

Corporate Social Responsibility: Its Economic Impact and Link to the Bullwhip Effect

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Abstract This paper examines the economic impact of implementing Corporate Social Responsibility (CSR) in the supply chain operations of multinational corporations (MNC). Because they have global supply chains in emerging markets, MNCs face certain operational challenges. For example, unethical operations often result in a huge loss to MNCs in the long run, even though their initial cost seems to be low. In this paper, we extend the Bullwhip Effect theory in supply chain management to the ethical operations context, and define and evaluate a special Bullwhip Effect due to Unethical Operations (BEUO). Using economic data from various sources including Ford, Toyota, and GM in the auto industry, we first estimate the indices of BEUO for the three companies and demonstrate the economic necessity for MNCs to incorporate CSR with supply chain operations. We then propose a coherent approach, blending what we term the *bottom-up* and *pro-active* methods, to achieve such an outcome. The bottom-up approach requires MNCs to switch their focus on stakeholders, shifting from shareholders to consumers and workers, and on decision levels from public relationships to supply chain operations. The proactive approach recommends initializing specific CSR operations to mitigate the negative impact of BEUO. Both theoretical analysis and case studies are conducted to evaluate our developed propositions that MNCs adopting the proposed CSR operations will in the long run achieve better economic

performance. Recommended actions for implementation, based on best practices, are also presented.

Keywords Economic cost · Corporate Social Responsibility · Operational decision · Bullwhip effect · Multinational corporations

Introduction

On Friday evening, May 20, 2011, an explosion in a manufacturing factory in a southwestern city of China killed four workers and injured 18. Given that tragedies happen everywhere and all the time, such local news usually never stirs big interest by the general public in the western hemisphere. However, this explosion was different because it happened in a factory of a primary supplier to Apple Inc, Foxconn, which was building Apple's iPad, a revolutionary product introduced the year before. Further investigation on the blast uncovered depressing working conditions in Foxconn's factories and suggested that the tragedy could have been avoided if proper safety measures had been implemented in advance (Tania Branigan in Beijing, theguardian.com). On January 25, 2012, the New York Times reported the explosion and gave an inside look at working conditions in Foxconn (Duhigg and Barboza 2012). Responding to the report, angry readers posted thousands of comments within 3 days to condemn Apple's wrongdoing in China.

A few weeks later, fair-labor organizers delivered 250,000 signatures to Apple stores in six cities around the world in protest (Freeman 2012). Apple, the computer giant whose success largely rests on its positive corporate reputation, was hit by a boycott call from social media, ethic and labor organizations, and worst of all, its loyal

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consumers (Harris 2012). Facing the crisis, Apple responded swiftly. The company's chief executive, Tim Cook, announced, "Any suggestion that we don't care is patently false and offensive to us...accusations like these are contrary to our values" (Harris 2012). One year later, the company shifted its supply chain away from Foxconn to Pegatron, ironically because Foxconn's cost advantages resulting from scale had waned as it worked to improve factory conditions after a series of accidents in the preceding years, but Pegatron was willing to accept lower profits (Dou 2013).

Apple's case demonstrates the challenges commonly faced by many multinational corporations (MNCs) that operate in global supply chains. The good reputation of a company that has taken years to build could be adversely impacted almost overnight by a disruption that happened on the other end of the long supply chain. Although the disruption sometimes is due to the unethical operations of a supplier, rather than the MNC itself, the general public nonetheless holds the MNC responsible because it is the MNC, not the supplier, that owns the brand of the product.

Over the past 10 years, Ford, GM, and Toyota (three MNCs in the auto industry) all have endured crises similar to Apple's and suffered enormously in terms of reputation and economic losses. The reasons for these outcomes vary, but all are linked to unethical operational decisions at the beginning. Due to pressures from the public and Congress, the three auto MNCs had to disclose detailed cost information during investigations after these crises. Such information provided us a good opportunity to evaluate the economic impacts of unethical operational decisions for MNCs in the long run, even though these decisions initially seemed convenient and incurred little cost.

MNCs are using longer lines of supply chains than ever before (e.g., Braithwaite 2003; Sheffi 2005; Hollon 2006; Belso-Martínez 2008; Wee et al. 2010). The shifting geography of global value chains has increasingly motivated MNCs to source from suppliers in emerging markets (World Economic Forum 2012; World Trade 2012). The aim of this outsourcing strategy is to spread risks and lower costs, but in many instances, outsourcing actually results in additional risks and unexpected costs due to the existence of a special type of bullwhip effect.

In supply chain management literature (e.g., Lee et al. 1997a, b), a bullwhip effect is often used to describe risk amplification from the demand side to the supply side due to distorted demand information. However, the cases of Apple and many other MNCs demonstrate another type of bullwhip effect in which the risk amplification moves from the supply side to the demand side due to unethical operations conducted along the supply chain. We therefore extend the classic bullwhip effect concept to define a special Bullwhip Effect due to Unethical Operations

(BEUO). BEUO originates from a "minor" unethical operational decision in the supply chain and results in a significant economic loss of a company's reputation and bottom line on the demand side. The existence of BEUO has two types of implications for MNCs. On one hand, the bullwhip effect, once it has appeared, will immediately cause severe damage to an MNC. On the other hand, an MNC can gain a competitive advantage over its competitors by initiating CSR operations to mitigate BEUO and improve the bottom line.

A study by Cheung et al. (2009) shows that up to 25 % of companies' operating costs are due to inefficiencies in the supply chain, but a mere 5 % improvement in supply chain efficiency can lead to doubling a company's profit margin. The principle of sustainability, supported by CSR initiatives, can be an effective driver of cost reduction and therefore should be directly incorporated with MNCs' strategies. The success of a company's CSR initiatives does not depend only on internal factors but also on the company's ethical conducts with all stakeholders. The ripple effect discovered in various instances (Tsikoudakis 2013; Amaeshi et al. 2008) also has clearly demonstrated that all stakeholders are closely connected through the operations of MNC supply chains. Therefore, a small disruption resulting from unethical operations in one stakeholder will have an immediate ripple effect across the entire supply chain and reach consumers quickly.

While the concept of CSR has been well developed in global business, some MNCs use it primarily to show a bright public image and lack the motivation to pursue strong CSR commitments from their supply chain partners. As Fassin (2005) has discussed, CSR policies and codes of conduct are usually introduced in corporations during prosperous times, but when the company is under economic stress and faces fierce competition, such policies tend to be forgotten and are seen as a luxury. Fassin argued that to achieve sustainable CSR, management should not only be confined to large strategic issues but must also address the small practical matters of everyday business life. In emerging markets, CSR violation incidents are noticed due to fierce competition and loose regulations. As a result, few companies "seem to have found a proper balance between their aspirations in CSR and their performance in emerging markets" (Tan 2009). To achieve such a proper balance, Amaeshi et al. (2008) examined the relationship among CSR, supply chains, and global brands. Their work "highlights the use of code of conduct, corporate culture, anti-pressure group campaigns, personnel training and value reorientation as possible sources of wielding positive moral influence along supply chains" (p. 223). However, the work of Amaeshi et al. (2008) did not address the operational decisions critical for support of CSR initiatives in supply chains.

There seems to be a gap in the literature on CSR and supply chain operations for MNCs. Given the importance of supply chains for MNCs, it is essential to study their relationship with CSR. Aiming to fill the literature gap and provide practical guides for MNCs, this paper will examine two propositions that articulate the relationship among supply chain operations, CSR, and the bullwhip effect.

