate unit of analysis to treat events in supply chain contexts. The extension of the stakeholders usually considered (e.g. employees, investors) to all incidental ones (e.g. employees of supply chain partners, investors of supply chain partners) must serve as the theoretical basis of a more comprehensive understanding of such matters. Among other things, it would necessarily appeal for the development of nearly exhausting, and by consequence, more sophisticated criteria on what constitutes an entity, person or groups of people capable to affect or be affected by the operations of a company. This shall be useful in the many phases of crisis management, from the initial speeches and official communication - normally held by the C.E.Os of the companies involved - until more accurate schemes of compensations to victims, which otherwise could be ignored. Future research on these matters may then apply the concept of *incidental stakeholders* in the analysis of companies' responses to acute situations. The comparison between the efficiency of such strategies for the stakeholders of the source company (traditional stakeholder model) and those of supply chain partners (mostly *incidental stakeholders*) must be worthy it, particularly if made in parallels (e.g. employees of source company against employees of supply chain partners, local communities linked to source firms against local communities linked to supply chain partners). These comparisons must reveal, for example, if crisis management

strategies keep their power as they reach distant *incidental stakeholders*, or, if they become less effective as they connect to them.

In the *ex ante* perspective, in turn, the possibility of *supply chain contamination* must call for broader risk assessment procedures, specially upon the design and configuration of supply chains. Supplier selection criteria, for instance, must be improved, possibly through the incorporation of factors such as the likelihood that negative events must take place in the operations of a given upstream partner. While this sort of consideration is, in general, already applied by insurance companies, the management of contamination risks would demand the adoption of similar assessments by other sorts of organizations, including basically any group directly composing a supply chain, as well as consulting firms. Nevertheless, while judgment around negative events linked to the interruption of physical flows (i.e. supply chain disruptions) must be more easily implemented, the prevision of other types of events, mainly those related to eventual unethical conducts of managers, shall be less direct. Future research indicating the more efficient ways to develop such analysis is welcome.

The segmentation of the factors and elements that may condition *supply chain contamination* in different stages – as proposed in Table 12 – must be useful in those tasks. In that way, further understanding of contamination triggers may also allow a clearer distinction between those events that indeed hold the potential to cause harm to companies (and disseminate), and those which do not. In addition to the empirical evidence provided here, this would be ideally treated through qualitative research that investigates the feelings and sensations caused by distinct circumstances. In-depth interviews with employees (including top management), customers, suppliers, investors, as well as any other class of stakeholders must be valuable. In fact, throughout the three articles of the dissertation, as well as on its text, the nature of events was discussed as a potential factor conditioning the occurrence of supply chain contamination.

However, although five categories of negative events were proposed (environmental disaster, corporate social and environmental irresponsibilities, operational failure, corporate fraud and corruption), they probably do not cover all possible types. The extension of our investigation must thus lead to the identification of events that may not fit in the classification here proposed, what would already configure a potential contribution in itself. The recognition of these potentially new categories of events must be also useful in the refinement of the present classification. By extending the time frame considered, the sources of information (newspapers, magazines, internet channels), and mainly the analysis of new corporate events that must inevitably take place in the future, prospective research may then contribute to the improvement of this initial effort. Once more, the perspective of incidental stakeholders must be useful. As discussed in the articles, our investigation is focused on the assessment of investors, being this the only class of incidental stakeholders considered. Even if empirical evidence confirmed the occurrence of *supply chain contamination* through the *inertial effect*, the investigation of the respective consequences to other classes of stakeholders may significantly reinforce its comprehension, and add to the consolidation of the Supply Chain Extended Stakeholder model as a valid theoretical contribution.

Another important aspect to be considered relates to the investigation of the process leading negative events to be presented to the general public. As also depicted in Table 12, the way the disclosure of corporate news take place must be relevant to the observation of supply chain contamination, in a way that the investigation of the reasons leading information channels to give publicity (or not) to a specific issue must be necessary. Within this reasoning lays the possibility that the media, including all means used in the production and distribution of public content, may be somehow controlled in face of political, economic and even ideological interests, among others. It is possible, for example, that these factors come to lead a given newspaper to deliberately choose to highlight a negative event related to a company, while

minimizing or even refusing to approach issues related to another. The same must be possible in relation to any other traditional, and more recently, social media vehicles. It must not be neglected that user-to-user content must be also object of censorship, even if the essence of this type of exchange may turn exogenous control more difficult.

It is also noteworthy the possibility that some events may receive more attention in the aim of damaging images and reputations of companies. This sort of orchestrated attack may hide the intentions of economic groups directly or indirectly interested in these outcomes. As no evidence on that direction was found in the course of these dissertation (and also not in any of its three articles) future research should test for this possibility, with eventual bias in the disclosure of negative events being considered in the lenses of ethics. These considerations would follow the widespread discredit that traditional media has suffered in the last years, what seems to be extending to social networks, as questions about the ethical use of algorithms and users' data gain relevance. From a broad perspective, any intentional manipulation of reality may be seen as an attempt to deliberately shape public opinion in a given direction. Just like these interactions may be useful in the building of artificially positive or negative perceptions of candidates running in arguably democratic elections, it may be reasonable to suppose that they may be also used in the conscious building or destruction of companies' intangible resources. In the era of “fake news”, not only real negative events must possibly impact companies, but also rumors. Future research must then extend the understanding of the different impacts from real and unreal negative events.

Finally, consideration around the validity of the metaphorical transfer proposed to address the *inertial effect* must be made. As the results of the three articles show, the three principles proposed were observed in some cases, but not in all. Nevertheless, the imperfection must not invalidate the reasoning. Instead, future research must evolve its currently working aspects and

reformulate those which fail to be reasonably adequate to explain the *inertial effect*. On what relates to principle 1 (*Focal firms relative to any given negative corporate event will more strongly absorb its effects.*), for example, in some cases the source firm was indeed more strongly affected while in others they were less affected or even not affected at all. In turn, principle 2 (*The effects of any given negative corporate event will not be restricted to the focal firm. Instead, supply chain partners will also be negatively affected.*) is also not observable in all cases, as some events showed to negatively affected only the source firms. Likewise, principle 3 (*As the effects of any given negative corporate event disseminate through supply chain networks, they will affect partners less strongly as they departure from the focal firm, until its force ceases.*) was not fully observed also, as for some events the intensity of the negative effects was higher for suppliers than for source firms. Despite these contradictions, it must be noted that in the three articles the impact of negative events was measured only in terms of market value. This means that, as new studies approach the dissemination of negative events using other dimensions that can be potentially affected (e.g. corporate images, corporate identities, corporate reputations, corporate credibility, trustworthiness, attitude towards firms), these principles must be more practical, and eventually confirmed. From this angle, the formalization of this metaphorical transfer must not be comprehended as an unequivocal scheme to explain the phenomenon. In fact, it represents an initial effort in providing the conceptual basis allowing not only the perception and measure of *supply chain contamination*, but also the process through which it happens.

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Appendix: Published Articles



Supply chain contamination: An exploratory approach on the collateral effects of negative corporate events



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ABSTRACT

The present work investigates the impact of negative events on supply chain partners. Through a contextualised discussion of the literature on supply chains and on the efficient market hypothesis, it is proposed that negative events negatively impact the market value of suppliers and customers. Following an exploratory approach, 307 companies (21 source companies, 158 suppliers and 128 customers) comprehending 20 cases of environmental disaster, corporate social irresponsibility, operational failure, corporate fraud and corruption were analysed. Results show that in 12 out of the 20 cases investigated supply chain partners indeed had their market value penalised, encompassing, to a greater or lesser degree, all five categories of cases considered. Yet, while both suppliers and customers absorbed the outcomes of negative events, suppliers seem to be at greater risk of sustaining such losses. Likewise, cases in which the source companies were also negatively affected seem to be slightly more prone to cause losses among suppliers and customers. In this sense, the concept of *supply chain contamination* is coined to address the observed outcomes. The study offers new insights into the applicability of the efficient market hypothesis and contributes to the assessment of the dissemination of negative events in supply chains, a theme that, despite its potential detrimental consequences for firms and stakeholders, has not yet been sufficiently treated in the Management literature.

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1. Introduction

Negative events, understood as adverse or threatening occurrences (Taylor, 1991), have traditionally channelled the attention of the media (Bednar, Boivie, & Prince, 2013; Freudenburg, Coleman, Gonzales, & Helgeland, 1996) and general public (Zavyalova, Pfarrer, Reger, & Hubbard, 2016). Although diverse circumstances may correspond to such classification (e.g. earthquakes, landslides, tsunamis and accidents), from a business perspective, unfavourable news around corporate social irresponsibility (CSI) (Kölbel, Busch, & Jancso, 2017), the recognition of firms' detrimental impact on the environment (Harrison, 2016), or even their inability to provide customers with safe and quality products (Borah & Tellis, 2016), among others, have also concentrated a considerable portion of public debate. Beyond the arguable erosion of the reputational capital of firms, under the assumptions of the efficient market hypothesis (Fama, Fisher, Jensen, & Roll, 1969; Jensen, 1978), negative corporate events are expected to trigger correspondently

negative reactions from investors, penalising the market value of firms in the adjustment or incorporation of such news (Fama, 1970).

The demands faced by organisations are not limited to their own operations, though (Gualandris, Klassen, Vachon, & Kalchschmidt, 2015). With the development of complex arrangements of trade and exchange, supply chains have been brought to the centre stage of the agitation (Pagell & Shevchenko, 2014; Zhu, Sarkis, & Lai, 2013). Within this set, it is possible that a negative event occurred in a firm comes to influence the perceptions and actions of customers, employees, investors and other related parties around one or more than one of its supply chain partners. Some of the most flagrant cases of corporate failures and setbacks (e.g. modern slavery, child labour and environmental damage) might be analysed inward this notion.

In that way, the perception that modern competition is not held among single companies, but rather, amidst supply chains (Lee, 2000), raises some pressing questions: (i) Do investors negatively react to announcements of negative corporate events related to a supply chain partner? and (ii) Do factors such as the nature of the event (i.e. environmental disaster, social irresponsibility, operational failure, fraud or corruption), the positioning of the partner in

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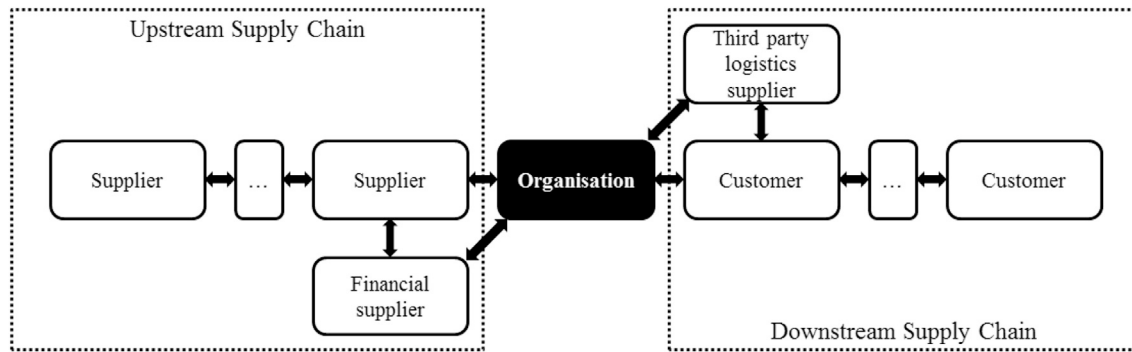


Fig. 1. Ultimate supply Chains.
Source: Adapted from Mentzer et al. (2001).

the supply chain (i.e. supplier/customer) and the fact of the source company (i.e. those originating the event) itself be affected influence the reaction of investors? In search to answer these questions, the present study is supported by the literature on supply chains and by the main arguments of the efficient market hypothesis on the adjustment of stock prices to new information (Fama et al., 1969). In this exploratory approach, the investigation concentrates on 20 cases of negative corporate events comprehending a total of 307 publicly traded companies (i.e. 21 source companies,¹ 158 suppliers and 128 customers). In face of the cases identified, the method of event study is applied to their market data.

Results show that in 12 cases, investors of suppliers and customers negatively reacted to such announcements, distributed, although unevenly, among all the categories considered. While all four cases of corporate social irresponsibility presented losses to suppliers and customers, similar results were only partially detected in cases of other natures. Yet, at the same time losses were also observed in source companies in seven of the 12 cases, market value damages were restricted to supply chain partners in five. Results also suggest that, although both suppliers and customers were found to be affected, suppliers seem to be more likely to present market value losses as a consequence of negative events. The empirical outcomes subsidize the conceptualisation of the term *supply chain contamination* to properly address the observed phenomenon. In this sense, this examination is expected to contribute not only to the literature on supply chains but also to a broader understanding of the adequacy or applicability of the efficient market hypothesis within supply chain contexts.

From a managerial perspective, it is hoped that the results offer new insights to an extended assessment of the risks in which single firms and supply chains may be embedded, potentially providing decision-makers with new factors to be considered in their investment and/or executive deliberations. After this introduction, this study is organised into four main segments: Section 2 presents the theoretical background, followed by a review of the methods employed in section 3. The results and discussion are then presented in section 4, with the concluding remarks in section 5.

2. Theoretical background

2.1. Supply chains

According to Mentzer et al. (2001), supply chains have emerged in response to the increasing focus on time- and quality-based competition. The demand from customers for products to be

delivered 'consistently faster, exactly on time and with no damage' (Mentzer et al., 2001, p. 2) would have forced firms to build closer relations with their suppliers and manage more effective ways to coordinate the flow of products and services. As discussed by Chen and Paulraj (2004), however, the development of the supply chain concept occurred in a complex and multifaceted manner, with the direct influence of several fields, such as the quality revolution (Dale, Lascelles, & Lloyd, 1994), the notions of materials management and integrated logistics (Carter & Price, 1993; Forrester, 1961), industrial markets and networks (Ford, 1990; Jarillo, 1993), the notion of increased focus (Porter, 1987; Snow, Miles, & Coleman, 1992) and influential industry-specific studies (Lamming, 1993; Womack, Jones, & Roos, 1990). As a result, different and sometimes unrelated terminologies have been used by researchers to treat the issue. Expressions such as 'demand pipelines' (Farmer & Van Amstel, 1991) and 'value streams' (Womack & Jones, 1994), among others, would be common in that regard.

The literature around supply chains evolved in a perceivable path that seems to have started on the coordination of material streams among companies, leading to a more developed and complex idea that sources of competitive advantage may reside in the relationship among firms (Dyer & Singh, 1998). For La Londe and Masters (1994), for instance, supply chains are defined as a set of companies through which materials flow. They would typically include several partners, such as raw-material and component producers, product assemblers, wholesalers, retail merchants and transportation companies. Lambert, Stock, and Ellram (1998), in turn, define supply chains as a set of firms aligned to bring products and services to market. Christopher (1992) states that supply chains represent a network formed by organisations that, through downstream and upstream linkages, are involved in different processes and activities that may yield services and products, adding value to firms.

In advancing the idea, Mentzer et al. (2001:4) state that a 'supply chain is defined as a set of three or more entities (organisations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer'. They also define three degrees of supply chain complexity: direct supply chains, formed by a firm, a supplier and a customer; extended supply chains, including suppliers of immediate suppliers, and customers of immediate customers; and ultimate supply chains, from the ultimate supplier through to the ultimate customer (i.e. consumer). The latter is illustrated in Fig. 1.

Complementing the theoretical positioning of the study, the sub-section below explores the preeminent aspects of the efficient market hypothesis. The approach is relevant to the purposes of this investigation since, as along with theoretically supporting the eventual detection of negative reactions in face of negative events,

¹ Case 5 accounts for two parent companies analysed.

it also supports the utilisation of the event study method as the proper apparatus to address the issue.

2.2. Efficient market hypothesis

The hypothesis that security markets are efficient has been widely accepted by academic financial economists (Malkiel, 2003). Accordingly, upon the emergence of late facts, news would be rapidly incorporated into the prices of securities, in such a way that the study of neither past nor financial information of firms (i.e. technical and fundamental analysis) would be useful in offering investors the opportunity to obtain greater returns than those offered by a randomly selected portfolio of stocks (within comparable levels of risk). The existence of arbitrage opportunities (i.e. the trade of assets in distinct markets as to profit from differing prices in a given moment) would be discarded, with the achievement of above-average returns without the acceptance of above-average risks being virtually impossible (Malkiel, 2005). In turn, Jensen (1978:96) claims that ‘a market is efficient with respect to information set Θ_t if it is impossible to make economic profits by trading on the basis of information set Θ_t ’. Efficient markets would then be those capable of fully echoing all available information in a fast and unbiased manner, in such a way that fair estimates of underlying values would be constantly provided (Basu, 1977).

Fama (1970) develops the idea by proposing three versions of the efficient market hypothesis: weak, semi-strong and strong. With the weak version, the price of assets is thought to fully reflect all past publicly available information. Once prices are considered independent, future estimates would be fully determined by information not contained in price series, following a ‘random walk’. In the semi-strong form, in turn, prices would be expected to not only reflect all publicly available information but to instantly change in response to any new data (in such a way that no abnormal return can be earned through eventual transactions based on such information). Finally, the strong form additionally proposes that even private or insider information may be reproduced in the price of securities, which, based on such premises, could possibly generate abnormal returns.