Proposition I *Unethical operations in MNCs' supply chain will have a significant negative impact on MNCs' reputations and bottom lines due to the bullwhip effect.*

Proposition II *Ethical operations in the MNCs' supply chain are the expected norm among stakeholders and are not prone to stimulate the bullwhip effect.*

Consumers expect MNCs to operate ethically and society does not allocate a premium for ethical conduct because it is expected. Holding everything else constant, an MNC that proactively implements CSR in its supply chain operations will have a competitive advantage in terms of reputation and overall cost. Due to CSR initiatives, unexpected disruptions are less likely to occur in operations. Thus, the MNC will enjoy a smooth production process and a positive public image in the long run. On the contrary, an MNC that reactively addresses CSR in its supply chain will have a smaller cost in the short run, but will likely encounter the bullwhip effect in the long run. Once BEUO appears, the MNC will be hit heavily from the loss of both public trust and the bottom line. Furthermore, to rebuild public trust, the company ends up paying much higher costs to reconfigure its supply chain, therefore suffering from both an irregular production process and a negative public image in the long run. Thus the opportunity costs for unethical operations are actually very high.

The aim of this paper, therefore, is twofold: First, we will develop an index to quantify the economic impact of BEUO through a model that addresses the cost/profit differences between ethical and unethical operations. We will also demonstrate the applicability of the index using real-world case-based information from Ford, GM, and Toyota. Second, we will develop a coherent approach for MNCs to incorporate CSR initiatives with strategic and daily operational decisions. The approach is built on the bottom-up concept and suggests proactive CSR operations. Both theoretical analysis and case studies will be conducted to support the propositions presented above. A set of actions based on the best practices is also recommended for MNCs and other stakeholders (suppliers, governments, and NGOs) to implement.

This study represents a continuation of work conducted by Fassin (2005), Tan (2009), and Amaeshi et al. (2008). By presenting the BEUO concept and examining its implications for CSR in supply chain operations, our work

complements the study of Amaeshi et al. (2008). Additionally, we highlight a new focus on operations management, which Fassin (2005) argued is critical for achieving sustainable CSR. A literature survey establishes that our study is the first paper linking CSR and supply chain operations by applying the bullwhip effect concept. Additionally, we develop a model to quantify the actual economic impact of CSR.

The paper is organized as follows: “[Literature Review](#)” section reviews literature in the related areas and points out the gap in the existing literature between CSR and the supply chain. “[Evaluation of the Bullwhip Effect due to Unethical Operations](#)” section evaluates the impact of BEUO by developing a quantitative index, and then estimates values of that index for three companies in the auto industry. “[Bottom-up and Proactive: A Coherent Approach for Ethical Operations](#)” section proposes a coherent approach to support MNCs in developing and maintaining ethical supply chains. This section also examines critical operational decisions and their consequences on MNCs' long-term profitability using two different CSR strategies, and provides recommendations to implement these CSR operations. “[Conclusions](#)” section presents our conclusions.

Literature Review

CSR: Concept, Theories, and Practical Challenges

Corporate Social Responsibility describes “a commitment to improve community well-being through discretionary business practices and contributions of corporate resources” (Kotler and Lee 2004). To implement CSR, researchers (e.g., Adams et al. 2001; Asgary and Mirschow 2002; Sethi 2005) discuss voluntary codes of ethics and propose codes for multinational corporations. The notion of CSR is one of the most important issues in the current business environment, due to the fact that relationships between businesses and their stakeholders have become more pronounced and integrated. Corporations realize that in order to operate successfully, they cannot isolate themselves from their stakeholders, but rather must focus equally on both market and nonmarket stakeholders in pursuit of long-term shareholder value creation. Therefore, the integration of CSR with business strategy has become a key feature of some of the leading companies worldwide.

Stakeholder theory is becoming the dominant approach of implementing CSR (Jamali 2008). According to Freeman (1984), stakeholders are “any group or individual who can affect or is affected by the achievement of the firm's objectives.” This theory maintains that companies should incorporate the interests of broader stakeholder groups—

not only internal stakeholders (investors, consumers, employees, and suppliers), but also external stakeholders (i.e., governments, environmentalists, special interest groups, and local community organizations, etc....)—into their business decisions. The basic idea behind the theory is that the success of an organization depends upon the degree of satisfaction of all stakeholders, not just shareholders.

Proponents of stakeholder theory make three core arguments to support their views: descriptive, instrumental, and normative (Donaldson and Preston 1995). The descriptive argument states that it is a more realistic presentation of what firms are actually doing. The instrumental argument is that it is essential for their business strategy. And finally, the normative argument maintains that it is the “right” thing to do. Therefore, when companies consider the interests of stakeholders, they will have better chances to develop and grow sustainably, and will ultimately increase shareholder value. In terms of firm value, sustainable development has the ability to forecast future cash flows and use a lower discount rate when assessing value due to the stability of a firm’s expected cash flow.

In a case where investors believe in sustainable development, they can value a company with a high degree of certainty. The effects of sustainable growth are an increase in financial performance while also meeting stakeholder requirements. The stakeholder theory has been well accepted and incorporated in contemporary business practices because more and more executives believe CSR activities will elicit company-favoring responses from stakeholders (McKinsey and Company 2006). Laplume et al. (2008) conducted a comprehensive survey of stakeholder theory. Lopez-De-Pedro and Rimbau-Gilabert (2012) further proposed new criteria to expand the stakeholder model.

The drivers for implementing sustainable CSR come from various sources, including independent mediators, the general public’s social awareness and education, as well as the companies’ desire for long-term growth. The role of independent mediators, particularly the government, to prevent damage to the universal good, including people and the environment (e.g., Ditlev-Simonsen 2010; Doh and Guay 2006) has been debated. Critics of CSR argue that the government should identify social responsibility through legislation and regulation, which will allow businesses to be responsible for their activities. Meanwhile, government legislation and regulation raise several concerns. Regulation in and of itself is unable to cover every aspect of corporation conduct in a comprehensive way. This situation leads to cumbersome legal processes relating to interpretation and controversial gray areas.

Social awareness and education of the general public are another set of factors that leads to the implementation of CSR (Mohr et al. 2001). International organizations,

especially the United Nations, have been initiating pacts and agreements such as Global Compact, Principles for Responsible Management Education, and Global Reporting Initiatives to address CSR issues. The public is putting pressure on corporations to act responsibly and uses the power of the media to acquire support. Development of ethical consumerism also plays an important role in forcing companies to address CSR. Many educated consumers are using their economic power to reward companies that incorporate CSR in their strategic plans (e.g., Ethical Consumer 2013; Ethical Consumer Group 2013).

In addition to these external pressures, more and more companies realize that CSR is not just a charitable deed, cost, or constraint. Instead, CSR generates innovation, provides competitive advantages, and offers new opportunities for companies. CSR also helps address urgent social problems (Anderson 2010). A company that is able to clearly identify its shared values with society and to incorporate CSR with its strategic business decisions will gain competitive advantages over its competitors (Porter and Kramer 2006; Kiran and Sharma 2011).

Bullwhip Effect and Supply Chain Management

The term *bullwhip effect* was officially introduced in the classic articles by Lee et al. (1997a, b), which describe that the variance of orders may be larger than that of sales and the distortion tends to increase as one moves upstream in a supply chain. On causes of the bullwhip effect, Lee et al. argued that the bullwhip effect is a consequence of the partners’ rational behavior within the supply chain’s infrastructure. Particularly, they identify four major causes of the bullwhip effect: (a) demand forecast updating, (b) order batching, (c) price fluctuation, and (d) rationing and shortage gaming. The bullwhip effect brings tremendous inefficiencies and detrimental consequences to the supply chain, such as product shortages at some periods and excess inventory at others, low utilization of capacity on certain occasions and overtime at others, poor product quality and customer service, less reliable replenishments, lost revenue, and extremely high supply chain costs. Li et al. (2005) simulated the impact of the bullwhip effect on a multi-stage supply chain. According to their simulation, the magnitude of the bullwhip effect could increase exponentially from a mild origin.