Consistent with the idea of an efficient market, successive price changes in individual common stocks had been indicated as nearly independent by many empirical studies conducted by the time (Fama et al., 1969). Nevertheless, despite works such as Mandelbrot (1966) and Samuelson (1965) being successful in linking aspects of the theory of efficient markets to the theory of random walks (Fama, 1970), market efficiency could only be inferred, as very little testing had been conducted on the ‘speed of adjustment of prices to specific kinds of new information’ (Fama et al., 1969, p. 1). Through the examination of the process of price adjustment, the authors concluded that announcements of stock splits lead the market to positively react as increased dividends were associated with events of this kind, driving investors to re-evaluate the stream of expected

income from their shares and adjust prices almost immediately. In face of such developments, no other proposition in Economics would count on more solid empirical evidence, to the extent that the related Finance, Accounting and Economics of Uncertainty literature accepted the efficient market hypothesis as ‘a fact of life’ (Jensen, 1978, p. 96).

This assumption is central to the present inquiry. In case investors recognise negative events as potentially compromising the future cash flows of source companies and/or their supply chain partners (either for operational, reputational, legal issues or for any other reason), the stock prices of these firms are expected to be negatively adjusted in response. Incidentally, given the analysis of public market value data, the current investigation finds better support in the semi-strong form of the efficient market hypothesis, which, following the applications built over its delimitations, is also called event studies (Fama, 1991). Beyond expressing the application and pertinence of this premise, the comprehension also validates the use of event studies as a consequent research method. The technique, which is coherently employed in the analysis conducted here, is complementarily debated in the section devoted to the methods engaged. Unlike the traditional approaches, however, this investigation seeks to empirically examine the collateral effect of events within supply chains. In other words, this analysis moves the conventional focus on individual companies, possibly extending the applicability of the efficient market hypothesis. The issue is further discussed as a theoretical implication of the study in the ‘Conclusion’ section.

3. Methods

As discussed by Hughes, Price, and Marrs (1986), a research is believed to be in an exploratory stage when theoretical models are still missing or at a considerably underdeveloped phase. Accordingly, the research interests in those cases would be organised around the definition of theoretical constructs and their respective operational conceptualisation, which shall be linked to observable variables. Considering the arguable novelty of the problems treated in the present research and the still incipient or inexistent theorisation around the validity and application of the efficient market hypothesis in supply chain contexts, this study should be viewed as exploratory in nature. The development of theoretical constructs to address the observed outcomes of the present inquiry – discussed in greater detail ahead in the text – also corroborates this understanding.

Within this reasoning, the present empirical research is divided into two main blocks. Within a qualitative approach, the first one comprises documentary research around the 20 cases. The second block presents a quantitative perspective through the application of 307 individual event studies derived from the analysed material. Fig. 2 presents an overview of the adopted methodological approach. As shown, while documentary research procedures were

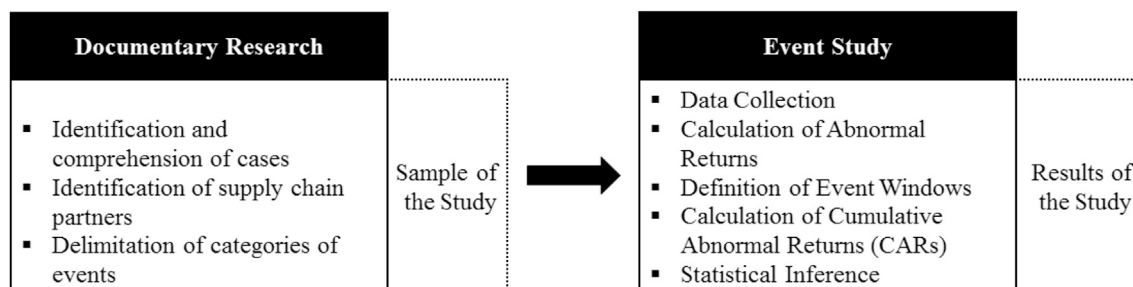


Fig. 2. Overview of the Method Approach.

Each of these stages is discussed in greater detail in sub-sections 3.1 and 3.2.

used to build the sample and provide an understanding of each case analysed, the event study method, in all its steps, supplied the results of the investigation.

3.1. Documentary research

The specific objective of the qualitative analysis is to provide a description of each case and a more detailed understanding of the events studied. Moreover, the assessment of all the documents gathered in the process strives to identify supply chain partners of the firms involved in the announcements. As well as contributing to the understanding of the events, this identification is particularly relevant as it leads to the construction of the sample tested in the quantitative section. As discussed by Ludke and André (1986), documentary analysis represents an important tool for qualitative research, as it either complements the information sourced through other means or supplies new and relevant aspects of a studied problem. Several other authors have also stated the utility of the method. Sá-Silva, Almeida, and Guindani (2009), for instance, argue that these tactics must be appreciated and valued, especially by social researchers, as they can be used to retrieve potentially rich information that could easily be neglected by other forms of research. This reflects the idea that the method may drive academics to deepen their understanding of objects which demand a historical and socio-cultural contextualisation in order to be properly studied.

The authors clarify, however, that the concept of document should not be restricted or limited to written or printed material. Instead, for research purposes, documents may be more appropriately conceptualised through several other forms of communication used as sources of information, indication and clarification of objects, such as films, videos and slides. Documentary research is then understood as a primary source of data once the documents are presumed not to have been scientifically treated or interpreted before (Oliveira, 2007). As discussed by Sá-Silva et al. (2009), the first step in conducting documental research is to find the material relevant to the object of interest. Secondly, the representativeness and credibility of such documents must be assessed. Thirdly, the meanings of the messages must then be properly understood. In that regard, the authors also highlight the fact that documents are not objects of modifications, meaning that, eventually, the interpretation of uncommon or unknown material produced by third parties may be the only way researchers might produce high-quality studies.

The event definitions in this paper were guided by the disclosure of negative events in at least one of the electronic databases of the following international newspapers: The New York Times (www.nytimes.com), The Guardian (www.theguardian.com) and Le Monde (www.lemonde.fr). The present study turns to these informational sources considering that news, which reflect market losses of companies, are presumed to be more likely to be reported by journals with an economic and financial focus. More generalist newspapers seem then to be a way to avoid or, at least, to soften eventual bias in that regard. The choice of three different sources may also allow for a broader perspective, enhancing the assessment of cases independently of the economic or political editorial positioning of a single publication. Additional criteria for the choice are the reach and relevance of the publications. While The New York Times and The Guardian websites are, respectively, positioned first and second in terms of Internet-based popularity (4imn.com Web Ranking, 2016), Le Monde is the leading French-language publication in the ranking. The reason for choosing both English and French is the fact that these are the two official working languages of the United Nations, with the latter having remained as a working language of diplomacy for more than a century (The Economist,

2013). These conditions may allow the research to capture an enlarged spectrum of international news, particularly relevant to cases within international supply chains.

Regarding the search procedures, combinations of the following terms were applied: 'supply chain', 'disaster', 'scandal', 'environment', 'workforce conditions', 'slavery', 'contamination', 'environmental responsibility', 'social responsibility', 'defect', 'safety', 'glitch', 'delay', 'corruption', 'bribery', 'misconduct' and 'fraud'. The time period considered runs from January 1985 to December 2016. As for restrictions, the following elimination criteria were adopted (adapted from Hendricks & Singhal, 2003): cases that do not actually address the discussed themes; cases in which supply chain partners were not clearly identified; cases in which source companies and/or all supply chain partners were privately held companies (i.e. not publicly traded); and cases in which source companies and/or supply chain partners had insufficient daily stock price information on the Yahoo Finance and Google Finance public databases, excluding firms not publicly traded on Nasdaq (USA), New York Stock Exchange (USA), American Stock Exchange (USA), London Stock Exchange (United Kingdom), Euronext Paris (France), Xetra Exchange (Germany), Frankfurt Stock Exchange (Germany), Madrid Stock Exchange (Spain), Amsterdam Stock Exchange (Netherlands), Copenhagen Stock Exchange/Nasdaq Copenhagen (Denmark), BMF Bovespa (Brazil), Korean Stock Exchange (South Korea), Tokyo Stock Exchange (Japan), Shanghai Stock Exchange (China), Shenzhen Stock Exchange (China), Taiwan Stock Exchange (Taiwan), Hong Kong Stock Exchange (Hong Kong), Stock Exchange of Thailand (Thailand), Bombay Stock Exchange (India), National Stock Exchange of India (India) or Singapore Exchange (Singapore).

Additionally, supply chain partners were also identified through the access to news published by other newspapers and magazines such as Corriere della Sera, El País, Daily Mail, Le Figaro, L'Opinion, O Estado de S. Paulo, Folha de S. Paulo, Time, The Economist, Veja, among others; the websites of the identified companies; any internally produced material supplied by the identified companies, such as annual reports, sustainability reports, press releases, financial statements, among others; reports produced by environmentalist groups and non-governmental organisations (NGOs); live and recorded broadcast transmissions available on video-hosting Internet sites; academic and practitioner publications, websites and complementary sources on financial information and market data such as Bloomberg, Reuters, among others. The final sample resulted in 307 companies (i.e. 21 source companies, 158 suppliers and 128 customers). The cases were grouped into five categories according to the nature of the event – environmental disaster, social irresponsibility, operational failure, corporate fraud and corruption – and then arranged in a chronological order within these categories. Charts 1 and 2 present the cases, along with a brief summary of each.

3.2. Event study

As discussed by Dwyer (2001), events are characterised by changes, developments or announcements that can produce a relatively large impact on the price of assets over a period. In this way, event studies examine the effect of a specific event (or a set of events) on the value of assets (De Mortanges & Rad, 1998). According to MacKinlay (1997), through the use of financial market data, event studies represent a powerful tool that allows analysts to measure the variances in the market value of firms due to new information. As discussed by Corrado (2011), although the event study method was primarily conceptualised as an empirical tool for studies of Finance and Accounting, studies in the most diverse areas of Management have employed the approach. From a broad perspective, event studies may then be seen as an apparatus that,

Case No.	Case (Event)	Source Companies	Description	Suppliers	Customers
1	Exxon Valdez	Exxon	More than 11 million gallons of crude oil spilled in Alaska, damaging around 1,300 miles of sea coast.	Parker Drilling Company (1)	
2	BP Oil Spill	British Petroleum (BP)	One of the greatest oil spills of all times occurred in 2010 in the Gulf of Mexico.	ABB (2); Accenture (3); Anadarko (4); Cameron International (5); Fluor Corporation (6); General Electric (7); Halliburton (4); JA Solar Holdings (8); KBR Inc. (9); Microsoft (10); National Oilwell Varco (11); Sempra Energy (12); Transocean (4); T-Systems (13); Weatherford (14)	Marathon Oil (15)
3	Shell Nigeria	Royal Dutch Shell	Release of the United Nations report on deep pollution caused by more than 50 years of oil exploration in Nigeria.	ABB (16); Emerson Electric (17); Fluor Corporation (18); Johnson Controls (19); KBR Inc (20); MAN SE (21); Noble Corporation (22); Parker Hannifin Corporation (23); Tesoro Corporation (24); T-Systems (25)	Hyundai Motor Company (26); Penske Automotive Group (27)
4	Rena Oil Spill	Costamare	Considered as New Zealand's worst maritime environmental disaster, the container ship Rena spilled nearly 2,000 tons of fuel in the sea.		A.P. Moller-Maersk (28)
5	Samarco Tailings Dam Collapse	Samarco (Vale do Rio Doce and BHP Billiton)	Collapse of a tailings dam releasing mining waste into Rio Doce river, destroying historic cities and killing 19 people. Regarded as Brazil's worst environmental disaster.	ABB (29); Accenture (30); Braskem S.A. (31); Cemig (31); Clariant (32); Ultrapar (33); Cap Gemini (34); Gerdau (35); Emerson Electric (32); Energisa (33); FLSmidth (32); General Electric (35); Metso Corporation (31); Orica (32); Petrobrás (31); Caterpillar (31); Valmet Corporation (32); Weir Group (33); Dassault Systemes (36); Outotec (37); ThyssenKrupp (38)	Nucor Corporation (39)
6	Foxconn Riots	Foxconn	Reports of riots and deaths due to extreme conditions imposed on workers.		Acer (40); Amazon (40); Apple (41); Cisco (40); Dell (193); Google (42); HP (43); IBM (194); Intel (192); Lenovo (196); Microsoft (43); Motorola (40); Nintendo (41); Nokia (40); Sony (41); Toshiba (40).
7	Pegatron	Pegatron	Over 70,000 employees in poor working conditions.		Apple (44); Lenovo (45); Microsoft (45); Sony (45)
8	CP Foods	Charoen Pokphand Foods	One of the most severe cases of modern slavery in shrimp production revealed by English newspaper The Guardian.		Carrefour (46); Costco (46); KFC (195); McDonald's (195); Morisson (47); Tesco (46); Wal Mart (46)
9	Samsung Malaysia	Samsung	Accusations of illegal confiscation of passports, exploration and underpaying of Nepalese migrant workers in Malaysia.	Broadcom (48); Cadence Design Systems (49); Dialog Semiconductor (50); General Dynamics (51); HannsTouch Solutions Inc. (52); Imagination Technologies Group (53); LOT Vacuum Co (54); Marvell Semiconductors (55); MediaTek (56); Namuga Co (54); NXP Semiconductors (57); Partron Co Ltd (54); Radiant Opto-Electronics Corporation (52); Rambus (58); Samsung SDI Co (59); Silicom Motion (60); Skyworks Solutions (61); Sodastream (62); Taiwan Semiconductor Manufacturing (63); Xilinx (64)	Alibaba Group Holding Ltd (52); Amazon (65); AT&T (66); Bed Bath and Beyond (67); Best Buy (68); Carrefour (69); Costco (70); Home Depot (71); JC Penney (72); JD.com (52); Kohl's (73); Lowe's (74); Macy's (75); Microsoft (76); Nordstrom (77); Qualcomm (78); Sears (79); Sprint Corporation (80); Staples (81); Target (82); Telstra (52); Tesco (83); T-Mobile (84); US Cellular (85); Verizon (86); Vodafone (87); Wal Mart (88)

Notes: Environmental disaster cases 1–5, and social irresponsibility cases 6–9; the numbers in parentheses represent evidence reference numbers (Appendix A).

Chart 1. Negative environmental and corporate social irresponsibility events – cases, brief description and supply chain partners.

Case No.	Case (Event)	Source Companies	Description	Suppliers	Customers
10	A380 Delay	Airbus	Postponement of Airbus A380 superjumbo's first delivery date by 6 months, following several operational difficulties.		Air France (89); Fedex (90); Korean Air (91); Lufthansa (92); Qantas (93); Singapore Airlines (94)
11	Boeing 787 Dreamliner	Boeing	Due to electrical system problems on its lithium-ion batteries (including an onboard fire), the entire fleet of Boeing 787 Dreamliner was grounded, causing diverse operational issues for airports and airline companies around the world.	B/E Aerospace (95); BAE Systems (96); Circor Aerospace (97); Cisco Systems (98); Curtiss-Wright (99); Elbit Systems (100); General Electric (101); Honeywell (102); Meggitt (103) Rockwell Collins (102); Thales S.A. (104); UTC Aerospace Systems (105).	Air Canada (106); Air China (107); Air France (108); Air Lease Corporation (109); American Airlines (110); Ryanair (111); Cathay Pacific (112); Delta Airlines (113); FedEx (114); Panalpina World Transport (115); SES S.A. (116); Singapore Airlines (117); Southwest Airlines (118); United Airlines (119)
12	Samsung Galaxy Note 7	Samsung	Following a series of reported combustion and explosions, the Korean multinational Samsung announced the discontinuation of the product.	Broadcom (48); Cadence Design Systems (49); Dialog Semiconductor (50); General Dynamics (51); HannsTouch Solutions Inc. (52); Imagination Technologies Group (53); LOT Vacuum Co (54); Marvell Semiconductors (55); MediaTek (56); Namuga Co (54); NXP Semiconductors (57); Partron Co Ltd (54); Radiant Opto-Electronics Corporation (52); Rambus (58); Samsung SDI Co (59); Silicom Motion (60); Skyworks Solutions (61); Sodastream (62); Taiwan Semiconductor Manufacturing (63); Xilinx (64)	Alibaba Group Holding Ltd (52); Amazon (65); AT&T (66); Bed Bath and Beyond (67); Best Buy (68); Carrefour (69); Costco (70); Home Depot (71); JC Penney (72); JD.com (52); Kohl's (73); Lowe's (74); Macy's (75); Microsoft (76); Nordstrom (77); Qualcomm (78); Sears (79); Sprint Corporation (80); Staples (81); Target (82); Telstra (52); Tesco (83); T-Mobile (84); US Cellular (85); Verizon (86); Vodafone (87); Wal Mart (88)
13	Dynegey Fraud	Dynegey	Upon the California electricity crisis, the company was indicated as conducting diverse deceptive practices, among which price manipulations.	Air Liquide S.A. (120); Dow Chemical Company (120); General Electric (120); Siemens (121)	
14	Olympus Fraud	Olympus	Accounting arrangements applied in the hiding and dissimulation of long-term losses revealed by a top executive of the company after he was fired.		Amazon (122); Best Buy (123); Costco (124); Staples (125); Tesco (126); Wal Mart (127)
15	Toshiba Fraud	Toshiba	Through the improper recognition of costs of projects, the company overestimated its operating profits by USD 1.2 billion between the years 2008 and 2014.	Cadence Design System (128); Foxconn (40); Intel (129); Inventec (130); Microsoft (131); Nvidia (132); Panalpina (133); SunPower Corporation (134); Synopsys (135); Xilinx (136)	Amazon (65); Best Buy (68); Costco (137); Ford (138); Kohl's (139); Macy's (140); Sears (141); Staples (142); Target (143); Tesco (144); Wal Mart (145)
16	Volkswagen Fraud	Volkswagen	Volkswagen admits having used illegal software to cheat environmental tests in the U.S.A.	Aisin (183); American Axle (188); Autoliv (189); Ballard Power Systems (146); BASF (147); BorgWarner (148); Bosch (182); Bridgestone (183); Continental (149); Dassault Systemes (150); Delphi (180); Gentex (184); Honeywell (151); IBM (152); Infineon Technologies (153); Kumho Tires (154); Lear (187); LG Electronics (155); Magna (156); Maruti (157); Meritor (181); Microsoft (158); Mobileye (186); Motorola Solutions (159); NGK (190); Nokia (160); Plastic Omnium (161); SAP (162); Siemens (163); Tenneco (185); ThyssenKrupp (183); Tupy S.A. (164); Valeo S.A. (183)Visteon (165)	UPS (191)
17	Siemens	Siemens	Disclosure of a bribery scheme to corrupt government officials in the development of its business in diverse geographic areas. The scandal cost the company USD 1.6 billion in the then largest fine for bribery ever applied.	Nvidia (166); Qualcomm (167)	Samsung Heavy Industries (168)
18	HP	HP	International investigations showed that in the management of some of its IT contracts, the company maintained bribery practices in countries like Poland, Germany, Mexico and Russia.	Citrix (169); Intel (170); Nvidia (171); Oracle (172)	
19	Rolls-Royce	Rolls-Royce	As a result of an investigations conducted by an external law firm, practices of bribery in China and Indonesia were found to be carried out by the company.		Airbus (173); Boeing (174)
20	GlaxoSmith Kline	GlaxoSmith Kline	Investigations conducted by Chinese authorities claim the existence of a network of corruption led by the company in the country. Among others, the goal of the corruption pattern was to artificially increase sales and prices.	Adaptimmune (175); Exelixis (176); Genpact (177); Infosys (178); Parexel (179)	

Note: Operational failure cases 10–12, corporate fraud cases 13–16 and corruption cases 17–20; the numbers in parentheses represent evidence reference numbers (Appendix A).

Chart 2. Operational failure, fraud and corruption events – cases, brief description and supply chain partners.

by contrasting actual returns (i.e. returns actually observed after a given event) to normal ones (i.e. returns that would be expected if the event had not taken place), allows the apprehension of the impact of a given fact on the market value of companies.

From the difference between the latter and the former emerges the concept of abnormal returns (Campbell, Lo, & MacKinlay, 1997) which, in presenting statistical significance, evidences an impact caused by the event in question. Regarding the estimation of normal returns, the study relies on the Market Model (Fama, 1970), according to which normal returns (r_{it}) are a function of the returns of the market portfolio (r_{mt}) (i.e. the conjunct of stocks that represent the overall return of a particular market), parameters α_i and β_i (i.e. the constant and angular coefficient resulting from the linear regression between the returns of the stock *per se* and those of the market portfolio within a 200-day estimation window) and the error term ε_{it} (i.e. the portion of the return of stock *i* not explained by market movements, capturing the effect of firm-specific information). The return of a given stock *i* in a given moment *t* would then be expressed as follows:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it}$$

where

- r_{it} = normal return of stock *i* on day *t*
- r_{mt} = the market return on day *t*
- α_i = the intercept of the relationship for stock *i*
- β_i = the slope of the relationship for the returns of stock *i* with the market return
- ε_{it} = error term for stock *i* on day *t*, with $E(\varepsilon_{it}) = 0$ and $\text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_{it}}^2$

The abnormal return for any stock *i* on day *t* is calculated as the difference between the *ex post* (i.e. actual) and the *ex ante* (i.e. normal) return of the stock, according to the following formula:

$$AR_{it} = Actr_{it} - r_{it}$$

where:

- $Actr_{it}$ = return of stock *i* on any day *t* (*ex post* or actual return)
- r_{it} = normal or *ex ante* return (expected return of stock *i* on any day *t* according to the Market Model)

In turn, event windows reproduce the stretch of time considered for the evaluation. Conventionally, as well as the event day itself, event windows also encompass a number of days before and/or after it, in order to cope with potential forethoughts or delayed reactions. For control purposes, five different event windows are considered, as represented in Table 1.

Through the sum of individual abnormal returns calculated for each day within a given event window, cumulative abnormal returns (CARs) represent the effect of an event across the whole

period considered. For any given day *t*, the CAR is calculated by the following formula:

$$CAR_T = \sum_{t=1}^T AR_t$$

where *T* represents any particular day within the event window.

Statistical inferences in event studies aim to analyse if CARs calculated are statistically significant. Following the traditional practices of inferential statistics, H_0 (the null hypothesis) stands for the inexistence of statistically significant CARs, while H_a (the alternative hypothesis) stands for their presence. Considering that $E(\varepsilon_{it}) = 0$ and $\text{var}(\varepsilon_{it}) = \sigma_{\varepsilon_{it}}^2$ within the efficient market premises (Fama, 1970), abnormal returns are understood as normally distributed. For that reason, the statistical inference may be run over parametric *t*-tests. The statistic of the test for CARs is the ratio between the cumulative abnormal return itself and its estimated standard deviation, as follows:

Statistic of Cumulative Abnormal Returns

$$= \frac{\text{Cumulative Abnormal Return in Day } t}{\text{CAR Estimated Standard Deviation}}$$

As discussed by MacKinlay (1997), the variance (σ_i^2) and standard deviation (σ_i) for the CARs are calculated as follows:

$$\sigma_i^2(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1)\sigma_\varepsilon^2$$

$$\sigma_i(\tau_1, \tau_2) = (\tau_2 - \tau_1 + 1)^{0.5}\sigma_\varepsilon$$

where τ_2 is the last day within the event window and τ_1 the first day within the same period. $\tau_2 - \tau_1 + 1$ then covers the number of days in a given event window. σ_ε represents the error term of the market model regression. The statistic inference is applied for three different significance levels (99%, 95% and 90%).

4. Results and discussion

Considering the objectives of the study, results may be grouped into two main categories, according to the following criteria: 1 – cases in which suppliers and/or customers were (and were not) negatively affected; and 2 – cases in which source companies were (and were not) negatively affected. From the combinations of these conditions, four main classifications of results emerge:

- Group 1** – Cases in which both source companies and supply chain partners were negatively affected;
- Group 2** – Cases in which negative effects were restricted to source companies;
- Group 3** – Cases in which negative effects were restricted to supply chain partners;

Table 1
Five event windows and estimation periods.

	Event Window			Estimation Period		
	Number of Days	Initial Day	Final Day	Number of Days	Initial Day	Final Day
Event Window 1	2	D0	D1	200	D-200	D-1
Event Window 2	3	D0	D2	200	D-200	D-1
Event Window 3	6	D0	D5	200	D-200	D-1
Event Window 4	3	D-1	D1	200	D-201	D-2
Event Window 5	5	D-2	D2	200	D-202	D-3

		Source firms NEGATIVELY affected	Source firms NOT affected
Supply Chain partners	NEGATIVELY affected	<p>GROUP 1</p> <p>Case 2 – BP Oil Spill (Environmental Disaster)</p> <p>Case 3 – Shell Nigeria (Environmental Disaster)</p> <p>Case 5 – Samarco Tailings Dam Collapse (Environmental Disaster)</p> <p>Case 12 – Samsung Galaxy Note 7 (Operational Failure)</p> <p>Case 15 – Toshiba Fraud (Fraud)</p> <p>Case 16 – Volkswagen Fraud (Fraud)</p> <p>Case 20 – GlaxoSmithKline (Corruption)</p>	<p>GROUP 3</p> <p>Case 6 – Foxconn Riots (Corporate Social Irresponsibility)</p> <p>Case 7 – Pegatron (Corporate Social Irresponsibility)</p> <p>Case 8 – CP Foods (Corporate Social Irresponsibility)</p> <p>Case 9 – Samsung Malaysia (Corporate Social Irresponsibility)</p> <p>Case 18 – HP (Corruption)</p>
	NOT affected	<p>GROUP 2</p> <p>Case 1 – Exxon Valdez (Environmental Disaster)</p> <p>Case 4 – Rena Oil Spill (Environmental Disaster)</p> <p>Case 11 – Boeing 787 Dreamliner (Operational Failure)</p> <p>Case 14 – Olympus Fraud (Fraud)</p> <p>Case 19 – Rolls-Royce (Corruption)</p>	<p>GROUP 4</p> <p>Case 10– A380 Delay (Operational Failure)</p> <p>Case 13– Dynegy Fraud (Fraud)</p> <p>Case 17– Siemens (Corruption)</p>

Fig. 3. Overall empirical results and classification groups.

Group 4 – Cases in which neither source companies nor supply chain partners were negatively affected.

The cases within each group may be represented in a 2×2 matrix, as illustrated in Fig. 3.

The analysis begins with the 12 cases in which source companies were negatively impacted (groups 1 and 2). As shown in Fig. 3, at the same time, companies at the origin of environmental disasters experienced losses in all five cases considered (cases 2, 3 and 5 in group 1, and cases 1 and 4 in group 2), three out of four companies giving rise to cases of corporate fraud also presented losses in terms of market value (cases 15 and 16 in group 1, and case 14 in group 2). In turn, source companies were penalised in two out of three cases of operational failure (case 12 in group 1 and case 11 in group 2). On cases of corruption, mixed results were found, with two out of four source companies suffering market value losses (case 20 in group 1 and case 19 in group 2). Particularly interesting, however, is the fact that none of the companies at the origin of cases of corporate social irresponsibility suffered market value penalisation upon the disclosure of such facts. Although this was not the primary objective of the study, results suggest that, when it comes to source companies, there seems to be a graduation of the relevance of negative events, with environmental issues being the most significant on one side, and cases of corporate social irresponsibility being the least on the other.

Regarding cases of environmental disasters more specifically, results may be argued to be coherent with a strong environmental awareness supported by the broad public debate on matters like global warming, the extinction of endangered species, animal ethics, among others. The debate promoted by non-governmental organisations and environmentalist groups (e.g. Greenpeace, Sea Shepherd Conservation Society), as well as by the general media, allied with the creation of various sustainability indexes (e.g. Dow Jones Sustainability Index, FTSE4Good), may have led stock market players to believe that such events could severely compromise the generation of cash flows by those companies, either through

immediate retaliation from the public or even through diverse issues such as the loss of governmental incentives, for instance. These factors could, at least partially, explain the negative reactions of the shareholders of these companies. The results concerning cases of corporate social irresponsibility, on the other hand, seem to contradict the corresponding attention that such cases have received. Arguably, they should be expected to have presented similar results to those observed in environmental cases. Running counter to these perspectives, despite the condemnable nature of the issues addressed in this group (e.g. modern slavery, child labour, poor working conditions), it is feasible that investors have not anticipated major operational losses for the companies directly or indirectly involved. Within a distinct but related perspective, Hillman and Keim (2001) show that, while shareholder value is positively associated with stakeholder management, it is negatively affected by the participation of firms in social issues. Within the two extremes are the cases of corporate fraud, operational failure and corruption, all suggesting both neutral and negative results.

As previously discussed, however, cases of corporate fraud and operational failure have presented slightly stronger suggestions of negative reaction than those related to corruption. It seems that these sorts of events, even considering the sharp market value losses some of them have caused, are not homogeneous in terms of investors' response to source companies. On the differences between the results of each group, it is important to note that it cannot be assumed that they were all analysed by the same poll of investors. Instead, it is very possible that the investors in one group or even in individual companies have no direct links to one another. Additionally, there is the diversity of financial markets analysed, as discussed in section 3.1. Nevertheless, considering the assumptions of the efficient market hypothesis, security markets would be expected to respond to events in a fast and homogeneous manner, otherwise arbitrage opportunities would be offered. Nonetheless, results must be regarded within a macro-prospect, as further particularisations are to be addressed in future research.

Particularly relevant for the study is the investigation of the

Table 2
Results for significant event studies.

Case	Company	Position	CAR (0, 1)	CAR (0, 2)	CAR (0, 5)	CAR (-1, 1)	CAR (-2, 2)
1	Exxon Valdez	Exxon	Source company	-1.88% *	-3.30% **	-5.73% ***	
2	BP Oil Spill	British Petroleum (BP)	Source company			-4.16% *	
		ABB	Supplier			-10.04% ***	-7.83% ***
3	Shell Negeria	Royal Dutch Shell	Source company	-3.39% ***	-4.69% ***		-5.13% ***
		MAN SE	Supplier				-8.70% ***
		Noble Corporation	Supplier	-5.80% ***	-9.67% ***		-7.86% ***
4	Rena Disaster	Costamare	Source company				-7.51% ***
5	Samarco Tailings Dam Collapse	BHP Billiton	Source company	-7.69% ***	-8.80% ***	-12.12% ***	-7.69% **
		Ultrapar	Supplier	-2.52% *			
		FLSmidth	Supplier			-8.37% *	
		Caterpillar	Supplier			-4.97% *	
6	Foxconn Riots	Google	Customer				-5.30% *
		Huawei	Customer			-13.74% **	
7	Pegatron	Sony	Customer				-9.12% *
8	CP Foods	McDonald's	Customer				-2.41% *
9	Samsung Malaysia	LOT Vacuum	Supplier			-14.19% **	-14.98% **
		Namuga	Supplier	-7.66% *		-16.97% **	
11	Boeing 787 Dreamliner	Boeing	Source company	-2.76% **	-3.41% **		
12	Samsung Galaxy Note 7	Samsung	Source company	-7.44% ***	-4.93% **		-9.30% ***
		HannsTouch Solutions	Supplier	-9.57% **	-9.16% *	-11.49% *	-11.15% **
		Radiant Opto-Electronic	Supplier				-8.03% *
		Silicom Motion	Supplier			-12.36% **	
		Xilinx	Supplier				-4.61% **
		Bed Bath and Beyond	Customer			-7.15% **	-6.17% *
14	Olympus Fraud	Olympus	Source company	-42.53% ***	-49.72% ***	-62.89% ***	-39.12% ***
15	Toshiba Fraud	Toshiba	Source company	-5.43% **			
		Costco	Customer			-3.58% *	
16	Volkswagen Dieselgate	Volkswagen	Source company	-17.71% ***	-30.39% ***	-27.56% ***	-17.76% ***
		BorgWarner	Supplier			-8.73% ***	-7.15% ***
		Continental	Supplier	-2.77% *			
		Honeywell	Supplier	-1.62% *	-2.09% **	-4.23% ***	-1.80% *
		Magna	Supplier			-4.90% **	
		Plastic Omnium	Supplier	-4.50% **	-8.44% ***		-7.33% **
		Delphi	Supplier			-3.53% *	
		Meritor	Supplier			-7.40% **	-13.31% ***
		ThyssenKrupp	Supplier			-5.09% *	
		Tenneco	Supplier	-3.97% ***	-8.79% ***	-7.60% ***	-3.87% **
		Lear	Supplier			-3.31% *	
		American Axle	Supplier			-4.17% *	
		Ainsi	Supplier	-4.02% *	-4.92% *		
18	HP	Nvidia	Supplier			-8.62% *	
19	Rolls-Royce	Rolls-Royce	Source company	-2.43% *	-3.21% *	-6.34% ***	-2.87% *
20	GlaxoSmithKline	GlaxoSmithKline	Source company	-2.25% **			-2.97% **
		Exelixis	Supplier			-12.39% **	

Notes: Significant at the *90% level, **95% level and ***99% level.

potential collateral effect of the events analysed within supply chain contexts. As also shown in Fig. 3, 12 events negatively affected supply chain partners (groups 1 and 3), denoting what is here defined as *supply chain contamination*. Based on the empirical findings, *supply chain contamination* would be understood as the dissemination of negative events through supply chains, negatively affecting not only the market value of customers and suppliers (possibly also that of customers of customers and suppliers of suppliers and so on), as well as potentially other dimensions such as corporate reputations, for instance. As also demonstrated in group 3, in cases 6–9 (corporate social irresponsibility) and 18 (corruption), supply chain partners were contaminated even though the source company did not present negative results. In other situations, the contamination seems to be the reflection of the damages observed in the source company, as ascertained in cases 2, 3, 5 (environmental disaster), 12 (operational failure), 15 and 16 (fraud), and 20 (corruption), all pertaining to group 1. Despite the relatively small differences in the number of cases in each situation (seven in group 1 and five in group 3), results suggest that *supply chain contamination* is more likely to occur when the source company is also affected. Further research, however, would be necessary to

assess this factor.