Although the concept of the bullwhip effect is relatively new, the nonlinear relationship of partners in a supply chain has long been acknowledged, and its first formal description can be traced back to Forrester (1961). Sterman (1995) demonstrated this phenomenon in the popular “MIT beer game.” He stated that the bullwhip effect originates from nonoptimal solutions adopted by supply chain participants without considering the system as a whole.

Economists have also noticed the bullwhip effect and ascribe its cause to rational actions managers take to mitigate demand uncertainties, avoid out-of-stock situations, and/or smooth production (Blanchard, 1983; Kahn, 1987). The existing literature (e.g., Lee et al. 1997a, b) suggests that the bullwhip effect could result in unexpected and adverse impacts on the efficiency of the whole supply chain, and should be avoided.

The evolution of globalization has created fragmented and complex supply chains (Braithwaite 2003). For many companies, the supply chain has grown so complex, it is hard to manage and therefore results in inadequate attention to CSR (e.g., Cheung et al. 2009). On the other hand, companies are increasingly under pressure from stakeholders to incorporate CSR into operations and supply chain management strategies. Tate et al. (2010) examined how top global companies integrated and improved the triple bottom line in internal operations and external supply chains. They concluded that supplier management is one of the key sustainability issues across the supply chain. Amaeshi et al. (2008) also found that global brands are under greater pressure to regulate their supply chains in order to prevent “negative public sentiments and invariably resentments towards” their brand image, thereby affecting their sales. Some MNCs that produce consumer goods (e.g., apparel) are forced by the threat of pressure groups such as NGOs and other organizations to conduct their business ethically in emerging markets. In this process, suppliers responsible for unethical practices are not directly targeted, thus allowing them to continue operating with lax CSR. Amaeshi et al. suggested that since MNCs wield a lot of power, they should encourage their immediate suppliers to adhere to CSR practices. And “through ripple effects, the influence of the powerful firm will filter down the entire spectrum of the supply chain” (p. 229).

Meanwhile, the relevance of supply chain management’s contributions to social and environmental sustainability is acknowledged in the literature. Caniato et al. (2012) conducted exploratory case-based research on environmental sustainability in fashion supply chains. They compared two different business models: (a) MNCs that include environmental aspects into a new concept of quality for their established brands and (b) smaller and local firms that leverage environmental sustainability to compete in new market niches and establish their brands. The study by Caniato et al. suggested that environmental sustainability in fashion can generate new business opportunities through supply chain management. Sen (2009) linked green supply chain management and shareholder value creation. The study suggested that resources committed and utilized for green supply chain management need to be looked upon as long-term strategic investments and not merely as cost centers. Therefore, companies

should shed their myopic views and become early adopters of green supply chain management. Cheung et al. (2009) also confirmed the importance of incorporating CSR and supply chain management, arguing that efforts to become proactive in CSR need collaboration between suppliers and MNCs because both parties will gain through the process. The study conducted in this paper further explores the ripple effects (part of the BEUO) stated in Amaeshi et al. (2008) and highlights the long-term impact of CSR initiatives on supply chain management, especially supplier management.

Evaluation of the Bullwhip Effect due to Unethical Operations

Development of the Index of BEUO

The global supply chain of an MNC typically consists of many partners, and the unethical conduct of a particular supplier may contribute to only a very small portion of the supply chain production cost. However, unethical conduct, once made public by disruptions, will dramatically disturb consumers and likely change their opinions of the MNC. Although not every act of unethical conduct will lead to disruptions, it is undeniable that unethical conduct is positively associated with disruptions, especially after such conduct occurs over a long period of time. Therefore, to compare the impact of ethical or unethical operations on the global supply chain of MNCs, we need to view the supply chain as a whole and we need to investigate not only short-term cost, but also the long-term cost and benefit.

When selecting ethical operations, a company may have to make an initial investment and its production costs may also be higher because additional or stricter procedures must be in place. However, due to the ethical operations, disruptions are less likely to appear in the supply chain. On the contrary, by selecting unethical operations, the company may enjoy lower production costs until disruptions happen in the facility after a long period of time. Once disruptions happen, the reputation of the MNC, who owns or contracts with the company in its supply chain, will also be adversely impacted. Moreover, repeated disruptions will lead to ascending damages due to “forecast updating” by consumers. In the supply chain literature, demand forecast updating is one of the key factors that contribute to the bullwhip effect (Lee et al. 1997a). This theory suggests that a company projects the consumer demand pattern based on what it has observed. A larger demand will lead to an even larger order because the company expects the demand could be even higher in the next period. Consequently, the company will increase output in advance. Similarly, in the unethical operation case, consumers may also apply

forecast updating on a company's reputation. The first unethical violation of a company held in high regard may have little impact on consumers' purchasing decisions because of the company's good record in the past. However, if such violations are repeated, the company might find consumers' loyalty diminishing quickly, while punishment for these violations increases dramatically. This result has been the case for the three auto industry companies (Ford, GM, and Toyota) for which we have been able to collect and examine data.

Given the factors described above, we can define two time-dependent profit measures, $TP(Unethical,t)$ and $TP(Ethical,t)$, as total profits of MNC operations under unethical and ethical decisions from the initial time when the decisions were made to any future time t . The total profits of operations depend on fixed and variable production costs, sales prices, and added costs of disruptions. The disruptions appear following a certain probability, and their impact includes both direct costs and indirect costs due to future sales loss. Appendix 1 presents an illustrative formulation to calculate total profits. To simplify the model in Appendix 1, we focus here on the total cost component of the function because of its direct impact and the certainty of information for testing.¹ Therefore, we define total direct cost as $DTC(Unethical,t)$ and $DTC(Ethical,t)$. DTC calculates only the fixed and variable production costs and the direct disruption costs (if any) for each type of decision. Now we can present the BEUO index as follows:

$$BEUO(t) = \frac{DTC(Unethical,t)}{DTC(Ethical,t)}.$$

If $BEUO(t) < 1$, it suggests that the unethical operations would lead to lower total costs in t periods; the MNC will probably continue such operations from an economic point of view even though they are morally wrong. However, if $BEUO(t) \geq 1$, unethical operations are both morally wrong and economically unjustifiable. We will use the three real-world cases from the auto industry to show that $BEUO(t)$ will become larger than 1 eventually, due to disruptions in the long run. Therefore, MNCs that tolerate unethical operations in pursuit of lower costs need to re-evaluate their strategies even from an economic point of view.

Estimation of the Index of BEUO: Lessons from the Automobile Industry

We are using the auto industry case to evaluate our propositions for two main reasons. First, the companies are MNCs and are within the same industry, therefore having

¹ In practice, collecting data for calculating the total profits, however, is very difficult, especially for the indirect costs of disruptions due to the future sales loss.

the same opportunities and challenges in terms of stakeholders and operational decisions. Second, quantitative data about their cases are available and will allow us to examine our index and propositions. Given the uniqueness of these cases, we shall be able to draw conclusions that are globally applicable. While the Apple case is very interesting and appropriate, we are not able to acquire quantitative data about the costs of ethical and unethical decisions. Therefore, our results would be a descriptive assertion rather than proof.

Operations of automobile supply chains often face many conflicting choices between functions (in terms of marketing, engineering, and manufacturing) and safety. Moreover, costs resulting from product liability claims are high because vehicle failures on the road are often associated with loss of lives. Therefore, it is expected that carmakers will put safety as their top priority and always make ethical operational decisions. Based on a few available cases, however, a few carmakers may choose the opposite. These companies tend to conceal quality flaws and quietly made corrective modifications to their defective products. This approach is used in the pursuit of high profit margins and low production costs, as well as out of fear that the problems will be discovered by potential plaintiffs' attorneys (Automotive News 2000). The three cases discussed below (Ford in 2000, Toyota in 2009, and GM in 2014) feature such unethical decisions, even though each company had opportunities to make ethical decisions and be transparent. In each case, we evaluate the direct costs of both unethical and ethical operations based on public data, thus calculating the index of BEUO. Our estimation for the unethical operations cost does not include the most significant component, the cost for the loss of lives, because it is not easy to put a "cost" label on lives, which are priceless. Therefore, the indices of BEUO we obtained below underestimate the "real" values of BEUO and could be considered accounting costs.

Ford in 2000

A large number of rollover accidents had happened to Ford's Explorer (SUV) in late 1990s and 2000, which resulted to more than 211 deaths and over 700 injuries domestically and internationally (Greenwald 2001). These accidents were due to the blowouts of Firestone tires equipped by the SUV. In 2000 and 2001, Ford and its tire supplier, Bridgestone/Firestone, recalled about 20 millions of tires on Ford Explorers. Further investigations (Salsbury and Davis 2003) showed that such disruption was the consequence of unethical decisions made by both companies years before. If Bridgestone/Firestone had chosen to install the nylon cap on the tire and educate the consumer properly, the recalls in 2000 and 2001 would probably have

been avoided. We estimate the direct total cost by 2001 for ethical operations would be \$24.5 million, and \$4,260 million for the unethical. Thus, $BEUO(2001) = 173.9$. A short description of the Ford recall and the details of our cost estimation appear in Appendix 2.

Toyota in 2009

ABC News (November 2009) reported that the potential dangers of unintended acceleration of Toyota cars were under investigation and hundreds of Toyota consumers were in “rebellion” after a series of accidents apparently caused by the acceleration. They also reported (December 2009) that court records showed the company had responded to “media accusations that it was continuing to hide defects in its vehicles” by publishing a statement on Toyota’s website stating that the company “has absolutely not minimized public awareness of any defect or issue with respect to its vehicles and any suggestion to the contrary is wrong and borders on irresponsibility.”

Facing the public pressure, Toyota recalled 8.1 million defective vehicles in 2009–2010. Such a disruption was the consequence of unethical decisions made by Toyota’s leadership in 2001 and was further worsened by the leadership’s intention to cover up the severe safety problems. We estimate the direct total cost by 2010 for the ethical operations would be \$810 million, and \$2 billion for the unethical. Thus, $BEUO(2010) = 2.47$. A short description of the Toyota recall and details of our cost estimation are in Appendix 3.

GM in 2014

On February 7, 2014, General Motors (GM) recalled about 800,000 of its small cars. The company continued to recall more of its cars over the next several months. By the end of the second quarter of 2014, GM had recalled nearly 29 million cars worldwide and 15 million of them were due to ignition switch defects. The faulty ignition switches caused air bags to fail and had been linked to at least 13 deaths. The direct recall cost was around \$1.2 billion and the charges could get worse as lawsuits and investigations continue (CNN Money 2014).

Investigations showed that the disruption was the direct result of an unethical decision made in 2006 by the company’s engineering managers who, instead of acknowledging a design problem and recalling all defective cars, chose to hide the information and quietly make corrective modifications. We estimate the 2014 direct total cost for ethical operations would be \$100 million at most, \$1.2 billion at least for the unethical. Thus, $BEUO(2014) = 12$. A short description of the GM recall and details of our cost estimation are in Appendix 4.

Bottom-up and Proactive: A Coherent Approach for Ethical Operations

Bottom-up and Proactive Approach

In all three cases evaluated in “[Evaluation of the Bullwhip Effect due to Unethical Operations](#)” section, the indices of UOBE are larger than 1, a clear indication that unethical decisions are economically inferior to ethical decisions in the long run for MNCs. Note that Ford, GM, and Toyota all responded to identified quality problems in a top-down and reactive approach; they treated these problems as potential threats to their public images and bottom lines, and tried to find a low-cost way out. Such an approach led to unethical decisions and resulted in much harsher penalties eventually. The reactive attitude reflected in the three cases is driven by the desire to minimize short-term costs and indicates the incapability of many MNCs to integrate the interests of stakeholders into their business decisions. The top-down decision direction reflected in these cases also suggests that many MNCs view CSR primarily as a way to brighten their public image and lack the motivation to pursue strong CSR commitments in their core operational procedures. Thus, when MNCs or their business partners are under pressure to cut costs, CSR is often treated as a luxury and might be the first cost center to be abandoned, as pointed out by Fassin (2005). Contrary to the top-down and reactive approach, we here propose a coherent approach for MNCs to perform operations, which we call the *Bottom-up and Proactive* approach.

The top-down approach focuses only on the “top” stakeholders (i.e., shareholders and top executives of MNCs) and the “top” decisions (i.e., the public relationship and the immediate profit maximizing decisions). The bottom-up approach focuses instead on the “bottom” stakeholders (Pralhad 2004), the workers and suppliers who produce the products and the consumers who eventually buy the products, and the “bottom” decisions, which are the operational decisions that MNCs make to design and manufacture their products through the supply chain. The bottom-up approach requires MNCs to switch their focus on targeted stakeholders and decision levels. In terms of stakeholders, most MNCs have educated and trained their executives on the importance of CSR. However, these MNCs also need to extend the CSR training and education to their suppliers and employees (Asgary and Mitschow 2002). In terms of decision levels, most MNCs realize the importance of CSR to their public relationships, but few seem to have found a proper balance between their aspirations in CSR and their performance in global supply chains (Tan 2009). We propose that the incorporation of CSR at the operational level provides the proper balance needed for these companies. CSR operations will offer

MNCs competitive advantages over their competitors in low operational costs and good quality products. Some companies, such as Starbucks in China with its Farmer's Support Centre and IKEA in India with its Better Cotton Initiative (BCI), are applying the bottom-up method. They not only ensure eco-friendly harvesting but also deliver better quality products and services, resulting in happier employees and consumers. These outcomes support both of our propositions.

The proactive approach is also necessary for MNCs, especially when they face long and unstable supply chains, in which unexpected disruptions are often inevitable. However, by proactively incorporating CSR within the operations of supply chains, MNCs can reduce the risk of disruptions to a minimum. Even if an unexpected disruption does happen, it can be effectively managed and not develop into a disaster due to the good relationship established by CSR operations. Thus, by proactively implementing CSR, an MNC can effectively mitigate or even avoid BEUO in supply chains and enjoy smooth production with an undisrupted public image in the long run. On the contrary, by negating CSR in the first place, the reactive approach stimulates BEUO even in minor disruptions. Once BEUO appears, it is very difficult to control because no partner in the supply chain is willing to take on the responsibility. Instead, they just blame the wrongdoing of other partners and further exacerbate BEUO. In the end, BEUO will create a huge loss for every stakeholder, as was the case for Ford and Firestone.