The nature of the events seems to play a different influence when compared to the exclusive analysis around source companies. Once more, intriguing in that regard is the observation of *supply chain contamination* in all four cases of corporate social irresponsibility analysed (cases 6–9 in group 3), even though none of the source companies was affected. This result could potentially indicate a predisposition of investors to associate such issues with supply chain problems. This perception would be supported by several other cases of poor working conditions, in which major problems were concentrated on the operations of suppliers. The other categories all present mixed results. Regardless of the degree, however, all types of events presented *supply chain contamination*. On the fact of the supply chain partner being either a supplier or a customer, it seems that contamination is more likely to affect the former, as results indicate eight cases of supplier contamination (cases 2, 3, 5, 9, 12, 16, 18 and 20) and five of customer contamination (cases 6, 7, 8, 12 and 15), as shown in Table 2. Noteworthy is the fact that only in case 12 – Samsung Galaxy Note 7 – supply chain contamination was observed in both suppliers and customers, as, in all other cases, the contamination was restricted to

either one or the other. Moreover, the data show that, while 26 individual suppliers were found to be contaminated, only six customers turned out to be in the same situation. Table 2 also presents the statistically significant CARs calculated and their respective levels of significance within each of the five distinct event windows analysed.

From a broad perspective, results suggest that negative events do indeed have the potential to negatively affect not only the companies directly responsible but also their supply chain partners. While the penalisation of the first group in terms of market value is not exactly unforeseen, the empirical demonstration that suppliers and customers of these companies may absorb, at least partially, the negative impacts of their failures may be seen as a supplementary contribution to the literature on the efficient market hypothesis, as well as to that on supply chain management. The amplification of the premises for the adjustment of prices to new information (Fama et al., 1969) from single companies to supply chains is particularly stimulating. As well as suggesting that the market value of firms may not be a direct function of factors strictly concerning them, this argument also calls for a re-evaluation of the risk factors to be considered in the analysis of individual firms.

When making transaction decisions, investors may also consider the potential influence that failures and non-routine behaviours of suppliers and customers might come to have on the performance of selected stocks. In other words, apart from the commonly employed analysis, additional factors relative to the business conduction of suppliers and customers must be more closely monitored. However, although the results concentrate on the investigation of market value reactions, they may also be of great interest to managers, as the fluctuations observed can be argued to be a final symptom of more deeply rooted issues. As discussed, it is possible, for instance, that *supply chain contamination* from negative events comes to seriously damage other aspects of neighbouring companies, as, in those cases, they may be collaterally associated with corporate misconducts and failures. Along with the detection of market value losses presented in the present investigation, the impairment of the reputational capital of firms may be an additional measure of *supply chain contamination*. Along with others, both these theoretical and practical implications are further discussed in the conclusion of the study in the subsequent text.

5. Conclusion

Through the analysis of 20 cases of negative corporate events, the present study investigated whether such events negatively affected suppliers and customers of the source firms. From a macro-perspective, results show that, out of the 20 cases analysed, in 12 of them supply chain partners did indeed suffer market value losses. Beyond the empirical evidence provided, the addressing of distinct levels of analysis and the employment of dissimilar approaches represent innovative and provocative findings for the literature on Supply Chain Management and on the efficient market hypothesis. More specifically, the exploratory investigation proposed that negative events are potentially destructive to these companies, with supplementary factors such as the nature of the events, the position of partners in supply chains and the relevance of negative effects on the source companies also being cogitated to influence the dissemination of negative events through supply chains.

These questions were empirically approached through the documentary research and event study methods. Within the 20 cases investigated, the sample procedures resulted in the identification of 307 companies (i.e. 21 source companies, 158 suppliers and 128 customers), within five distinct categorisations: environmental disasters, corporate social irresponsibility, operational

failure, corporate fraud and corruption. Results suggest that supply chain partners absorb, at least partially, the adverse outcomes of negative events. At the same time, the nature of the events seems to influence the collateral effects on supply chains, suppliers seem to be more willing to be affected when compared to customers. However, evidence also shows that supply chain partners are more prone to have their market value damaged in cases in which the source company was also affected. The empirical identification of the dissemination of negative events allowed for the development of the concept of *supply chain contamination* to address the phenomenon studied here. As discussed, the term is particularly useful for referring to the dissemination of negative events through customers and suppliers, in terms of either market value or any other perceivable and/or measurable factors.

Despite its contributions, some limitations emerged during the evolution of the present study, signalling opportunities for future research. As the documentary research developed, some supply chain partners may not have been identified, and hence not included in the final sample of the study. Other negative events may also have not been identified as, although intense, the procedures adopted in the research are not exhaustive. Nonetheless, as documentary research and publicly available data were considered, investors' perceptions were measured through market value variation. Further research could also examine them through other sources of primary data such as interviews, allowing for deeper insights into the investors' positioning and actions. Similarly, other stakeholders could also be assessed (e.g. clients, supply chain partners, employees) to enrich the analysis. Qualitative research in this direction may be particularly useful, in the form of either individual case studies, grounded theory or other approaches.

From a theoretical perspective, the main contribution to the efficient market hypothesis derives from the empirical demonstration that firms may indeed be affected by news related to other companies, opening up interesting avenues for a dialog with the present state of the field. Considering that the efficient market hypothesis primarily relates to the adjustment of prices of individual securities, the present approach may offer progress in this respect as, ultimately, it seems to have broadened that comprehension. The study also supports the development of a new understanding of the conditions that may influence the absorption of outside events by companies. More in-depth study of the different scenarios in which companies are vulnerable to news from supply chain partners or even from competitors may help clarify the functioning of stock markets, notably on what concerns the understanding of the correlation between the prices of securities. In particular, a closer analysis of the reasons supporting eventual co-ordination in the behaviour of investors may add to the study of issues treated by Behavioural Finance researchers, such as herd behaviour, for example. Additionally, once the results have been built into the assumptions of the efficient market hypothesis, they could represent an additional block in the building of a more developed understanding between rationalist and behaviourist academics.

From a supply chain management angle, the proposition of *supply chain contamination* as a new concept may positively contribute to the building of a specific Supply Chain Theory, not necessarily subordinate to other better-established theoretical fields such as Strategy or Economics. This construction would be influenced by the fact that the term was coined to treat a specific supply chain phenomenon. Given the present proposition and the initial empirical demonstration, other studies may be conducted to build a solid theoretical base capable of transforming the concept into a theoretical development itself. More precisely, the study adds to the evolution of an arguably more detailed and comprehensive approach to supply chain risk management. Beyond the market

value examination performed here, other sources of risk may also be treated through the concept of *supply chain contamination*. In large, the delimitation of the concept offers a proper denomination to the approach of eventually less tangible consequences of pertaining to a supply chain, as more distinctly evident questions like operational glitches and supply chain disruption count on more significant attention from literature.

Concerning investors' point of view, the study evidences the increased risk to which individual stocks may be subjected. Pragmatically, as well as the traditional monitoring activities financial analysts perform on companies, additional control over the activities of supply chain partners would be necessary. If the possibility of a *supply chain contamination* does not get more seriously considered, investors must be surprised by severe losses due to disasters or misconduct occurring among supply chain partners. As the results suggest, the analysis of the environmental, social, operational, fraudulent or corruptive behaviour of partner companies must be more significantly included in the general risk analysis conducted on individual securities.

From a managerial perspective, the results call for the development of more rigorous approaches in the selection of supply chain partners. Classical criteria employed in such deliberations such as dependability, speed and cost efficiency must be considered in light of the potentially broadened risks that both suppliers and customers may pose to companies. Among other outcomes, new and potentially more sophisticated contractual tools may be developed with the aim of offering companies valid alternatives to financial compensation for damage from negative events related to their partners. As assessed in the 'Discussion' section, the demonstration of *supply chain contamination* in terms of market value does not exhaust the discussion. Instead, other factors such as the corporate reputation of firms may also be damaged, thus demanding proper assessment of risk. Reputational risks shall be seen as particularly sensitive, as the building of positive corporate reputations normally demands considerable investments in terms of time, energy and financial capital. Additionally, associations with issues like corruption, bribery, fraud, child labour and modern slavery, among others, must be markedly costly to companies in terms of the reconstruction of their public image. The results evidence then the importance of closer monitoring by managers of the business conduct of customers and suppliers, under penalty of being associated with events of this kind, even when companies maintain strict standards in the conduction of their business.

Exposing the occurrence of collateral effects from events reinforces the idea that firms must not be seen as isolated bodies, but rather as part of a broader network of companies and systems which may influence each other. Within this view and in face of the

results here presented, one may argue that at least part of firms' performance (positive or negative) may be attributed to the actions, behaviours, omissions and any other situation related to other companies. More than recognising the influence of generic elements such as the macroeconomic, political or social environment on organisations, the precise identification of supply chain partners as eventual sources of disturbances in that regard is significant. From this angle, it shall be recognised that circumstances residing out of the direct control of managers must be seriously considered as holding the potential to affect companies. In that way, the study of the factors leading to firms' superior performance – in great measure the objective of fields such as Strategy – may gain considerable complexity. Among the mainstream views of this terrain, none seems adequate to address the outcomes here observed. This must corroborate the idea that the reasoning supporting the concept of *supply chain contamination* represents a novel development, which may directly add to the understanding of the arrangement of companies in the form of supply chains.

Still on the distinctions of the current approach, attention is drawn to the fact that it is not related to the creation of value. Instead, the phenomenon discussed is closer related to the study of value destruction, and, particular to the approach employed, to its dissemination through supply chains. Beyond that, the concept of *supply chain contamination* allows the construction of metaphorical transfer, borrowing from the medical and biological literature the idea that some diseases (i.e. negative events) are infectious, possibly spreading around those who get in direct or indirect contact with the disease carrier (i.e. supply chain partners and source firm, respectively). It is necessary, however, to advance the understanding of the conditions and means by which such contamination occurs, which may significantly contribute not only for the study of supply chains but also for the knowledge of how individuals, groups and systems interact.

Lastly, the answer to both the research questions proposed – (i) Do investors negatively react to announcements of negative corporate events related to a supply chain partner? and (ii) Do factors such as the nature of the event, the positioning of the partner in the supply chain and the fact of the source company itself be affected influence the reaction of investors? – is yes, as these conjectures are supported by the results here presented.

Appendix A. Additional evidence for supply chain relationship

Evidence #	Reference	Available at:
1	Nelson (1989)	http://newsok.com/article/2284037
2	ABB (2010a)	http://www02.abb.com/global/abbzh/abbzh251.nsf!OpenDatabase&db=/global/abbzh/abbzh250.nsf&v=553E&e=us&url=/global/seitp/seitp202.nsf/0/1840DB77909FE986C125718F0048DA2F!OpenDocument
3	Accenture (2016)	https://www.accenture.com/us-en/success-mastering-high-performance-bpo-bp-finance-accounting
4	The Guardian (2010)	https://www.theguardian.com/environment/2010/jun/29/bpoilspilltimelinedeepwaterhorizon
5	British Petroleum (2010)	http://www.bp.com/content/dam/bp-country/en_gb/uk/documents/scotland_Quad204_Project_EIA_Scoping_Report_Aug_2010.pdf
6	Fluor Corporation (2008)	http://investor.fluor.com/phoenix.zhtml?c=124955&p=irol-newsArticle&ID=1186681
7	GE (2003)	http://www.ge.com/files/usa/company/investor/downloads/ge_oil_gas_indonesia_ing.pdf
8	JA Solar Holdings (2009)	http://investors.jasolar.com/phoenix.zhtml?c=208005&p=irol-newsArticle&ID=1256176
9	KBR Inc. (2010)	http://investors.kbr.com/investors/press-releases/Press-Release-Details/2010/kbr-signs-technology-collaboration-agreement-with-bp/default.aspx
10	Microsoft (2007)	http://www.microsoft.com/danmark/cases/Microsoft-SQL-Server-2005/BP/BP-Cuts-Hours-Off-Emergency-Response-with-Visual-Solution-that-Tracks-Threats-to-Assets/201427

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(continued)

Evidence #	Reference	Available at:
11	Mason (2010a)	http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/7992825/BPspillWeatherfordfloatcollarconcernsplayeddown.html
12	Sempre Energy (2009)	http://www.sempra.com/pdf/responsibility/final_2009.pdf
13	Flinders (2009)	http://www.computerweekly.com/news/1280091533/BP-outsources-comms-and-supplier-management-to-T-Systems
14	Mason (2010b)	http://www.telegraph.co.uk/finance/newsbysector/energy/oilandgas/8187385/US-inquiry-into-Gulf-of-Mexico-oil-spill-blocked-by-BP-supplier-National-Oilwell-Varco.html
15	Marathon Oil (2004)	http://www.marathonoil.com/content/includes/2004ar/oprev_gas.htm
16	ABB (2010b)	http://www.abb.com/cawp/seitp202/2d16a84ac7d729b9c125776e004be755.aspx
17	Emerson Electric (2011)	http://www2.emersonprocess.com/en-uk/news/pr_uk/pages/1108-shell.aspx
18	Fluor Corporation (2011)	http://www.fluor.com/projects/shell-gabon-oil-gas-processing-epc
19	Johnson Controls (2011)	http://investors.johnsoncontrols.com/news-and-events/press-releases/johnson-controls-inc/2011/23-03-2011
20	KBR Inc. (2011)	http://investors.kbr.com/investors/press-releases/Press-Release-Details/2011/shell-global-solutions-and-kbr-announce-hydroprocessing-technology-alliance-agreement/default.aspx
21	MAN SE (2011)	http://www.man.eu/man/media/en/content_medien/doc/global_corporate_website_1/presse_und_medien_1/DE_MDT-CH_tradepress_Shell_Rahmenvertrag_19122011.pdf
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186	Citron Research (2015)	http://www.citronresearch.com/wp-content/uploads/2015/09/MBLY-Part-II-final-a.pdf

(continued)

Evidence #	Reference	Available at:
187	Lear (2015)	http://www.lear.com/blog/tag/lear-corporation/
188	American Axle (2014)	https://www.aam.com/docs/default-source/annual-reports/aam_2014-annual-report_10k.pdf?sfvrsn=6
189	Autoliv (2012)	http://www.autoliv.com/Investors/Financial%20Reports/AR2012.pdf
190	NGK (2013)	http://www.ngkntk.com.br/automotivo/ngk-e-premiada-pela-volkswagen-por-excelencia-em-velas-de-ignicao/
191	UPS (2016)	https://pressroom.ups.com/assets/pdf/pressroom/infographic/UPS_VehicleEvolution_Poster-Vertical-Final-FPO.p1.pdf
192	Intel (2012)	http://www.intel.com/content/dam/www/public/us/en/documents/supply-updates/itanium-9500-enabling-components-supplier-listing.pdf
193	Hille and Kwong (2010)	https://www.ft.com/content/8287fed0-68cd-11df-96f1-00144feab49a
194	Balfour and Culpan (2010)	https://www.bloomberg.com/news/articles/2010-09-09/the-man-who-makes-your-iphone
195	Jittapong and Dhananaphorn (2014)	http://www.reuters.com/article/us-charoen-pok-food-china-idUSKBN0GI0RF20140818
196	Lenovo (2012)	http://pcsupport.lenovo.com/fr/en/downloads/ds029490

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9

The Impact of Negative Social/ Environmental Events on the Market Value of Supply Chain Partners

Mauro Fracarolli Nunes

1 Introduction

Corporate social responsibility (CSR) comprehends the belief that firms hold commitments to society beyond the creation of wealth for investors. Within this concept, along with environmental protection, the interests of a larger group of stakeholders must be taken into account in the development of businesses (Carroll, 1999). In order to certify that they operate under sustainable practices, firms have increasingly sought to be well ranked on their performance in CSR policies, as “governments, activists and the media have become adept at holding companies to account for the social consequences of their activities” (Porter & Kramer, 2006, p. 1). Beyond that, several actions may be adopted by firms in the building and management of corporate social and environmental reputations, not necessarily coherent with real sustainable operations (Fracarolli Nunes & Lee Park, 2017).

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From a sustainable supply chain management (SSCM) perspective, such issues have gained considerable relevance as the field has evolved from stand-alone research in social and environmental debates into a real CSR agenda (Carter & Easton, 2011). The development of outsourcing strategies (Quinn & Hilmer, 1994) and the exponential increase in the complexity of production, distribution and consumption networks that followed made more urgent the better understanding of the tangles of direct and indirect relationships created. Due to this operational intricacy, pressing sustainability issues such as the employment of modern slavery, child labor, deforestation and general pollution, among others, may remain concealed, with the perception of their responsibility diluted through the many parties involved from raw material to consumption. In this set, the effects of firms' actions and decisions may be analyzed within an extended perspective, considering the eventual repercussions for direct stakeholders, but also for stakeholders of stakeholders. While this task must demand a theoretical effort in the design of convoluted relations of immediate and more distant counterparts, empirical investigations of the extended impact of sustainability-related issues must help clarify the actual relevance attributed to such matters by distinct groups of stakeholders. The present study concentrates then on the analysis of the consequences for the market value of a firm of a negative social/environmental event occurring in (or caused by) a member of its supply chain. The objective of the study is thus better represented by the following research question: *do investors negatively react to announcements of negative social/environmental events related to a supply chain partner?*

The event study method is indicated to conduct such a test as it allows for the perception and measurement of market value creation/destruction due to any new information available about firms. Through the examination of 15 cases, the variance of the market value of 82 supply chain partners was assessed at three levels of analysis: (1) individually, considering the isolated effect of each event on each partner; (2) combined effect through supply chains, comprehending the gathered effect of events on all supply chain partners identified; and (3) general effect of negative social/environmental events, measuring the overall impact of such events through the whole sample.

The study intends to offer theoretical and practical contributions. Regarding the former, it is relevant as it contributes to the operations management literature by addressing the link between sustainability matters and stakeholders' assessment. Beyond that, through the proposition of both the *supply chain extended stakeholder model* and the concept of *incidental stakeholder*, it also subsidizes the emergence of new questions around the critical role of stakeholder theory in sustainable operations management (SOM). As for the practical contribution, the study offers empirical evidence that might be useful in guiding and valuing the importance of SSCM decisions, specifically on what relates to the potential impact on the market value of indirectly associated firms.

Following this introduction, the investigation is arranged into six further sections. The literature review proposes an integrative discussion on the main arguments of stakeholder theory, on the developments in the literature on SSCM and on the efficient market hypothesis, as well as on the main criticisms of the latter (behavioral finance, institutionalism and the nature of investors). The subsequent section presents the proposition of a theoretical framework and the hypothesis of the study, both developed from the assimilation of previous debate. In turn, the method and sample section approaches the event study methodology as well as the sampling procedures adopted, succeeded by the results, discussion, conclusion and limitations and suggestions for future research.

2 Literature Review

2.1 Stakeholder Theory

In contrast to more “shareholder-driven” understandings of the nature and objectives of firms (e.g. Friedman, 1970), stakeholder theory builds on the assumption that the practice of business must have the attention to values as one of its fundamental concepts (Freeman, Wicks, & Parmar, 2004). Accordingly, it would invite managers to explicit the way they intend to run operations, particularly regarding the sort of relationships they seek to build with related parties. Through this prism, the meeting of corporate aspirations would be more virtuous, as, in the vision of the

authors, “truth and freedom are best served by seeing business and ethics as connected” (Freeman et al., 2004, p. 364). In a way, this call for recognition of and effective concern for all inter-related parties (Freeman, 1994) may be seen as a theoretical basis for the concept of sustainability in business, as further discussed ahead.

Nevertheless, although the notion that organizations count on stakeholders has been extensively incorporated, the definition of who or what indeed constitutes one has been the subject of a rich and sometimes confusing debate, with terms such as stakeholder, stakeholder model, stakeholder management and stakeholder theory being employed in remarkably distinct forms (Donaldson & Preston, 1995). In that regard, Windsor (1992) highlights prevalent variations in the approaches, orbiting around broader and narrower perspectives. Within the first cluster would be the perception defended by authors such as Freeman and Reed (1983), for whom the notion of stakeholder would refer to those individuals or groups who may influence and/or be influenced by organizational accomplishments. Similarly, Freeman’s (1984) “now-classic definition” (Mitchell, Agle, & Wood, 1997, p. 856)—that “a stakeholder in an organization is (...) any group or individual who can affect or is affected by the achievement of the organization’s objectives” (Freeman, 1984, p. 46)—would be particularly generous once, beyond leaving the notion of stake and potential stakeholder unequivocally open to be fulfilled by nearly any actor, it also posits the perception of stakes as being possible in both an uni- and a bidirectional sense (Mitchell et al., 1997). Accordingly, from this point of view the only agents excluded from eventual stakes would be those simultaneously unaffected by organizations and incapable of affecting them. Arguably more circumscribed perspectives, in turn, would lie in the notion of stakeholders as an adequate label for factions considered essential to the continued survival of organizations (Stanford Research Institute, 1963).

By linking the idea of stakes to risk, Clarkson (1994) offers a more compressed interpretation (Mitchell et al., 1997). Inner to his view, in face of their awareness and risk propensity, stakeholders shall be roughly classified as either voluntary or involuntary, offering what seems to be a distinction around the level of activeness or passivity one may have in relation to the operations of a company. More specifically, while the for-

mer would be delineated as those stakeholders who “bear some form of risk as a result of having invested some form of capital, human or financial, something of value in a firm”, involuntary ones would be those indirectly “placed at risk as a result of a firm’s activities” (Clarkson, 1994, p. 5). Besides the considerations over the definition and classification of stakeholders, a discussion of stakeholder theory from a processual perspective is also useful. In this way, according to Donaldson and Preston (1995), contrary to the previously conventional input-output view in which investors, employees and suppliers are understood as sources of inputs directed to firms, which then process them into output to customers, within the stakeholder model, all actors holding legitimate interests in an enterprise would expect benefits, in a way that there should be no prioritization of the interests of one group over the others. More than the consideration of a broader set of actors, the angle proposed features two-way exchange flows between firms and their respective stakeholders. Figures 9.1 and 9.2 below illustrate these different conceptualizations.

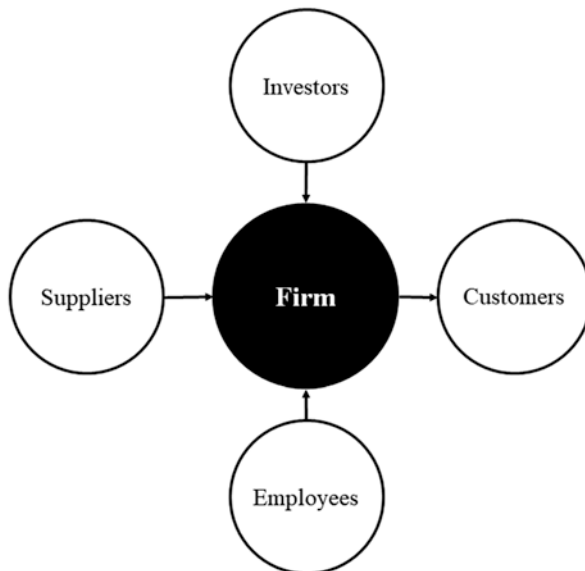


Fig. 9.1 Conventional input-output view. Source: Adapted from Donaldson and Preston (1995)

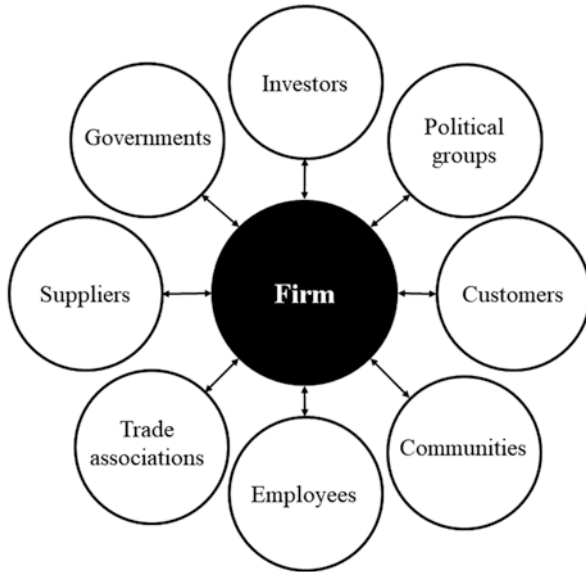


Fig. 9.2 Stakeholder model. Source: Adapted from Donaldson and Preston (1995)

The recognition of firms' relations and links to their numerous counterparts represents a key element of the ongoing investigation, as stakeholder theory offers the main postulates not only for the discernment of these ties, but also for their differentiation in terms of objectives. In addition to offering a visual perspective of the social architecture in which firms are embedded, the main arguments of the theory—along with the structure of the stakeholder model—may be seen as central to the development of SOM. Among other things, the reasoning would systematize firms' need to simultaneously meet the demands of a wide range of publics, which, coherently with Elkington's (1997) triple bottom line approach to sustainability, could be delimited in distinct social, environmental and economic perspectives.

Although pivotal to the relations of stakeholders and firms *per se*, the stakeholder model could possibly profit from a theoretical development encompassing the relation between firms and their eventual *incidental stakeholders*, here defined as the stakeholders of stakeholders, which, as such, may not be aware of their links with other companies, or even not

consciously willing to take the risks associated with such a subsidiary connection. Aiming to offer additional guidance in that direction, the relation between firms composing supply chains and their direct and indirect counterparts (i.e. *incidental stakeholders*) are further addressed next within a SSCM perspective. The debate is markedly pertinent to the development of both the theoretical proposition and the hypothesis of the study.

2.2 Sustainable Supply Chain Management: The Link Between Firms, Partners and Stakeholders

Supply chains have been traditionally understood as arrangements of companies organized around the efficient flow of materials (La Londe & Masters, 1994), information, products and services (Mentzer et al., 2001), bringing the latter two to markets (Lambert, Stock, & Ellram, 1998). As pointed out by Mentzer et al. (2001), the basic grouping configuring a supply chain would consist of at least three elements: a firm, a buyer and a supplier. In this way, direct supply chains would account for the alignment of these three players, while extended ones would include suppliers of immediate suppliers and customers of immediate customers. Although nearly innate to the current comprehension of supply chains, the depiction of players and the links between them is helpful in the comprehension of contemporary matters firms forming these arrangements have faced. Corporate social responsibility issues, for instance, have been particularly critical, mainly for companies inserted in global configurations. With the emergence of several cases of negative social/environmental events in supply chains, ranging from accusations of environmental damage to forms of modern slavery, CSR policies managed in buyer-supplier relationships have been openly discussed, in both the traditional media and social networks. In this way, sustainability matters, once marginal in the supply chain debate, have now become part of its mainstream, including what has come to be known as the study of SSCM (Pagell & Shevchenko, 2014). In their quest to meet the demands of societies, firms, municipalities and countries have invested in the improvement of their

processes around green procurement (Michelsen & De Boer, 2009) and socially responsible purchasing (Worthington, Ram, Boyal, & Shah, 2008), among other SSCM practices.

As observed by Nidumolu et al. (2009, p. 2), “not surprisingly, the fight to save the planet has turned into a pitched battle between governments and companies, between companies and consumer activists, and sometimes between consumer activists and governments”. Within this logic, the discussions around CSR would encompass a much broader and more complex debate than that confined to the single firm, as all the chain partners may potentially affect each other in this regard. Yet, considering that partners may simultaneously hold joint and opposing goals (Ellegaard & Andersen, 2015), the link between CSR and supply chains may emerge in apparently much more discreet ways. As specific industries (e.g. the fashion business) have largely relocated their production from economically developed areas to low-labor-cost zones, important “unsustainability symptoms” may arise on both sides. Beyond causing sudden unemployment among the unskilled workers of the deprecated areas, the transfer usually relegates newly employed personnel to precarious conditions of work (De Brito, Carbone, & Blanquart, 2008).

Tragedies such as the Rana Plaza Collapse, in which thousands of workers died (Hoskins, 2015), are contained in this category, as well as the fires in Bangladesh factories, which also victimized hundreds of people (Bajaj, 2012). These sorts of cases and events, along with those within an environmental context, offer the opportunity to test whether a given group of stakeholders (i.e. investors) negatively reacts to eventual disrespect or losses caused by firms to other groups (e.g. employees, communities), either directly or diffusely. Moreover, the approach also allows for the evaluation of investors’ responses to sustainability issues in the condition of *incidental stakeholders* of the firms responsible for social and environmental failures. In this sense, the approach is expected to offer insights into the critical role of stakeholder theory in SSCM and SOM as a whole. In advancing this debate, the following section concentrates on developments in the literature on the efficient market hypothesis and the adjustment of stock prices to new information. The discussion presents an additional basis for the comprehension of how negative social/environmental events may possibly impact the market value of supply chain partners.

2.3 Efficient Markets Hypothesis: The Adjustment of Stock Prices to New Information

The idea of efficiency seems to indicate the best possible way in which something may be accomplished, in terms of either minimized use of time and resources or any other related factor. In this way, the concept is employed in the most distinct fields of study, generally in relation to the ideas of readiness and competence. From an operations management angle, for instance, it is classically used in themes such as the assessment of logistics performance (e.g. Clarke & Gourdin, 1991), inventory management (e.g. Småros, Lehtonen, Appelqvist, & Holmström, 2003) and supply chain management (Kärkkäinen, 2003), among others. From a sustainability landscape, in turn, the idea of efficiency is usually related to the optimum use of water (Rogers, De Silva, & Bhatia, 2002) and energy (Ayres, Turton, & Casten, 2007), along with a broad debate around the responsible use of other inputs, the generation of waste, as well as the general consequences of human activities for societies and the environment.

When it comes to the functioning of stock markets and the adjustment of stock prices to new information (Fama, Fisher, Jensen, & Roll, 1969), the concept of efficiency assumes a particularly prominent aspect in the present study, as, depending on its fortitude as a premise, the beliefs around shareholders' reactions may be considerably distorted. Within this reasoning, the finance literature disposes capital markets as efficient in cases where they fully and correctly represent all pertinent information in the determination of security prices (Malkiel, 1989). From this perspective, as observed by Beechey, Gruen, and Vickery (2000), prices would be expected to be invariably coherent with "fundamentals", or the logical and economic reasoning supporting their formation.

Based on these underlying conceptions, Fama (1970) proposes the division of work on market efficiency into three groups: weak-form tests, semi-strong-form tests, and strong-form tests. While the first would relate to the assessment of past returns as predictors of the future, the second and third respectively refer to the speed with which the announcement of public information is reflected in prices and the possibility of investors holding private information which may not be fully reproduced in market figures (Fama, 1991). In reviewing this classification, the author evolves

the idea into a more comprehensive division: (1) tests for return predictability, (2) event studies and (3) tests for private information. In this way, in its strong version, the efficient market hypothesis would represent “the simple statement that security prices fully reflect all available information” (Fama, 1991, p. 1575), while in “a weaker and economically more sensible version”, information would be reflected in prices to the limit where the marginal benefits of such inputs would not outrun their marginal costs (Jensen, 1978).

Despite its prominence and arguably broad acceptance, the efficient market hypothesis is not free of criticism. Westerlund and Narayan (2013), for instance, highlight that some of its predictions on the joint behavior of spot and future prices are not supported by most empirical evidence. Authors such as Basu (1977), in turn, stress the considerable questioning around the validity of the rationale, as, among other issues, many scholars would claim that prices are actually biased concerning the price-earnings (P/E) ratios of securities, for example. Fama (1970, 1991) partially refutes these criticisms, evoking what he calls “the joint-hypothesis problem”, according to which market efficiency all alone would not be testable. Instead, it would be inescapably evaluated alongside equilibrium or asset-pricing models. From this angle, there should be ambiguity in the eventual findings of anomalous behavior of returns, as it would not be evident whether they are indeed due to market inefficiency or to poor market equilibrium models. Nevertheless, in comparison to the other classifications, the implications of event studies for market efficiency would be less controversial, as they would narrow the distinction between market efficiency and equilibrium-pricing matters (Fama, 1991). Still, rooted in a semi-strong form of the efficient market hypothesis, event studies would offer the most direct and supportive evidence around efficiency, and for this reason are adopted in the present investigation.

2.4 Behavioral Finance, Institutionalism and the Nature of Investors

Beyond the critics already addressed, severe arguments have been put forward to challenge the rationality premises underpinning the efficient market hypothesis. Among the most significant questioning in that sense

would be those within a behavioral finance perspective, which, as pointed by Barberis and Thaler (2003, p. 1053), “argues that some financial phenomena can plausibly be understood using models in which some agents are not fully rational”. Within the distinctions of the field of traditional finance would be the general recognition that the human brain processes information through shortcuts and emotional filters, also called “psychological biases” (Nofsinger, 2016). Depending on the myriad forms such psychological biases may assume, investors could be argued to hold a considerable level of heterogeneity on what relates to their decision-making processes and reactions.

Yet, it is also possible that the behavior of individual investors may come to significantly, or at least partially, differ from that of institutional ones, such as pension funds, for example. From this angle, while advances in behavioral finance might be particularly useful to analyses concentrated in the first group, institutional and sociological logics may add relevant insights to the investigation of behavior patterns and anomalies of the latter. Gompers and Metrick (1998), for instance, contend that institutional investors tend to have preferences for securities holding greater market capitalization, liquidity and book-to-market ratios, as well as lower returns for the preceding year. Ferreira and Matos (2008), in turn, add that, beyond the preferences for the stocks of large firms, institutional investors would also be inclined to hold shares of firms with relatively higher levels of governance. Apart from these and other issues more directly related to the financial characteristics of businesses and managerial practices, less straightforward circumstances are also argued to influence the decisions of institutional players. In this way, Goetzmann, Kim, Kumar and Wang (2014) show the impact that weather-based indicators of mood might have on institutional investors’ decisions, as cloudier days would increase the perception of overpricing and thus the propensity to sell.

It is also possible that certain frames happen to be useful in the analysis of the investment decisions of both individual and institutional sets. Jun (2016, p. 487), for example, highlights the clout that socially responsible investing (i.e. “investment strategy that incorporates environmental, social and governance (ESG) issues in the decision-making process”) may exercise on the two groups, representing an additional concern to that solely focused on financial aspects. Nevertheless, independently of the

nature of these influences, it seems reasonable to recognize the relevance that psychological, social and institutional factors may have in the reaction of distinct categories of investors. From this angle, although the current investigation is grounded on the premises of the efficient market hypothesis, the literature discussed in the present sub-section contributes to the recognition of its limitations, notably around the discernment that investors may not be seen as a homogeneous class.