The bottom-up and proactive approach is essential for MNCs to achieve a sustainable and profitable future in a global supply chain. The bottom-up approach specifies *where* to implement CSR initiatives and the proactive approach specifies *when*. In the next subsection, we further address *which* specific CSR initiatives should be implemented through supply chain operations and discuss different consequences of operational decisions with and without CSR initiatives. A discussion of *how* to implement these decisions will follow in subsection c.

CSR-Operational Decision and Expected Outcome

Porter and Kramer (2006) stated that "the more closely tied a social issue is to a company's business, the greater the opportunity to leverage the firm's resources—and benefit society." Therefore, to achieve sustainable CSR impacts, a company needs a proactive and tailored operational process. Davis and Heineke (2012) classified strategic operational decisions into eight major categories. We focus here on four specific decisions: supplier selection and management, facility location selection, product design, and workforce selection. These four decisions are directly related to global supply chain management. Also, the

relationship between CSR and the supply chain is more clearly observable for these four areas of decision making. For each, we analyze the challenges and corresponding opportunities that an MNC has to confront when making a decision in the global supply chain context. Distinguished by CSR awareness, the company's decision can be either proactive or reactive, each leading to a different outcome. We discuss potential impacts on the company's costs and stakeholder values, whether a company incorporates CSR initiatives in its operations or not. We also use real-world examples to demonstrate the outcomes for each type of decision. The following table describes major factors and outcomes, which support our Propositions I and II:

Supplier selection and management is an important operational decision. Suppliers play a significant role in a company's strategic partnership because they provide the company with natural and human resources that cannot be easily substituted. On the other hand, MNCs often find a few suppliers in emerging markets who are able to accept a very low sourcing price by sacrificing human rights and engaging in unethical practices. Thus, one of the main differences between a proactive MNC and a reactive MNC is the choice of suppliers. A proactive CSR leadership in an MNC (CSR leader for short) will choose CSR-compliant suppliers even though this strategy often means excluding suppliers who can provide the lowest bidding price. The CSR leader will also continuously monitor suppliers' behaviors and decisions, encourage improvement in working conditions, and actively address other stakeholder concerns. In performing these actions, the CSR leader needs to share some of the company's revenues with its suppliers and pay additional costs to help suppliers implement and maintain proper CSR procedures.

On the contrary, a reactive CSR follower (CSR follower for short) tends to use purchasing price as the primary factor in choosing suppliers. To gain maximum profits, the CSR follower also tries hard to squeeze the profit margin from its suppliers, constantly demanding lower purchasing prices. Thus, in the short run, a CSR follower will have a lower operational cost than a CSR leader, thereby gaining a competitive advantage quickly.

However, in a global supply chain that consists of dozens and even hundreds of partners, unexpected disruptions may happen at any time. Worse, to survive in fierce price competition, suppliers working with a CSR follower will frequently generate disruptions. These suppliers transfer price pressure by sacrificing human rights or product quality—or both—to keep orders delivered on time. Such unethical operations will inevitably lead to more disruptions. And once disruptions occur, social media will quickly deliver the message to consumer markets. Because CSR conduct is expected as the norm by stakeholders, unethical conduct in the supply chain of the CSR

follower will easily produce huge negative consumer responses. Under pressure, the CSR follower switches to another supplier. Although changing suppliers seems to be a low-cost way to pacify consumer anger, it is very inefficient and costly to supply chain operations. The new supplier needs a long learning period in order to coordinate its production with the CSR follower's supply chain. In the learning period, the CSR follower will suffer from delayed or defective delivery from the new supplier. Besides, the CSR follower will have to adjust its operations to comply with the changed situation, such as reprinting the operations manual, retraining employees, and redesigning its logistics network. All these changes lead to additional expenses, which culminate in a huge switching price when combined with advertising and other public relations costs to rebuild public trust. Moreover, if the CSR follower keeps the same reactive approach, another disruption and the resulting BEUO will likely start again with the new supplier. When consumers of the product observe repeated unethical incidents by the CSR follower, they will lose the trust to the company eventually. Thus, the reactive approach for the supplier selection will inevitably lead to higher operational costs and may force the CSR follower to go out of business. The above scenario illustrates why Proposition I holds.

The CSR leader will face a totally different scenario in the long run. The good supplier relationship generated by proactive CSR initiatives will bring a good reputation and sustainable profits for both suppliers and MNCs, if everything else is held constant. Thus, these suppliers have strong motivations to preserve the relationship by maintaining ethical operations and implementing new CSR initiatives if needed. These strong CSR-compliant suppliers will not be prone to incur disruptions. Even if a disruption does happen, these suppliers will actively seek ways to confine the disruption within their control boundaries. Through the collective efforts of both suppliers and the CSR leader, the disruption is not prone to stimulate BEUO. Therefore, via a proactive approach, ethical operations become the norm; the MNC will have a continually decreased operational cost because the relationship between suppliers and CSR leader becomes tighter over time. The above scenario verifies why Proposition II holds.

The supplier selection and management decision by the CSR leader generates a positive stakeholder value cycle: The selection of CSR-compliant suppliers leads to a strong relationship among supply chain partners as well as a stable supply chain production flow, both of which will reduce operational costs. Low operational costs then enable the supply chain partners to strengthen their relationships and gain a competitive advantage in the market. On the contrary, the decision of the CSR follower generates a negative stakeholder value cycle. The selection of cheapest suppliers

has a high potential of leading to a resentful relationship among supply chain partners. Such a relationship could cause frequent disruptions to the supply chain production flow and therefore high operational costs, which further weaken the relationship of supply chain partners and will result in loss of the MNC's competitive advantage (Table 1).

Similar stakeholder value cycles also appear in other strategic operations areas as the result of different decision approaches. In the facility location decision, the proactive CSR strategy selects a place that has minimal damage to the environment and community, thereby enjoying low maintenance costs and a good relationship with the local community. In the product design decision, the proactive CSR strategy uses environmentally sustainable materials and maintains a healthy environment for workers, thereby enjoying high sales prices and a more favorable product image in the long run. In the workforce selection decision, the proactive CSR strategy provides CSR education in local community schools and continual CSR employee training, thereby enjoying low worker training costs and a great reputation among all stakeholders. A common feature of these proactive CSR strategies is that they require an initial cost to create the proper mechanism to incorporate CSR into the operations. Once the mechanism is built and the incorporation is properly implemented, however, all supply chain stakeholders will enjoy a positive value-creation cycle, which leads to low costs and strong competitive advantages in the long run.

Implementation of CSR Operations

Implementing CSR operations proactively in global supply chains and ensuring operations sustainability take more than good intentions and strong leadership (Porter and Kramer 2006). Effective implementation requires the coordinated efforts of MNCs, local suppliers, governments, and NGOs. The experiences of Nestlé's milk business in India and the Starbucks and Conservation International Partnership provide important insights to implementation of CSR operations (Table 2).