3 Theoretical Framework and Hypothesis Development

Considering the theoretical background discussed in the previous section, the present study counsels that the inter-relation between the stakeholders of different firms may be conjunctly analyzed in an integrating and, perhaps, more embracing theoretical proposition. In this way, alike Donaldson and Preston's (1995) stakeholder model, it seems that Mentzer et al.'s (2001) conception of direct supply chains places companies as central in relation to their near environment, at least on what relates to the trade of their inputs and outputs. While buyers and suppliers would be firms' immediate counterparts, from an extended view (i.e. extended supply chains), buyers of buyers and suppliers of suppliers (as well as all their own related counterparts) would represent *incidental stakeholders*, as previously defined in the present study. This design suggests that, although these *incidental stakeholders* do not share immediate interfaces with firms, they may also be affected by their attitudes in an indirect manner. Such a rationale then theoretically supports the developments of the *supply chain extended stakeholder model* depicted in Fig. 9.3, where the firm's stakeholders are presented in black and its *incidental stakeholders* in white:

The *supply chain extended stakeholder model* accounts for the prolonged consequences that the acts, behaviors, events, facts, crisis, fails, successes or virtually anything concerning a given firm may cause not only on its direct stakeholders, but also on the stakeholders of its immediate upstream and downstream partners. The development is based on the idea that, within supply chain contexts, the counterparts of firms may be grouped as first-, second- and third-order stakeholders, and so on. While the first

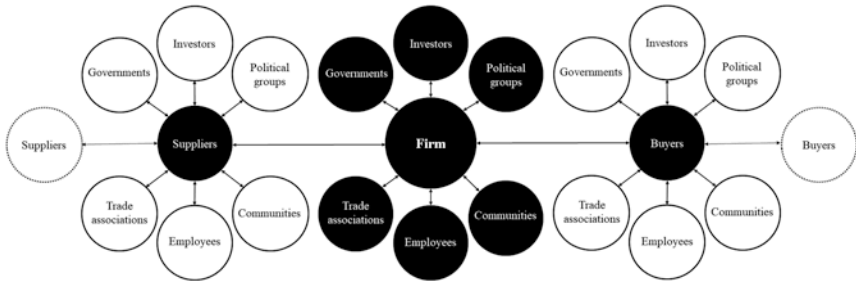


Fig. 9.3 The supply chain extended stakeholder model

order addresses the traditional stakeholder model, the second relates to the stakeholders of direct buyers and direct suppliers. The third order, in turn, regards the stakeholders of buyers of buyers and those of suppliers of suppliers. Simplistically, from the second-order stakeholders on, the indirect stakeholders of a firm would be classified as incidental. Likewise, more than one-way paths, the influence that the stakeholders of a given firm shall exercise on other firms within this net is also lengthened, what is illustrated by each of the two-way arrows in the framework. Within this reasoning, even if stakeholders and firms are not directly linked to each other, it is possible that they end up affecting one another, as they belong to a broader interconnection. While the framework is grounded on the first two topics discussed in the literature review, its alignment with the efficient market hypothesis subsidizes the development of the study's hypothesis:

H1: Investors negatively react to announcements of negative social/environmental events related to a supply chain partner.

The hypothesis is tested on three distinct levels: (1) the impact of each negative event on the market value of each supply chain partner identified; (2) the overall impact of each negative event on the conjunction of corresponding supply chain partners identified; and (3) the general impact of negative social/environmental events. While the first and the second levels aim to provide evidence on specific cases (i.e. offering a detailed assessment of the impact of specific events on specific partners and specific supply chains), the third level of analysis seeks to provide

initial evidence for a possible generalization of the expected results of negative social/environmental events. The following section details the sampling procedures for the identification of the 15 different cases considered and the event study method applied, as well as its specificities to the conduction of each level of analysis.

4 Method and Sample: The Event Study Methodology

The event definition represents the initial task in the conduction of an event study and is divided into two main steps: the definition of the event of interest and the identification of the event window, defined as “the period over which the security prices of the firms involved in this event will be examined” (Campbell, Lo, & MacKinlay, 1997, p. 151). For control purposes, seven different event windows are examined. In this study, the definition of events was based on the disclosure of sustainability and CSR failures in supply chain contexts from January 2005 to September 2015. The relatively long period considered (more than 10 years) aims to capture both recent and earlier events, lessening eventual contextual or time bias in the results. In this way, the electronic databases of 10 international newspapers and magazines were chosen as the object of the sampling procedure: the *New York Times* (www.nytimes.com), *Washington Post* (www.washingtonpost.com), *Guardian* (www.theguardian.com), *Telegraph* (www.telegraph.co.uk), *The Economist* (www.economist.com), *Financial Times* (www.ft.com), *Le Monde* (www.lemonde.fr), *El País* (www.elpais.com), *O Estado de São Paulo* (www.estadao.com.br) and *Clarín* (www.clarin.com). Aiming to select negative social and negative environmental events, the following words were applied in the search tools offered by the websites: “buyer”, “catastrophe”, “child labor”, “client”, “corporate social responsibility”, “customer”, “failure”, “global warming”, “hazard”, “human rights”, “protest”, “pollution”, “infracton”, “servitude”, “supply chain”, “supplier”, “sustainability” and “tragedy”.

In face of the results of this initial search, the following steps of the sampling procedure consisted in reading the news collected in full, segregating cases into negative social and negative environmental events and

identifying source companies and supply chain partners. Considering the objectives of the study and our methodological choice, companies that did not have the prices of their shares publicly disclosed were necessarily discarded from the final sample. Table 9.1 below briefly presents the 15 cases analyzed.

Daily closing prices adjusted for dividends and splits were collected from the website Yahoo Finance (see <http://finance.yahoo.com>). A measure of abnormal returns is required for the appraisal of the impact of the event (Brown & Warner, 1980). The method most often used for the estimation of normal returns (*ex ante*) in event studies is the market model proposed by Fama (1970) (Agrawal & Kamakura, 1995). Abnormal

Table 9.1 Analyzed cases, respective nature and number of suppliers

Case number	Case name	Nature of the case	Source company	Number of suppliers
1	Palm Oil—Unilever	Environmental	Multiple palm oil suppliers	2
2	Palm Oil—Nestlé	Environmental	Multiple palm oil suppliers	2
3	BP Oil Spill	Environmental	British Petroleum	6
4	Zara Brazil	Social	Small local suppliers	1
5	Foxconn	Social	Foxconn	12
6	Junking the Jungle	Environmental	Asia Pulp Paper	1
7	Bangladesh Fire	Social	Small local suppliers	6
8	Child Labor	Social	Multiple local suppliers	1
9	Zara Argentina	Social	Small local suppliers	1
10	Rana Plaza Collapse	Social	Small local suppliers	16
11	Pegatron	Social	Pegatron	1
12	Licence to Kill	Environmental	Multiple palm oil suppliers	3
13	Palm Oil—P&G	Environmental	Multiple palm oil suppliers	5
14	CP Foods	Social	CP Foods/Small local suppliers	5
15	Volkswagen Fraud	Environmental	Volkswagen	20

returns are then considered as the difference between actual and normal ones and are analyzed in the form of cumulative abnormal returns (CARs) for individual firm analysis and cumulative average abnormal returns (CAARs) when more than one company is considered for a given case (see Brown & Warner, 1980; Campbell et al., 1997, for further references).

5 Results

The first analyzed event window (D-1, D0) shows that, among the 82 firms studied, 80 did not demonstrate significant negative returns at the 99% or 95% significance levels. In the second event window (D0, D1), none of the 82 firms yielded negative returns at the 99% significance level, and 81 also did not find confirmation for negative abnormal returns at the 95% significance level. The third event window (D0, D2), in turn, displays 78 non-affected companies at the 95% significance level. However, the analysis of the 99% significance level with two companies (Borg Warner and Plastic Omnium, both in Case 15–Volkswagen Fraud) could possibly indicate negative reactions. For the fourth event window (D-1, D1), 81 companies did not present negative abnormal returns at the 99% significance level.

Similarly to the results found in event window 2, the fifth event window (D-1, D5) shows that 79 companies did not present negative reactions. At the 99% significance level, the fact that two firms (Apple in Case 8–Child Labor and Honeywell in Case 15–Volkswagen Fraud) yielded negative abnormal returns might suggest that negative reactions were detected for these companies. In the sixth event window (D-2, D2), 78 out of the 82 assessed companies did not present significant negative abnormal returns. Once more, at the 99% significance level the negative returns detected in two firms (Apple in Case 8–Child Labor and BorgWarner in Case 15–Volkswagen Fraud) might suggest a possible reaction.

Finally, the last and wider event window (D-5, D5) captured no reaction from 78 companies at the 95% significance level. However, at the 99% significance level, the negative abnormal returns detected in two companies (Sears in Case 7–Bangladesh Fire and Honeywell in Case 15–

Volkswagen Fraud) may also point to the possibility of a negative reaction. Table 9.2 below summarizes the findings, presenting the companies for which significantly negative market value losses were observed as a result of the negative social/environmental events considered.

Even though a compilation of all results indicates some negative effects, the majority of the firms studied (74 out of 82) did not demonstrate negative CARs in any of the event windows considered. The results suggest that, in general, investors do not react to negative social/environmental events in supply chains, as no significant negative CARs were detected in 74 companies. However, market value penalization observed in eight companies suggests that further analysis may be useful, especially for case 15–Volkswagen Fraud, which concentrated five companies in this situation.

As previously discussed, the second level of analysis aims to detect the effect of a given event through all the buyers and suppliers identified (i.e. the whole supply chain). However, some cases (e.g. cases 4, 6, 8, 9 and 11) count on only one identified buyer/supplier. For this reason, this level of analysis concentrates only on those cases in which two or more supply chain partners were found, as the analysis of single firms coincides with the first level of analysis discussed above. None of the cases presented statistically negative CAARs.

For the third level of analysis, the overall impact of negative social/environmental events is assessed. Table 9.3 below presents the calculated CAARs and their respective statistics for each period considered. None of the CAARs calculated presented statistical significance, meaning that the

Table 9.2 Summary of results

Case number	Case	Company	CAR	t-stat	Statistical evidence
Case 5	Foxconn	Google	-9.22%	-1.99	95%
Case 7	Bangladesh Fire	Sears	-43.73%	-4.12	99%
Case 8	Child Labor	Apple	-12.21%	-4.92	99%
Case 15	Volkswagen Fraud	Magna	-4.90%	-2.15	95%
Case 15	Volkswagen Fraud	BorgWarner	-8.73%	-4.27	99%
Case 15	Volkswagen Fraud	Honeywell	-5.56%	-2.80	99%
Case 15	Volkswagen Fraud	Siemens	-2.05%	-2.18	95%
Case 15	Volkswagen Fraud	Plastic Omnium	-8.44%	-3.03	99%

Table 9.3 CAARs for the seven event windows

	CAAR	t-stat
Event window 1	-0.09%	-0.04
Event window 2	0.01%	0.00
Event window 3	0.01%	0.01
Event window 4	-0.27%	-0.11
Event window 5	0.38%	0.09
Event window 6	-0.16%	-0.05
Event window 7	-0.04%	-0.01

negative social/environmental events analyzed did not impact the market value of supply chain partners when observed through this view. The results suggest that, in general, investors do not react to negative social/environmental events in supply chains, as significant negative CAARs were not detected in any of the seven different event windows considered. In other words, the market value of supply chain partners was not penalized by the announcement of negative events of social/environmental practices held by chain partners.

6 Discussion

We first assess the cases that relate to environmental practices. Cases 1–Palm Oil Unilever, 2–Palm Oil Nestlé, 6–Junking the Jungle, 12–Licence to Kill and 13–Palm Oil P&G demonstrate various similarities, as they all comprehend environmental accusations by Greenpeace around deforestation in tropical areas (Blewitt, 2014; Gologowski, 2012; Mainwaring, 2011). Beyond that, they also share the fact that the market value of the companies involved did not cause significant negative reaction in any of the event windows considered. This corroborates the idea that damages to corporate image or to reputational matters do not affect the market value of firms. Also related to environmental issues, the BP Oil Spill case (Case 3) did not cause negative reactions for any of its supply chain partners. Moving along to workforce conditions, despite several protests around the globe, the considerable attention from the traditional media to the tenth case (i.e. Case 10–Rana Plaza collapse) and the great impact it had on social networks (Hahn, 2017), none of the companies linked to the episode suffered market

value losses. That possibly means that, from an operational perspective, the incident may have been interpreted as presenting no major impact on the firms involved, as the production addressed in the sweatshops could arguably be easily and rapidly redirected to other suppliers.

The Bangladesh Fire (Case 7), in turn, showed that out of the six supply chain partners linked to the case, only Sears saw its market value negatively impacted. It is possible that a higher portion of Sears' production was concentrated in the factory. Nevertheless, the analysis of the case did not allow for such conclusion. Previous to the event day itself, Sears' market value already presented abnormal behavior, with high volatility. Even though the fourth case (Zara Brazil) is also within the fashion business, unlike the cases discussed above, it does not relate to a tragedy with a high death count. Moreover, it focuses on a single company, instead of diverse supply chain partners. The absence of negative reactions from investors to slavery practices suggests that reputational issues were not relevant for them either. Zara's case in Argentina (Case 9), linking the company to poor working conditions in the country (Root, 2014), holds great similarity to the case in Brazil (Shankar & Das, 2015). The results of the empirical study were the same, with investors presenting no negative reaction to the disclosure of such practices.

In the Foxconn case (Case 5), out of the 12 companies analyzed, only Google presented a negative reaction from investors. Unlike the other 11 companies, Google's most representative relation with Foxconn is not around electronic goods manufacturing. Instead, both companies are close research and development partners in the field of robotics, with Foxconn being responsible for new product development (Luk, 2014). It is possible that investors perceived a greater threat to this kind of long-term partnership, presumably more sophisticated and riskier.

Similarly to the Foxconn case, the announcement of extreme working conditions in China in Case 11—Pegatron did not trigger any reaction from Apple's investors. The Child Labor case (Case 8) carries the particularity that Apple itself announced severe abuses of working conditions in several of its supply chain partners (Gupta & Randewich, 2013). This may have led investors to anticipate operational problems, as the companies involved carried out a significant portion of Apple's production (mainly in China). Moreover, investors' negative reactions may also have

been driven by the expectation that compensation would have to be paid, as the case concerned a large number of employees. Another possibility is that higher control costs were expected, as Apple announced multiple measures to be adopted in that respect.

Case 14—CP Foods brought to light the announcement of extreme working conditions, human traffic, slavery, torture and death of employees (Fishwick, Hondal, Kelly, & Trent, 2014). Yet no negative reaction from investors was detected in the case. Finally, and more recently, Volkswagen Fraud (Case 15) is the most representative case of a negative reaction from investors. Five out of the 20 identified supply chain partners presented significant losses in their market value. Volkswagen is a relevant client of many of these firms (Bolduc, 2016; Tomesco, 2015), which may reflect investors' concerns about their sales being seriously affected. Despite not comprehending the objective of the study, in order to provide an additional perspective on this case, the same event study analysis was conducted to test the impact of the event on the market value of Volkswagen itself. The results show that the company suffered harsh market value losses (significant at the 99% confidence level) in event windows 2, 3, 4, 5, 6 and 7, as follows (Table 9.4).

The gravity of the market value loss in the company may be an additional factor for the comprehension of the impact its supply chain partners experienced.

Table 9.4 Event study for Volkswagen

	Event window			Event impact		
	Number of days	Initial day	Final day	Estimation window	Calculated CAR	t-stat
Event window 1	2	D-1	D0	200	-0.31%	-0.209
Event window 2	2	D0	D1	200	-17.71%	-12.000
Event window 3	3	D0	D2	200	-30.39%	-16.769
Event window 4	3	D-1	D1	200	-17.76%	-9.825
Event window 5	7	D-1	D5	200	-27.61%	-9.974
Event window 6	5	D-2	D2	200	-30.43%	-13.006
Event window 7	11	D-5	D5	200	-27.29%	-7.839

7 Conclusion

The present study proposed the assessment of investors' reactions to negative social/environmental events within supply chains contexts. In other terms, it investigates whether stakeholders of a company are affected by and/or react to sustainability issues related to a chain partner. Along with the discussion of the pertinent facets of stakeholder theory, such hypothesis is supported by the literature on SSCM and the efficient market hypothesis. Likewise, the link between firms and their *incidental stakeholders* is depicted in the form of the proposed *supply chain extended stakeholder model*. These developments theoretically support the idea that sustainability failures in business levels may destroy value not directly observable to stakeholders. Over the identification of 15 cases, the variation in the market value of 82 supply chain partners was analyzed. The results suggest that, in the majority of the assessed companies (74/82), no statistically significant reaction was detected.

Each case was individually analyzed. Considering operational consequences, the results show that cases concentrated on small suppliers (i.e. small source firms) did not cause a negative reaction from investors. In other cases, in turn, despite the source, firms were expressive in transactional volumes, operations do not seem to have been severely affected, and this did not translate into major consequences for partners. A second category refers to those cases where the source firms concentrated a strategic portion of supply chain partners' operations, with some of the identified supply chain partners being markedly penalized (e.g. Volkswagen Fraud). The delimitation of these two categories suggests that investors' decisions may not be directly based on the social/environmental consequences of firms' operations for stakeholders. Instead, as long as no major operational consequences emerge, investors' positions remain apparently unaffected. Although logical within a profit-oriented rationale, results happen to be surprising and somehow counterintuitive to initial expectations.

As discussed throughout the study, sustainability, CSR and SSCM seem to be not only valued by stakeholders, but also worthy of considerable investment by companies in the construction of positive associations in that direction. Moreover, most of the cases discussed received great

media attention, linking large firms to cases of extremely poor working conditions, social abuse and environmental damage, among other negative consequences of their operations. This unfavorable publicity is expected to cause reputational damage to companies, as they would be linked to a lack of respect for nature and human rights. The results, however, suggest that damage to corporate images, identities or reputations around the sustainability of firms does not seem to be relevant to investors, or at least did not cause a re-evaluation of the fair stock price of the analyzed firms. The outcomes deserve deeper appraisal, as they could potentially present a new perspective on stakeholders' expectations and values towards firms.

From a theoretical perspective, the results may present a questioning of the main arguments of stakeholder theory. This means that the concern of firms around their operations may not be directly related to the consequences suffered by the environment, clients, employees, communities and society in general. The value creation logic would be stronger in that sense. This would be aligned with the mainstream SOM literature, which ultimately searches for the sources of competitive advantage and differential performance among firms, supporting shareholder-oriented approaches rooted in more classical economics literature. In a nutshell, once more the results suggest that investors' decisions might be mainly driven by profit maximization, and that negative social/environmental events in supply chains in general do not affect them. However, due to the limitations of the present study, such conclusions count in its own shortcomings. In that sense, it would not be possible to say that investors do not value sustainability at the business level, as they may have perceived the negative events discussed as punctual failures, not related to the policies and practices normally employed by firms. In order to assess their actual judgement of the issue, further research would be necessary. The limitations in question as well as the suggestions for future research are better addressed in the final section.

The study contributes to the SOM literature, providing empirical support for the joint assessment of sustainability issues and the analysis of the effects that members of supply chains may cause to each other, a promising and still underdeveloped field of research. In this sense, although the results—when jointly analyzed—do not suggest such an effect, they do

not invalidate the *supply chain extended stakeholder model* proposed, as it may serve as a theoretical basis for future research. In fact, it may prove useful in the theorization of multiple sorts, linking firms and their diverse direct and *incidental stakeholders*. This contribution ultimately adds to the development of OM literature and stakeholder Theory itself. All in all, the main conclusion of the study is that, apparently, investors do not react to negative social/environmental issues in supply chains. Therefore, the answer to the research question proposed—do investors negatively react to announcements of negative social/environmental events related to a supply chain partner?—is no, as the results do not allow for the rejection of the null hypothesis.

8 Limitations and Suggestions for Future Research

Despite its contribution, the present work has limitations, which, on the one hand might represent constraints to its improvement, but on the other hand provide convenience for future research. In this way, despite allowing for the direct measure of effects, the concentration of the investigation on market-value data limits the perception of more subtle aspects, such as the reasons for the (lack of) reactions observed. Qualitative research conducted with different groups of investors could be useful in advancing such comprehension. Beyond that, as previously addressed, other groups of stakeholders could be assessed, as well as the effects of negative social/environmental events on dimensions other than market value (e.g. corporate images, identities and reputations). These distinct approaches would be likely to contribute to the testing and development of the *supply chain extended stakeholder model*, and to the conceptual reinforcement of the notion of *incidental stakeholder* as valid paths to treat similar issues.

In addition, overcoming the restriction to the analysis of sustainability-related events is also very profitable. More than stretching the scope and contributing to similar comprehensions in other areas, the eventual recognition of the similitudes and idiosyncrasies of negative social/envi-

mental events in relation to cases of distinct natures may greatly contribute to a better comprehension of the influence of sustainability matters on stakeholders' perception, contributing to the SOM debate as a whole, as well as to the other aspects treated in the present work.

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Caught red-handed: the cost of the Volkswagen Dieselpgate

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Abstract

Purpose – With the investigation of the US stock market response to the Volkswagen Dieselpgate, this paper aims to empirically demonstrate a case of dissemination of corporate scandals and events through industries and supply chains (i.e. inertial effect).

Design/methodology/approach – Individual event studies were conducted in the analysis of the market value fluctuations of 33 companies of the American automotive industry upon the disclosure of the scandal.

Findings – Results show that the fraud held by the German automaker spread to surrounding companies within the industry and supply chain levels of analysis, contaminating market values and costing around 6.44 billion dollars to American firms.

Originality/value – Building on the efficient market hypothesis and on the literature on supply chain management, empirical evidences support the conceptualization of the inertial effect as a valid rationale to address the dissemination of events through companies not directly involved. In that sense, the study contributes to an emerging and promising research field within the supply chain management literature. Beyond that, its interdisciplinary approach may inspire future research in the applicability of the event study methodology in similar contexts, as well as of alternative forms to empirically test other theoretical constructs.

Keywords Corporate scandals, Environmental fraud, Inertial effect, Volkswagen Dieselpgate

Paper type Research paper

Introduction

By associating companies with negative and undesirable issues, corporate scandals may be severely noxious to businesses. Depending on factors such as their nature, consequences and level of repercussion, the disclosure of negative corporate practices or behaviors may seriously compromise corporate reputations built over decades (or even centuries). Not surprisingly, some of the most solid and admired companies have seen large portions of their reputational capital disappear, as their names were associated with cases of fraud, corruption, environmental disasters, disrespect to human rights, among others. With the expansion of media channels and mass communication technologies, the damages that corporate scandals may cause are highly potentiated (Wilburn and Wilburn, 2015). As consumers intensively address these questions on social networks, information is even more speedily processed by a particular group of stakeholders: investors do not hesitate to penalize firms involved in corporate scandals, leading the disclosure of negative events to be almost immediately reflected in possibly acute losses on market value.

That seems to be the logics behind the Volkswagen Dieselpgate (Maynard, 2015), which has been considered one “of the most outrageous white-collar crimes and corporate scandals of recent times” (Kottasova, 2015). In the search to become the global



leader of the automotive industry by 2018, Volkswagen implemented an aggressive growth strategy, particularly in the USA. Through the promotion of the diesel technology, the company expected to triple its sales in the country (Muller, 2013). However, in September 2015, the German automaker was accused by the Environmental Protection Agency (EPA) of defrauding emission tests through softwares illegally installed on its cars (Davenport and Ewing, 2015). Other reputable German brands such as Audi, Porsche (Volkswagen Group) and Bosch also had their names associated to the case (Yeomans, 2015). In that sense, beyond directly affecting the corporate image (Preston, 2015) and the market value of Volkswagen itself (Snyder and Jones, 2015), it has also called into question the legacy of the “made in Germany” brand for high-level engineering (Löhr, 2015a) and general quality (Chambers, 2015). From an even broader perspective, the scandal is believed to have also affected the assessment of consumers on the environmental viability of the whole diesel automotive technology (Löhr, 2015b), especially in North America.

An aggressive strategy of growth of one of the biggest automakers of the world is not held in isolation though. Ultimately, it affects other players of the industry, either through direct increased concurrence or in the form of complex strategic options, where established players may be seen as potential targets for takeovers, mergers and acquisitions. The arrival of a new giant calls for the development of a whole supply chain, with potential suppliers necessarily searching to align their operations to the needs of the newcomer. These adaptations generally mean the investment of non-negligible sums of money in the reconfiguration of plants, increasing of sales workforce and channels, research and development and so on. Inner to this view, further studies on the impact the Volkswagen Dieselgate may have caused on other companies may be particularly useful.

In the context of the present work, the consequences of the disclosure of practices or behaviors configured as corporate scandals are addressed within the logics of events. Based on the developments of the efficient market hypothesis (EFM) (Fama, 1970), the link between events and the reactions of stock markets is addressed. Moreover, the analysis of the potential effect of corporate scandals (or events) in companies other than those on which they emerged leads to the conceptualization of the *inertial effect* in both industries and supply chains. Building on the examples of corporate scandals such as the BP deepwater oil spill, Unilever palm oil, Enron, as well as on other empirical studies, the *inertial effect* is theoretically delimited, supplying the ground for the comprehension of the outcomes of the Volkswagen Dieselgate. The objectives of the research may then be summed up into the following research question:

RQ1. Is the disclosure of an environmental fraud capable of triggering an inertial effect on other companies?

In that sense, based on the event study methodology (Fama, 1970; Brown and Warner, 1980), we analyze investors’ reaction in two distinct groups. Results show that while two companies within the industry level of analysis presented severe negative effects, three within the supply chain level had their market value also strongly compromised by the scandal. The results of the study suggest also that these companies have suffered market value penalizations of around 6.44 billion dollars upon the disclosure of the case. In answering the *RQ1* proposed, the investigation offers empirical data that contribute to the comprehension of the *inertial effect* in both industries and supply chains.

The following sections develop a literature review on corporate scandals and corporate fraud, on the Volkswagen Dieselgate scandal and on the theoretical framework of the study. The method of event study is also discussed as the appropriate tool to be applied. Beyond that, results are presented and discussed. Practical and theoretical implications are addressed, followed by conclusions and the limitations and suggestion for future research.

Literature review

Corporate scandals and corporate fraud

Corporate scandals may be defined as the disclosure of any information capable to compromise the image of firms, negatively impacting the manner how stakeholders shape their perception and expectations on past, present and future behavior of companies. Inner to this view, the exposure of unethical or socially condemnable corporate practices or behaviors may decisively contribute to the building of negative assessments, and, thus, seriously compromise the overall performance of businesses. In face of the fast development of media channels and mass communication technologies, the outcomes of negative news around firms may be particularly risky. Considering the current reach of global internet access and the mass connectivity it allows, information shall quickly spread throughout markets. Depending on the repercussion of this sort of issue, online campaigns may emerge, organizing the boycott of costumers to brands and products, among other actions.

Within this context, firms might see themselves involved in scandals of several natures. The most common are those related to environmental disasters, condemnable environmental practices, poor workforce conditions and workforce slavery. Some of the most famous corporate scandals fit into one of these categories. Back in 2010, for instance, upon one of the biggest oil spills of all times ([The Telegraph, 2011](#)), several players of the oil industry, such as British Petroleum, Anadarko, Transocean, Halliburton ([Guardian research, 2010](#)), among others, were directly or indirectly involved in an environmental scandal of the highest proportions, considering the great impact the incident caused to the fauna of the Gulf of Mexico and to the environment as a whole ([Rushe, 2015](#)).

From a supply chain perspective, in turn, firms such as Nestlé, Unilever and Procter & Gamble have been associated with the destruction of tropical forests due to the extraction of palm oil. Moreover, several firms have been recently linked to cases of poor conditions of work, modern slavery, sexism and discrimination of employees, particularly those inserted in global supply chains. In some of these cases, beyond the detrimental association of these companies to negative events, the disclosure of such news has also driven them to spend high sums of money in the reconfiguration of processes, in the implementation of more rigid controls, as well as on the rebuilding of their corporate reputation.

However, the rational use of practices or behaviors intended to consciously deceive stakeholders seems to be particularly harmful to companies. Corporate frauds may assume diverse forms and be used in the search of the most different outcomes. Enron, “one of the world’s dominant energy companies” ([Oppel and Sorkin, 2001](#)) of the early 2000s, for instance, was caught in the conduction of diverse fraudulent practices ([Watkins, 2003](#)). Accordingly, “not only did Enron’s management and consultants fail the company’s shareholders and employees, but the market and watchdog agencies also

failed to protect shareholder interests as well” (Watkins, 2003, p. 6). The case became famous as one of the biggest corporate scandals ever known (Kottasova, 2015). Beyond that, clients of auditing companies were also indirectly affected, with the integrity of their financial numbers being severely questioned (Chaney and Philipich, 2002; Asthana *et al.*, 2009; Reitenga *et al.*, 2010).

As the cases discussed illustrate, negative events related to environmental and ethical issues indeed have the potential to be spread through surrounding companies. In that sense, the Volkswagen Dieselgate offers a valuable opportunity for the study of corporate scandals, as it relies precisely on the frontier of these apparently distinct dimensions, as discussed next.

The Volkswagen Dieselgate scandal

Back in 2008, Volkswagen’s global CEO, Martin Winterkorn, announced the plans of the company to become the leader of the global automotive industry by 2018 (Muller, 2013). Yet accordingly, however:

[...] skeptics may snicker that Winterkorn’s grandiosity is delusional, especially his plan for the USA, where VW would need to triple its 2008 volume to meet his target of one million cars a year (800,000 Volkswagens and 200,000 Audis). Competitors like Toyota, Honda and Hyundai aren’t about to yield; neither will the domestics. VW had ignored the USA market for decades after stumbling badly in the 1980s and remains saddled with a reputation here for high prices, mediocre quality and a tin ear for American tastes. (Muller, 2013).

As part of its strategy, the German automaker initiated a “large-scale promotion of diesel vehicles in the USA in 2005” (Volkswagen, 2015a). Ironically, one of these actions included a “Dieselution Tour to educate USA consumers and lawmakers about the advantages of clean diesel” (Bernestein, 2007). As stated by Volkswagen of America’s CEO by the time, Stefan Jacoby:

Volkswagen of America considers the Dieselution Tour an important informational resource for everyone concerned about the environment and improved fuel economy standards. This tour aims to change any outdated perception about diesel technology (Bernestein, 2007).

In 2014, prior to the disclosure of the Dieselgate scandal, Volkswagens’ sales in the USA accounted for a total of 366,970 units (Volkswagen, 2015b), far behind the 1 MM targeted for 2018. However, apart from its business performance, what really puzzled its competitors was the fact that Volkswagen diesel cars were able to regularly pass emission tests, while theirs did not. Automakers such as General Motors, Mazda and Honda, all interested in strengthening their position in the diesel business, frequently put into question the capacity of the German company to consistently meet California’s environmental demands (Kiley, 2016). In this sense, despite the intense investigation held on Volkswagen cars, General Motors’ engineers just could not figure out how the diesel technology of the company was able to do it. As stated by Robert Lutz, vice chairman of the company and responsible for product development between 2001 and 2009, “our people told me that they had studied the Volkswagen products and that they could not get the hardware to perform the same way to satisfy California’s emissions standards” (Kiley, 2016).

Further investigations on Volkswagen cars were then financed by the International Council on Clean Transportation (ICCT). Through extensive road tests conducted by the West Virginia University, huge discrepancies between real emissions and those

measured on tests were found. The results offered empirical evidences that Volkswagen was indeed cheating emission tests in the USA. Later, the studies were corroborated by the US EPA and by the California Air Resource Board, giving rise to the scandal (Morgan, 2015). The discovery of a “defeat device” used to circumvent emission tests [The International Council on Clean Transportation (ICCT), 2015] lead the EPA to order Volkswagen to immediately recall almost 500,000 cars sold in the USA (Neate, 2015). A mass coverage followed on the media.

According to Volkswagen itself, the fraud was motivated to the impossibility of its EA 189 diesel engine to meet the strict levels of nitrogen oxide emission required in the USA. As a way to deal with this issue, the company opted for the incorporation of a software designed to adjust the levels of emissions when tests were conducted (Volkswagen, 2015a). The scandal brought the diesel technology to be even more questioned in the USA. Inner to this view, “the damage done by Volkswagen’s cynical and ethically challenged behavior could well prove fatal to the future of the diesel technology in the USA” (The Economist, 2016). Studies have estimated the loss in the market value of the German company to be around 30 per cent upon the disclosure of the scandal (Snyder and Jones, 2015). Moreover, suppliers that have bet in the development of diesel driven auto parts also saw their plans and eventually their whole business models suddenly under threat. The side effects of the Volkswagen Dieselgate in both the diesel industry and the diesel supply chain of the USA ground the development of the *inertial effect*, discussed next.

The inertial effect

Beyond the impact on the market value of firms directly involved, studies have analyzed the effect of corporate scandals to surrounding companies, with interesting results. As previously discussed, the Enron case has received particular attention, as companies of the auditing sector as well as their clients also absorbed, at least partially, the negative outcomes of the case. From a supply chain perspective, the effect of negative social and negative environmental events on the market value of buyers and suppliers has also been analyzed (Fracarolli Nunes, 2015). In that sense, empirical evidence has been provided that commercial partners of companies involved in this sort of scandals may also face considerable losses on the evaluation of investors.

The negative effect of events on companies other than those which have originally sourced them is here conceptualized as the *inertial effect*. The *inertial effect* is precisely the property of these events to be spread throughout industries and supply chains, like the waves caused by a stone that hits the water previously rested. Despite negative events may impact surrounding firms in distinct dimensions, the analysis of their effect on the market value offers an important opportunity to the detection and measurement of the *inertial effect*. In this sense, the discussion of the link between events and investors’ reactions is particularly useful.

Through the developments of the EFM (Fama, 1970), the concepts supporting the adjustment of stock prices to new information is a well-sedimented concept on the theory of finance. From a broad perspective, it states that, in face of any new relevant information, the market value of firms is instantaneously adjusted to reflect the renewed expectations of investors around the future cash flows of companies. While on its weak version, stock prices are expected to fully reflect all past available information, on its semi-strong version, the price of these assets is also expected to reflect any new publicly

available data. The strong version, in turn, extends the concept, addressing that even privately held or insider information are instantaneously reflected on prices. Inner to this view, in case a scandal or any other event is believed to affect the capacity of a firm to generate future cash flows (positively or negatively), the stock market is expected to automatically adjust the value of this given company to its new fair level. Consequently, stock prices would reflect an accurate estimation, making it impossible to investors to profit from eventual arbitrages or distortions between stock prices and their due value.

As they allow the detection of eventual changes due to the disclosure of new data and their respective variations, event studies represent a direct test of the EMH. For this reason, the method represents the appropriate tool to test the inertial effect of the Volkswagen scandal in both industry and supply chain levels, being further discussed ahead in the text.

Method, sample and data

Event study methodology

Originally developed for empirical studies of finance and accounting (Corrado, 2011), the event study methodology has been used in the assessment of the impact of a diverse and broad set of events on firms' market value. Through the comparison of a company's actual returns to those that would be expected in the hypothetical absence of a given event, the method allows for the detection and the measurement of its potential outcomes on publicly traded stocks' prices. In other words, event studies enable the comparison between a firm's market return (actual returns) – disturbed by the occurrence of an event – and the return that would be considered normal. The difference between actual and normal returns results on what is conceptualized as abnormal returns (Campbell *et al.*, 1997).