When Nestlé entered the Indian market in 1962 and built a dairy-processing factory in the northern district of Moga, poverty in the region was severe. People were without electricity, transportation, telephones, or medical care. The company decided to proactively implement a series of CSR initiatives for the "bottom" of society—the local farmers. The MNC invested in local infrastructure, sent experts to provide medicines and nutritional supplements for sick animals and to hold monthly training sessions for local farmers, and provided financing and technical assistance to these farmers. Nestlé successfully incorporated its operations with the CSR initiatives. By doing this, the company

Table 1 Operational decisions and CSR

Operational decisions	Challenges in global supply chain	Opportunities in global supply chain	Decision type	CSR initiatives	Expected outcome: costs, stakeholder values, and BEUO	Examples of MNC's decisions ^a
Supplier selection and management	Less reliable and cost-driven suppliers	Long-term relationship with suppliers by value-sharing	Proactive	Select CSR-compliant suppliers and encourage continual CSR improvement	High initial sourcing costs; low disruption costs; good supplier relationship. Suppliers help manage disruptions; low risk of BEUO	Starbucks' support of small-scale producers in the emerging markets. The company developed a supply chain spanning 19 countries that funnel everything for nearly 20,000 retail stores in 60 countries; the company also established (2004) Coffee and Farmer Equity Practices program, providing social, environmental, economic, and quality guidelines for farmers
			Reactive	Use cheapest suppliers; change to another if a current supplier is reported violating CSR standard	Low initial sourcing costs; high switching costs; high disruption costs; resentful supplier relationship. Suppliers shift responsibility off in disruptions; high risk of BEUO	Apple's switch from Foxconn to Pegatron. This switch was made because the former supplier's cost had increased after accidents. The recall of millions of tires by Ford and its tire supplier, Bridgestone/Firestone. Each was blaming the other for wrongdoing in this process
Facility location	Inefficient and unstable Infrastructure	Abundant and unpolluted resources; sufficient and sustainable supply	Proactive	Select a place with minimum damage to surrounding environment and community	High selection and construction costs; low maintenance costs; low disruption costs; good community relationship. Community helps defend reputation if incidents occur; low risk of BEUO	Nestlé's investment in India for its dairy-processing factory. By doing this, the company has gained direct and reliable access to suppliers and consumers for its global supply chain while generating enormous social benefits for the local community
			Reactive	Find most convenient place; shut down facility if damage proves too big to fix	Low selection and construction costs; increasing maintenance costs; high shutdown costs; high compensation costs; continual pressure from local government and NGOs. Community helps publicize and condemn incidents; high risk of BEUO	Bhopal disaster in India. This disaster, created by Union Carbide, spewed poisonous gas on a densely populated Indian city, killing 8,000 people and over 200,000 thousand injured. Investigations show that such a disaster could be avoided if ethical decisions were made in advance (Cherukupally 2011)
Product design	High design cost and high risk of quality problem in complex supply chain	Competitive advantage for products using sustainable and healthy materials	Proactive	Use environmentally sustainable and healthy materials	High material costs; high sales prices; more favorable product image. Low risk of BEUO	Starbucks Coffee's green initiatives in design of coffee cups and other products. The cooperation of Starbucks and NGOs to advancing environmental standards also helps coffee supply growth
			Reactive	Use low-cost materials; change to another design quietly if current design found defective	Low material costs; risk of lawsuits because of harm to consumers; high switching costs to other materials. High risk of BEUO once harmful materials are found to have been used in supply chain.	Ford, GM, and Toyota's reactive decisions on the faulty product design. For example, GM's decision to redesign a defective part, but not create new part number for this change

Table 1 continued

Operational decisions	Challenges in global supply chain	Opportunities in global supply chain	Decision type	CSR initiatives	Expected outcome: costs, stakeholder values, and BEUO	Examples of MNC's decisions ^a
Workforce selection	Low-skill workforce; less awareness of CSR	Loyal consumers and happy employees through CSR education	Proactive	CSR education in schools and community; continual CSR employee training	High initial investment in education; low work-training costs; low disruption costs; great reputation. Skillful and ethical workers ensure no unethical incidents could happen; low risk of BEUO	Starbucks's employee program. The company announced that a large segment of its employees can acquire college degrees paid by the company. Nestlé's training program. The company holds monthly training sessions for local farmers, and medicines and nutritional supplements for sick animals
			Reactive	Train employees only if regulations require or if harmful consequences are found among employees	Cheap labor costs; high costs of training employees to change behaviors; high compensation costs if operations harm employee health. High risk of BEUO due to unawareness of ethical operations	The human rights violation in factories of Foxconn, Apple's major supplier

^a More discussions on the successful practices of Starbucks and Nestlé can be found in Section c. Implementation of CSR Operations

has gained direct and reliable access to suppliers and consumers for its global supply chain while generating enormous social benefits for the local community. Porter and Kramer (2006) examined the Nestlé case and concluded that when value chain practices and investments in a competitive context are fully integrated, CSR becomes hard to distinguish from the day-to-day business of the company, exactly as predicated in Proposition II of this paper. In addition, Porter and Kramer (2006) pointed out that integrating business with CSR requires adjustments in organization, reporting relationships, and incentives. Companies have to shift the performance measures from short-term revenue generating to long-term competitiveness.

The partnership between Conservation International (CI) and Starbucks Coffee Company exemplifies another important implementation issue. The relationship shows how MNCs should work with NGOs to proactively promote CSR operations for the “bottom,” such as small-scale producers in emerging markets. CI is an international NGO founded in 1987 aiming at societal change by advancing and promoting environmental standards. The CI-Starbucks partnership started in 1998 when CI attempted to secure a market for coffee supply grown using the best conservation practices. Meanwhile, Starbucks, faced by NGO pressure and a major coffee production crisis, attempted to secure a long-term stable supply chain in South America. Through the partnership, CI developed a set of best practices for coffee production suitable for emerging markets. They convinced local producers to adopt these practices and collaborated with local governments and organizations to promote CSR. Starbucks applied these practices along its entire supply chain, developed its own coffee-purchasing code using the same principles, and provided financial and technical assistance for local farmers. The decision by Starbucks represents a characteristic “reactive-turned-proactive” strategy, where pressures from NGOs and economic interests for stable coffee production led the company to go from resistance and mere compliance to strategic movements toward a strong CSR supply chain. Perez-Aleman and Sandilands (2008) used the CI-Starbucks partnership as a good empirical case to address how the implementation of social and environmental standards in supply chains can foster inclusion of the bottom of the pyramid. Their study provided insightful lessons on CSR implementation in emerging markets, including focusing on processes, addressing specific conditions and challenges faced by local suppliers, and providing incentives and active assistance to the suppliers.

While proactively incorporating CSR into operations proves beneficial for both MNCs and society, as shown in the Nestlé and Starbucks cases, not all companies realize this benefit and are willing to give up their top-down and reactive CSR strategies voluntarily. Government regulation,

Table 2 Recommended actions for implementing CSR operations

Implementing stakeholders	Targeted objects	Actions	Expected results
MNCs	Operations process of supply chain	Shift performance measures from short-term revenue generation to long-term competitiveness Create new standards, codes of conduct, and certification programs suitable for global supply chains Proactively incorporate CSR with strategic operations	Ethical conduct in supply chain process by MNCs becoming norms Long-term profits and competitive advantages
MNCs	Local suppliers	Select CSR-compliant, not only lowest-cost, suppliers Allow sufficient profit margin for suppliers to improve working conditions Provide financing and technical assistance for suppliers' CSR initiatives Proactively address any ethical concerns and have zero tolerance for CSR violations	Ethical conduct by suppliers becoming norms Minimum disruption and not prone to BEUO Positive stakeholder value cycle
Government	MNCs and their local suppliers	Use regulation to monitor the conduct of MNCs and punish wrongdoings Use incentives (tax rebates, subsidies, and awards) to encourage CSR operations	Local region becoming attractive to MNCs with CSR operations Healthy competition in CSR innovations becoming norms. Natural resources being reserved and welfare of local residents being protected
NGOs including UN	MNCs and their local suppliers	Develop UN-backed Principles for Responsible Operations (PRO) Keep pressure on MNCs that have unethical operations Build partnership with MNCs to foster CSR operations Coordinate with local government and community to promote best CSR practices	Win-win condition for both local community and MNCs Best CSR practices being adopted and becoming norms globally

incentives from outsider organizations, and pressure from consumers are often needed to push companies to implement “reactive-turned-proactive” strategies. The failure of CSR implementation in Spanish companies teaches us that international and national initiatives to promote CSR are critical and should be combined with initiatives that companies implement voluntarily (Gonzalez and Martinez 2004).

In the international scope, the United Nations (UN) has developed Principles for Responsible Investment (PRI) with the goal of understanding the implications of sustainability for investors and support signatories to incorporate these issues into their investment decision making and ownership practices (UNPRI 2013). Although these principles are voluntary, they provide pressure and guidelines for companies to make CSR investment decisions. Similar to PRI, we believe the UN can also develop a set of Principles for Responsible Operations (PRO), based on best CSR operations practices. Like other UN initiatives, PRO will encourage CSR operations in supply chains, especially regarding sourcing operations.

In the national scope, national or local governments can use regulations and incentives to foster and monitor CSR operations. Between the two, providing incentives is often

a better way to achieve desired CSR behaviors (Mirrlees 1997). There are mainly three different forms of incentives that can be chosen—tax rebates, subsidies, and awards. MNCs to a large extent can be presumed to transfer their profits out of countries with medium to high taxes and into countries with lower taxes. Therefore, offering tax rebates on CSR operations not only incentivizes MNCs to adopt CSR policies, but also makes countries that implement this tax policy attractive to operate in. Subsidizing local companies that develop and maintain CSR operations is another effective way to encourage MNCs and their local suppliers to adopt CSR. Local government subsidizing helps reduce the initial cost required by the proactive CSR approach and exhibits government commitment in support of ethical conduct. All of these incentivize MNCs to invest in the region. Also, government can offer awards to encourage healthy competitions on CSR investment, such as benefits for companies with best labor practices, most environmentally friendly, and greatest CSR partnership. Innovation-based CSR awards can also bring a new form of BEUO, in which a small CSR innovation made by a company impacts the operations of other companies and leads to better and larger-scale CSR innovations.

Our conclusion is that in order to effectively implement bottom-up and proactive CSR operations in global supply chains, MNCs need to initiate a series of changes in their operations and work closely with all stakeholders, especially local suppliers, local governments, and international NGOs. The following table presents a list of recommended actions for MNC stakeholders; these recommendations are based on best practices in various industries (e.g., Gonzalez and Martinez 2004; Porter and Kramer 2006; Perez-Alleman and Sandilands 2008) and our analysis in this paper. The primary focus here is on MNCs and their three stakeholders—suppliers, government, and NGOs—which have direct impacts on MNCs' operations in global supply chains.

Conclusions

This paper examined ethical challenges and opportunities that MNCs confront when having a global supply chain deeply reliant on emerging markets. We discussed the importance of MNCs developing and maintaining bottom-up and proactive CSR approaches. We presented the concept of BEUO in supply chains and analyzed its significant economic impact on both bottom line and reputation for MNCs. We developed a model to estimate the index of BEUO, which incorporated the long-run costs and benefits for ethical and unethical decisions. The data from Ford, GM, and Toyota were used to show quantitatively that in the long run it is beneficial to make operational decisions ethically. In our calculations, we focused on the total direct cost linked to operational decisions. Our analysis showed the validity of the two propositions we proposed: (1) Ethical operations in the supply chain are not prone to stimulate BEUO, while (2) unethical operations will have a significant negative impact on MNCs' reputation and bottom lines due to BEUO. Application of the BEUO concept to CSR and the supply chain provided strong economic arguments for MNCs to incorporate CSR proactively in their business models. Our study also presented critical operational decisions that should be incorporated with CSR initiatives and recommended actions for implementation.

Future extension of this study would be the development of a questionnaire that can quantify the indirect costs and benefits between ethical and unethical operations. By collecting such data, we will be able to evaluate the impact of BEUO in a more comprehensive way. A reasonable number of MNCs and suppliers should be surveyed and the cost and benefit curves be plotted over time. We acknowledge that implementing the proposed future study faces a challenge—MNCs may be unable or unwilling to provide information at such a detailed level.

Appendix 1: Quantitative Model of Evaluating Profits

We developed two production functions for a profit maximizing firm.² In one case the firm makes an ethical decision, and in the other the firm will proceed with an unethical decision, holding everything else constant. Assume the unit operating cost of the firm be x with *unethical* operations and $x(1 + \alpha\%)$ with *ethical* operations where $\alpha\%$ is a positive constant. In addition, ethical operations may require an initial investment, whose amount we denote as B . We denote the remaining cost that is independent of the operating cost of this particular firm as M . We also denote the production quantity of the MNC per period as β and the unit price of each end product as y . Unethical operations will lead to a profit $\beta(y - x - M)$ for the MNC supply chain in each period, but ethical operations will reduce the profit to $\beta[y - x(1 + \alpha\%) - M] - B$. Thus, the unethical operations are beneficial to the supply chain in a short run from a cost point of view. We assume the additional costs brought by ethical operations are shared by the whole supply chain, which represents the "best scenario" case. In reality, many MNCs actually leave the firm alone responsible for the additional cost, which further motivates the firm to adopt the unethical operations and hide such information from the MNC.

When a disruption happens due to unethical operations of the firm, a segment of consumers will be disturbed and choose not to buy the product from the MNC. We denote the percentage of this type of social awareness consumers as $\gamma\%$. Meanwhile, the MNC will also have to pay additional damage costs such as product recalls, victim compensation, lawsuits, and public relations rehabilitation. We denote such a cost as N . We also model the forecast updating factor of the consumer on the MNC's reputation as δ^{i-1} where δ is a constant larger than 1 and i is the times of unethical violations discovered by the consumers. Thus, if an unethical violation is first known to consumers, the consumer base will reduce $\gamma\%$ and the damage cost is N in the first time; if the violation is repeated, the consumer base will be further reduced $\delta\gamma\%$ and the one-time damage cost will increase to δN . Now consider the probability between unethical operations and the disruptions. We denote this probability as $\varepsilon\%$, which suggests that a disruption will happen in every $(100/\varepsilon)$ time periods on average. For example, if $\varepsilon\% = 1\%$ and the time unit is day, then on average within each 100 days, one disruption will happen. The following formulations compare the cost difference between the ethical operation and the unethical operation in

² We assume the profit maximizing firm can be a contracted supplier, a subsidiary company, or a part of the MNC itself. The consumers are indifferent to the ownership of the firm; decisions made by the firm are viewed by the consumers as part of the MNC's decisions.

$3(100/\varepsilon)$ time periods. For simplicity, we assume the time unit is day and two disruptions happen in $3(100/\varepsilon)$ days: one on day $(100/\varepsilon)$ and another on day $2(100/\varepsilon)$.

Total Profit of the MNC in $\frac{300}{\varepsilon}$ days:

(A) Total Profit with unethical operations

$$TP\left(\text{Unethical}, \frac{300}{\varepsilon}\right) = \left[\beta y * \frac{100}{\varepsilon} \beta y(1 - \gamma\%) * \frac{100}{\varepsilon} + \beta y(1 - \gamma\% - \delta\gamma\%) * \frac{100}{\varepsilon} \right] - (1 + \delta)N - (x + M)y * \frac{300}{\varepsilon}.$$

The total profit $TP(\text{Unethical}, \frac{300}{\varepsilon})$ has two parameters, in which “Unethical” identifies type of operations and $\frac{300}{\varepsilon}$ is days of performing the operations. TP consists of three components: $\beta y * \frac{100}{\varepsilon} \beta y(1 - \gamma\%) * \frac{100}{\varepsilon} + \beta y(1 - \delta\gamma\%) * \frac{100}{\varepsilon}$ is the total revenue in $3(100/\varepsilon)$ days; $(1 + \delta)N$ is the damage cost caused by two disruptions; and $(x + N)y * \frac{300}{\varepsilon}$ is the total supply chain costs in $\frac{300}{\varepsilon}$ days.