Abnormal returns are the main interest of event studies and may be analyzed in different manners. In case abnormal returns or their accumulation come to present statistical significance, one may claim that a given event has produced a variation on the market value of a company within a given significance level. Event windows represent the period over which the effect of the event is measured. Traditionally, it comprises the event day itself, a certain number of days prior to it and a certain number of days after it. The extension of the period around the event is used to properly capture eventual anticipations or latter responses of the market. Considering that the Volkswagen Dieselgate emerged in result of academic investigations conducted since 2013 (Ewing, 2016) and, moreover, that in the days following the initial exposure of the fraud new potentially negative information were made available – for instance, Volkswagen's admission that 11 million cars around the world were equipped with the defeat devices and the banishment of Volkswagen's diesel car sales in Switzerland, respectively, three and eight days after the disclosure of the fraud (Kollewe, 2015) – the results of the present study are comprehended within an 11-day event window, addressing five days prior to the event, the event day itself and five days after it. For robustness purposes, an additional five-day event window was also analyzed, comprehending the event day itself, two days prior to it and two days after it, in a way that only companies presenting statistically significant negative abnormal returns in both event windows are considered to present evidences of a possible impact generated by the Volkswagen Dieselgate scandal.

The calculation of normal returns demands the choice of an appropriate model (Brown and Warner, 1980). For the present study, the Market Model (Fama, 1970) is chosen, as it is the most commonly used method for that task (Agrawal and Kamakura, 1995). The model posts that normal returns (r_{it}) are based on the returns of the market (r_{mt}), as well as on the estimation of parameters α_i and β_i [equation (1)]:

$$r_{it} = \alpha_i + \beta_i r_{mt} \quad (1)$$

While r_{mt} is represented by proxies of the returns on the market portfolio (S&P 500), α_i and β_i result from a linear regression between the returns of the market and those of the stock of interest within a period called estimation window, presently considering 200 days prior to the event windows.

Once actual (r_{it}) and normal ($E_{i,t}$) returns are calculated, abnormal return for any day t (AR_{it}) is obtained by the difference between them [equation (2)]:

$$AR_{it} = r_{it} - E_{i,t} \quad (2)$$

After abnormal returns have been calculated to each day within the event window, they are aggregated in the form of cumulative abnormal returns (CAR). CARs represent the cumulative effect of an event through the whole event window considered, as presented in equation (3):

$$CAR_T = \sum_{t=1}^T AR_t \quad (3)$$

The statistical inference of CARs is calculated through the ratio between each CAR itself and its estimated standard deviation as follows:

$$\text{Statistic of Cumulative Abnormal Returns} = \frac{\text{cumulative Abnormal Return}}{\text{CAR Estimated Standard Deviation}} \quad (4)$$

For all the companies on which statistical significant impact were detected for both event windows, market value losses in terms of USD were calculated through the multiplication of the initial market value of each company (previous to the event window) to the respective negative CAR calculated. The initial market value is calculated through the multiplication of the number of outstanding shares of each company by its respective stock price on the day immediately before the event window considered.

Sample and data collection

As discussed, the objectives of the study are centered around the analysis of the impact of the Volkswagen Dieselpgate on American companies. In this sense, the assessment of investors' reactions on the American market is interesting due to four main reasons. First, despite Volkswagen being a German company, the scandal relates to automobiles sold in the USA and was triggered due to fraud used against the environmental laws of the country; second, along with the Chinese, the American automobile market is one of the biggest of the world, representing approximately 6.2 per cent of its global production

and 10.5 per cent of global sales (Statista, 2016); third, the American market is not predominantly based on diesel technology (Lussenhop, 2015), what introduces a control variable and adds to the complexity of the analysis; and fourth, as part of its global strategy, Volkswagen intended to strengthen its participation on the American market, strongly supporting its diesel technology as a viable solution to meet the long run strategic plans of the company.

The sample is then limited to the listed companies on the three main stock exchanges of the USA:

- (1) The New York Stock Exchange (NYSE);
- (2) The National Association of Securities Dealers Automatic Quotation System (Nasdaq); and
- (3) The American Stock Exchange (AMEX).

To further delimit the scope within the Automobile industries, two Standard Industrial Classification (SIC) codes were chosen – 3711 (motor vehicles and passenger car bodies) and 3714 (motor vehicle parts and accessories) – as they allow for a double evaluation on both the industry and the supply chain. The application of these criteria lead the final sample of the study to result in seven American companies from the industry level and 26 from the supply chain level. For a matter of discretion, companies' names were substituted by codes and are referred to as I1 to I7 and S1 to S26 for industry and supply chain level, respectively.

Daily stock returns without dividends were collected from the Center of Research in Security Prices database for each firm of the final sample. Additionally, the returns on S&P 500 were also collected from the same data base and used as the proxies for the returns of the market.

Results

The results suggest that two companies of the industry level of analysis were negatively impacted by the event. As presented in Table II, Firm I4 accounted for a cumulative retraction in the order of 24.89 per cent in the first event window (D-5 to D5) and of 20.45 per cent in the second, both within the 99 per cent statistical significance level. In absolute terms, these figures represent losses around 372 million dollars. Firm I6, in turn, presented cumulative percentage losses of 5.83 and 3.48 per cent in the first and second event windows, respectively, both within a 90 per cent statistical significance level. In absolute terms, however, the losses account for 1.19 billion dollars. This suggests that the Volkswagen Dieselgate represented then a total loss of 1.59 billion dollars within the industry level of analysis (Table I).

As shown in Table III, three companies of the supply chain level of analysis suffered market value losses in both event windows. Within a 90 and 95 per cent statistical significance levels, firm S2 reports CARs of 5.85 and 4.82 per cent for the periods analyzed, what in absolute values represents a loss on its market capitalization of approximately 292 million dollars. Firm S6, in turn, presented CARs of 11.80 and 12.98 per cent for Event Windows 1 and 2 (within a 99 per cent significance level), translating in losses of approximately 326 million dollars. Firm S13 stands for CARs of 5.48 per cent in Event Window 1 and of 2.58 per cent in Event Window 2 (with 99 and 90 per cent significance levels, respectively). In terms of absolute value, these figures represent an estimated loss around 4.26 billion dollars in terms of market value. The aggregated

Table I.
CAR results for the
sectorial level

Company	Event window 1 (D-5, 5)			Event window 2 (D-2, 2)		
	CAR (%)	t-stat		CAR (%)	t-stat	
I1	-1.835	-0.384		-1.886	-0.587	
I2	0.057	0.019		-0.777	-0.374	
I3	-0.833	-0.209		-1.323	-0.489	
I4	-24.897	-2.901	*	-20.451	-3.505	*
I5	-7.309	-1.240		-5.351	-1.348	
I6	-5.830	-1.870	***	-3.478	-1.663	***
I7	-0.208	-0.034		-0.293	-0.070	

Notes: * $p < 0.01$; *** $p < 0.10$

figures result in a calculated loss to the companies of group two of 4.88 billion dollars (Table II).

As presented in Table III below, when the results for the industry and the supply chain levels are analyzed together, the results suggest that the cost of the Volkswagen Dieselgate scandal was of approximately 6.44 billion dollars. These results are discussed in further details in the next session (Table III).

Discussion

Based on the empirical results, the analysis focuses on the affected companies of each group, starting on the industry level. As discussed, the Volkswagen Dieselgate is claimed to have affected not only Volkswagen itself but also the whole diesel industry. Within this logic, companies concentrated around the diesel technology would be expected to be more intensively affected by the case. In that sense, despite the American automobile industry being not centered on the fuel, all the seven companies analyzed carry diesel-driven products in their portfolio. It is possible that the different results obtained are linked to the strength with which each company is associated with the diesel technology. In contrast with the other five companies of the sample, the negative variation in the market value of firms I4 and I6 could be due to a more adherent association to the production of diesel related products in the USA, as they concentrate on heavier trucks and engines.

However, considering Volkswagen's aggressive growth strategy for the American market, the negative results may also be rooted in distinct reasons. Within a hypothesized strategy held by the German brand to "buy", a consolidated position in the American truck market, both companies have been pointed as potential merger and acquisition targets. Speculations in this sense brought firm I4 to the spotlight of this discussion in 2012. The possibility of a transaction, however, was denied by both companies (Bimmer, 2012). In 2014, in turn, rumors had been that firm I6 and Volkswagen were engaged in a merger negotiation. By the time, the operation was seen as a plausible move for a global player such as Volkswagen, aiming to enter the American market of heavy trucks (Tita, 2014). In both cases, it is possible that investors were betting in the success of future negotiations between Volkswagen and the American companies. Nevertheless, the disclosure of the Volkswagen Dieselgate scandal would have led these expectations to be frustrated, what, according to the EFM, could explain the abrupt adjustment in the market value of both companies. However,

Company	Event window 1 (D-5, 5)			Event window 2 (D-2, 2)		
	CAR (%)	<i>t</i> -stat		CAR (%)	<i>t</i> -stat	
S1	-12.346	-1.439		-11.558	-2.007	**
S2	-5.855	-1.750	***	-4.820	-2.147	**
S3	0.582	0.123		-2.387	-0.740	
S4	-6.174	-1.582		-7.108	-2.698	*
S5	-0.399	-0.099		-1.604	-0.589	
S6	-11.799	-4.687	*	-12.983	-7.685	*
S7	-14.490	-1.825	**	-7.526	-1.409	
S8	-2.841	-0.509		-2.183	-0.581	
S9	-6.845	-1.877	**	-2.139	-0.874	
S10	-2.197	-0.498		0.161	0.054	
S11	-8.784	-1.113		-2.678	-0.507	
S12	-6.913	-0.878		-8.175	-1.542	
S13	-5.481	-2.753	*	-2.576	-1.923	***
S14	0.371	0.110		-0.965	-0.422	
S15	310.214	10.233	*	332.254	16.439	*
S16	11.975	2.031	**	3.151	0.781	
S17	-10.750	-1.721	***	-6.861	-1.628	
S18	-5.875	-1.217		1.430	0.435	
S19	10.762	-0.609		12.454	1.043	
S20	-10.523	-1.543		-4.638	-1.013	
S21	1.780	0.239		-1.092	-0.217	
S22	0.172	0.036		-3.173	-0.995	
S23	-5.181	-1.399		-6.540	-2.643	*
S24	-11.377	-1.324		-3.295	-0.569	
S25	-6.178	-0.969		-2.777	-0.646	
S26	-0.952	-0.281		1.310	0.580	

Table II.
CAR results for the
supply chain level

Notes: * $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$

Company	CAR (%)	US\$ (m)
I4	-24.89	-372
I6	-5.83	-1,187
S2	-5.85	-292
S6	-11.80	-326
S13	-5.48	-4,265
Total		-6,440

Table III.
Volkswagen
Dieselgate's
implicated losses

despite the empirical demonstration of the losses, the scope of the present investigation does not allow for such conclusions. At best, it suggests these factors as a possible explanation for the results observed. Further analysis on the characteristics of the companies as well as on the relations they kept with Volkswagen would be necessary.

Even more interesting are the results within the supply chain level of analysis. As shown in the previous section, 3 of the 26 companies of this group faced losses in their market value. In that sense, companies that compose Volkswagen's supply chain are inherently expected to be more strongly affected, as investors may expect a direct

retraction in their sales forecasts to the German company. According to the EMH, this framing shall be translated into an adjustment of the stock price of these firms. Most of the companies analyzed were identified to fit this criterion, not having been impacted though. Moreover, firms such as S3, S9 and S11 were identified to supply parts not only to Volkswagen but also to firms I4 and I6, both in the industry level of analysis and affected by the scandal. Within this logic, still according to the developments of the EMH, they were expected to present strong negative returns, which were not confirmed by the empirical results.

In turn, firms S2, S6, and S13 seem to have accounted for a total joint loss of about 4.88 billion dollars, with firm S13 representing 87.4 per cent of this value. On what regards the first two companies, the dimension of the losses may suggest a relatively reasonable adjustment of projections for both, following the rationale of a decreased activity of its client. The expectation of the difficulties to be faced by Volkswagen would have also led investors to revalue their prospects to the sales of these suppliers. Apparently, the revaluations were worth 292 and 326 million dollars, respectively. Possibly, this is the clearest example of the *inertial effect* in the present study, as no other major reason for observed impact were identified during the research process.

The results for S13 are particularly intriguing. Right after the emergence of the scandal, market analysts stated that the impact on the market value of the company would be limited to a minimum (Graf, 2015). Accordingly, the expectation was due to the low level of trade between the two companies, with Volkswagen representing around 1 per cent of Honeywell's sales (Moskowitz, 2015). As the empirical results demonstrate, they could not be more wrong. Despite the limitations of the present research do not allow for such conclusion, it is possible that optimistic expectations of future sales of firm S13 for the German company may have been revalued by investors, as the American company had intensively invested in the development of auto parts for the diesel industry.

Practical and theoretical implications

From a practical perspective, the study offers additional comprehension around the consequences of one of the greatest corporate scandals of recent times (Kollewe, 2015). In this sense, instead of concentrating its investigation on the effect of the case on the most evident players, the addressment of the impact on the American automotive industry offers valuable insights to managers and investors operating in the USA. The demonstration in terms of US\$ lost by American companies presents a tangible comprehension of the consequences of the Volkswagen Dieselpgate, which might be useful in discussing and determining not only future strategic choices but also a more comprehensive analysis of past performance of these firms.

When it comes to its theoretical contribution, the proposition and the empirical test of the *inertial effect* may represent the main tribute of the study to the management literature. The delimitation of the construct for both industry and supply chain levels of analysis may be of great relevance in the parametrization of future research, being notably convenient in the description and deeper analysis of similar phenomena. The design of the concept has the potential to gather future developments around them, possibly contributing to the foundation of a promising research field.

Conclusion

Given its distinctive institutional, legal, social and cultural contexts, American society has been claimed to give greater importance to corporate scandals and business ethics issues when compared to other capitalist economies (Vogel, 1992). Beyond the reasons previously discussed, this claim highlights the relevance of analyzing the reactions of the American stock market. In that sense, the present study proposed the assessment of the impacts of the Volkswagen Dieselgate on the market value of American companies of the automotive industry. Building on a literature review around corporate scandals and the EFM, the concept of *inertial effect* is introduced. Based on this debate, the Volkswagen Dieselgate was hypothesized as having caused negative impacts on the market value of American companies. Thirty-three individual event studies were conducted in both industry and supply chain levels. The variations of the market value of American firms listed on the NYSE, the Nasdaq and the AMEX under the SIC 3711 (motor vehicles and passenger car bodies) and 3714 (motor vehicle parts and accessories) were measured.

Results suggest that the *inertial effect* was perceived in the two groups, with two companies of the first having suffered losses on their market value (i.e. firms 1.4 and 1.6), as well as three companies of the second (i.e. firms 2.2, 2.6 and 2.13). Within this reasoning, the answer to the proposed *RQ1* is YES, as statistically significant CARs were detected and measured in five companies of the sample. Additionally, results also suggest that the event would have caused a total loss of 6.44 billion dollars in the market value of the companies comprehended on the sample, divided in 1.56 billion for the two companies within the industry level of analysis and 4.88 billion for the three of the supply chain level.

Ultimately, the impacts observed state for a revaluation of investors for reasons other than those directly linked to the scandal. As discussed on the previous section, on what regards Navistar and Paccar, both within an industry level of analysis, the severe losses seem to account for the frustration of a possible future corporate transaction with Volkswagen. This dimension may be further explored through the analysis of the *inertial effect* within the M&A literature. In turn, the results observed for the supply chain level for S2, S6 and S13 seem to indicate the detection of the *inertial effect* in a more easily perceivable form. As Volkswagen was believed to have its sales compromised by the scandal, it would be expected for partner companies to also have their projections revised, what shall be translated in terms of losses in their market value. These aspects are further discussed as a possibility for future research on the next session.

In sum, it seems that investors have seen in the Volkswagen Dieselgate a frustration, or at least a hard withdraw on the intentions of Volkswagen to strengthen its position on the American market. As a consequence, possible targeting companies for eventual mergers and acquisitions at the industry level lost a portion of their value. In turn, suppliers that had bet on the development of Volkswagen and the diesel technology in the USA were also penalized, as the expectation of their sales had to be adjusted. In that sense, beyond answering the *RQ1* proposed, the observation of the empirical results leads the study to be successful in proposing and confirming the concept of the *inertial effect* to address the mechanism through which the effects of corporate events spread throughout surrounding companies.

Limitations and suggestions for future research

The study is limited to the assessment of the *inertial effect* on the American automotive industry. However, it is possible that beyond the two levels of analysis considered, other firms may have presented similar results. Beyond that, due to the method chosen, the study may forcibly be restricted to listed companies. Broader studies that seek to detect the impact of the scandal in private companies are certainly welcome. Additionally, a further comprehension of how corporate reputations are impacted may extend the analysis of the *inertial effect* as a whole. Future research could offer important contributions to the M&A literature. Qualitative research with managers, as well as with investors, could elucidate the reasons why firms were penalized for the scandal. The same rationale is valid for the companies that did not present losses, as the comparison between contaminated and non-contaminated companies may bring extra perceptions.

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