(B) Total Profit with ethical operations

$$TP\left(\text{Ethical}, \frac{300}{\varepsilon}\right) = \beta y * \frac{300}{\varepsilon} - [x(1 + \alpha\%) + M]y * \frac{300}{\varepsilon} - B.$$

With ethical operations, the supply chain of the MNC will avoid the two disruptions that happened in the unethical operations scenario. Thus, the total profit of the ethical operations in $\frac{300}{\varepsilon}$ days is equal to the total revenue $\beta y * \frac{300}{\varepsilon}$, minus the total cost $[x(1 + \alpha\%) + M]y * \frac{300}{\varepsilon}$ and the initial investment B for ethical operations. Note here we imply two somehow “unrealistic” assumptions in order to simplify the model: (1) the supply chain costs of the ethical operations remain constant in time and (2) the sales of the ethical operations remain constant in time. In reality, most MNCs will enjoy decreasing costs and increasing sales simultaneously without disruptions. Therefore, formulation (B) represents the most conservative estimation for the profit of ethical operations; the actual profit could be much higher.

Appendix 2: Case Study: Ford in 2000

By 2000, a large number of rollover accidents had happened to Ford’s Explorer, a popular sport utility vehicle (SUV), which resulted in 174 deaths and over 700 injuries on US highways, and more than 40 deaths elsewhere in the world (Greenwald 2001). And the blowouts of Firestone tires mounted on the vehicles were the reasons for these accidents. Bridgestone/Firestone recalled 6.5 million tires

in August, 2000, and Ford recalled 13 million Firestone tires that had been installed on Ford Explorers and pickup trucks in May 2001. The business relationship of the two companies was also broken soon after, and both companies blamed the other for the wrongdoing. Salsbury and Davis (2003) wrote a comprehensive case on the quality problems at Ford and Firestone, which clearly demonstrated how “the different quality problems accumulate overtime and across organizational boundaries, to the point where there are major consequences for all the parties that are involved.”

Facing the quality problems, both Ford and Firestone made unethical decisions in various operation areas. In automobile design and manufacturing, Ford decided to use the suspension system that was known to be defective on the Explorer because it allowed Ford to manufacture its new SUV on existing assembly lines. The Explorer prototype demonstrated a rollover response with such a suspension system. Instead of changing the design, however, Ford decided to lower the recommended tire pressure to help the vehicle pass rollover tests. On tire design and manufacturing, Firestone decided not to install a nylon cap that makes the tire robust in order to reduce the cost, while the cost to include the cap can range from pennies to as much as \$1.00 per tire. Meanwhile, Bridgestone/Firestone didn’t put enough effort in educating the consumer on the importance of maintaining proper tire maintenance and safety until 2001 when, after the tire recall, the company agreed to fund a \$5 million consumer educational campaign to do it. In supply chain management, the two companies lacked effective communications and mutual trust, even though they had been partners for nearly 100 years, which led to slow responses to consumer complaints and problem solving.

The financial impact of the recall was significant for both Ford and Bridgestone/Firestone. The latter suffered a \$510 million loss in 2000 and \$200 million in 2001. The company’s net profit was 80 % lower in 2000 than in the previous year and its tire sales dropped 40 % in January 2001. Meanwhile, Ford incurred \$550 million in the 2000 recall and \$3 billion in the 2001 recall.

If Bridgestone/Firestone had chosen to install the nylon cap on the tire and educate the consumer properly, the recalls in 2000 and 2001 would probably have been avoided. Each cap costs \$1.00 per tire (Healey and Nathan 2000). The total cost for installing the cap on all recalled tires would be \$19.5 million. This cost plus the \$5 million education fund would have required \$24.5 million of direct total costs by 2001 for ethical operations. The direct total cost by 2001 for unethical operations would have been \$4,260 million, which includes \$710 million from Bridgestone/Firestone and \$3,550 million from Ford.

Appendix 3: Case Study: Toyota in 2009

In 2010, Toyota stated that massive recalls of 8.1 million vehicles due to gas pedal problems estimated costs of \$2 billion in repairs and lost revenue. The recall cost estimates do not include any expenses or lost sales (Valdes-Dapena 2010). In March 2014, ABC reporters noted that Toyota agreed to pay \$1.2 billion to avoid prosecution for covering up the severe safety problems of unintended acceleration. And the court documents showed that Toyota made cars with parts that the FBI said were known to the company to be “deadly.” Toyota “admitted” that it “misled U.S. consumers by concealing and making deceptive statements about two safety-related issues affecting its vehicles, each of which caused a type of unintended acceleration.” And according to FBI Assistant Director George Venizelos, Toyota “put sales over safety and profit over principle.”

In 2002, when Lexus ES cars were on showroom floors, the company’s US engineers sent a test report to Toyota’s leadership stating the luxury sedan shifted gears so roughly that it was “not acceptable for production.” The warning was also reported to a Toyota executive vice president in Japan, who stated that despite misgivings among US officials, Lexus was “marginally acceptable for production.”

Other studies (i.e., Finch 2010; Cole 2011) have provided detailed explanations of Toyota’s recall history. Finch stated that “Toyota has avoided the ‘root cause’ of sudden acceleration defects because it will be very expensive to fix.” Bowen and Kennedy (2010) discuss in detail the total costs of the recall. Therefore, if Toyota would have taken the results of the test that concluded “not acceptable for production” by engineers seriously, and identified the problem and fixed it in 2001, the total direct cost would have been about \$100 per vehicle. Of course, in 2001 significantly fewer defective automobiles would have been sold. The total direct cost for fixing the defective sudden acceleration for 8.1 million cars in 2010 would have been \$810 million. The most conservative estimate for fixing these vehicles is \$2 billion, which is the total direct cost for the unethical operational decision. And of course there are significant indirect costs to its reputation that are not easy to calculate.

Appendix 4: Case Study: GM in 2014

GM noticed the ignition switch problem in some of its car models as early as 2003. To fix the problem, the company needed to recall these defective cars, which might cost the company 57 cents per car—or about \$100 million in total if the recall happened in 2007 (Krisher and Durbin 2014). An engineering manager at GM rejected the fix proposal because it was “too expensive and would take too long”

(Higgins 2014). Instead, in 2006, the manager approved a plan proposed by Delphi, the company that makes the switch, for a redesigned ignition switch, but did not create a new part number for this change. “Changing the fit, form or function of a part without making a part number change is a cardinal sin,” as an expert asserted, because it caused years of delay in tracing the defect on GM’s cars (Colias and Bunkley 2014). The design change had been unnoticed until April 2013 when an outside expert hired by GM finally figured out the problem.

When the ignition switch problem was found in 2006, GM could have made an ethical decision by acknowledging the problem and recalling all defective cars. The direct total cost of the ethical decision would have been at most \$100 million. Unfortunately, GM chose to follow an unethical decision-making track, which was to hide the information and quietly make corrective modifications to their defective products. Such a decision exacerbated instead of fixed the problem and led to the mass recalls in 2014 and at least \$1.2 billion in total direct cost.

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