Sustainability-induced risks: Exploring how hidden costs create a vicious cycle

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Abstract

Sustainability is recently recognized as not only a concern for profitability, but also for risk. The struggle to implement sustainability practices raises unique trade-offs, which lead to disruptive profiles and strategies, introducing a new form of vulnerability and increasing risk, especially for supply chains spread around the emerging economies. However, companies are not yet aware of cost of not managing sustainability-induced risks, and bear the cost of the risks associated with sustainability programs. Research is also scarce to understand this implicit trade-off between the cost of sustainability-induced risks and risk mitigation. Following the tenets of systems view, theory of constraints and chaos theories, this study investigates how sustainability-induced risks increase cost and threaten the viability of sustainability programs in the long run. Data is collected through face-to-face interviews among thirty-one experts of food supply chains in an emerging economy. Findings conceptualize the interplay between the cost of sustainability-induced risks and risk mitigation strategies, and posits a framework to break the risk-cost vicious cycle to undermine the sustainability practices.

Keywords: Supply Chain Risk, Risk Mitigation, Sustainability, Food Industry

Introduction

Over the past 20 years, the triple bottom line has become a critical lens for evaluating corporate strategy (Elkington, 1997). Indeed, sustainability considerations are increasingly touted as a top strategic priority (Fawcett et al., 2015). For most companies, however, when economic trade-offs emerge, sustainability practices are relegated to second-tier status (Brockhaus et al., 2017). Yet, sustainability initiatives almost always require significant changes to operating practices. These changes tend to increase risks, negatively impacting costs and potentially causing substantial economic harm—a fact that is too often overlooked (Hofmann et al., 2013).

Consider the Chipotle case, a national fast food chain, known for healthy and responsible supply chain, promising "food with integrity", emphasizing a respect for animals, farmers, customers and the environment. This company was reported to have caused the sickening of 500 people in 13 states since July 2015, due to E-coli, norovirus, and salmonella-caused food poisonings, damaging its reputation (Berfield, 2015). The reality was more dramatic, according to public-health officials, the actual number is probably 10 times higher. This high-quality, sustainability focused company worth for

$24 billion saw 40 percent drop in value, to $10 billion, sales at established stores dropped 27 percent by March 2016, and stock value has already lost 25 percent in the past 12 months – this offset excludes the legal issues and the ongoing federal investigation. This dramatic breakdown was neither inevitable, nor coincidental; it was a problem within the supply chain of the company, as yet unclear, perhaps a sick worker who should have been at home, or supply scarcity driving them to work with multiple suppliers, which made the monitoring difficult. Whatever the reason, they failed to manage the risks of the highly complex supply network, and increased the risks associated with sustainability initiatives. Despite increasing sustainability efforts, they neglected to act proactively towards potential sustainability-induced risks, make the necessary preventive controls. They had no strength plan prepared to manage the greater complexity of the supply chain caused by these sustainability practices, making it more vulnerable.

Therefore, what is argued is that, companies may implement sustainability programs to comply with government regulation or improve their image; but, they often fail to consider all of the potential ramifications of their sustainability programs (Seuring and Müller, 2008; Hoffmann et al., 2013). Acting myopically, managers overlook the potentially negative consequences of sustainability initiatives. That is, companies get caught up in the quest to be socially responsible and overlook the reality that social and environmental programs have both positive and negative consequences (Carter and Rogers, 2008; Seuring and Müller, 2008). That causes mismanagement of sustainability-induced risks, and avoids companies to take a proactive approach to mitigating those risks.

Our objective is to explore one aspect of these negative consequences: the cost of sustainability-induced risks. Specifically, we investigate how sustainability-induced risks threaten the viability of sustainability programs—and perhaps even the firm's own existence, and increase cost.

We identify the risks induced by sustainability programs through face-to-face semi-structured interviews in food supply chains, and document commonalities of the underlying causes in order to develop a systematic risk-mitigation approach. More importantly, we document and describe the risk-cost vicious cycle initiated by sustainability programs in emerging countries—a cycle that is overlooked in both the literature and practice (Carter and Rogers, 2008; Seuring and Müller, 2008; Hoffmann et al., 2013).

Theoretical Background

Sustainability programs are difficult to manage (Fawcett et al., 2015). Combined with the complex and dynamic nature of supply chains, sustainability initiatives introduce diverse trade-offs and induce various risks at individual processes, making it harder to manage the risk impacts on the supply chains and sub-optimize the overall system (Gammelgaard, 1997).

Since supply chains now traverse the globe, their effects necessarily go beyond their local boundaries, which inevitably create increased uncertainty and complexity. While the pursuit of integration brings many benefits that improve competitiveness, it introduces new challenges (Zsidisin et al., 2007) that trigger environmental and social problems for different stakeholders. This has made risk management an integral part of sustainability, leading to a recognition that supply chains can become more sustainable by adopting risk management principles regarding their environmental and social effects (Seuring and Müller, 2008; Anderson and Anderson, 2009; Mandal, 2011). In particular, rather than only focus on short-term financial gain, it has become important to manage risk factors

causing long-term damages in supply chains in order to achieve sustainable development (Gladwin et al., 1995).

Although it is increasingly obvious that supply chains suffer serious losses from social or environmental problems, there is the gap in the literature regarding the integration of sustainability and risk management issues (Seuring and Müller, 2008). While sustainability has the potential to protect against risks for future generations (Krysiak, 2009), knowledge is limited on how sustainability issues materialize as risks (Krysiak, 2009; Hoffmann et al., 2013). In particular, there are few studies integrating the sustainability dimensions or focusing on environmental and social aspects (Seuring and Müller, 2008; Hassini et al., 2012). Further research is therefore needed to address the intersection between risk and sustainable supply chains (Seuring and Müller, 2008; Anderson and Anderson, 2009; Krysiak, 2009; Hoffmann et al., 2013), and develop a risk framework of sustainability initiatives.

Supply chain management is philosophically based on systems approach, which views the supply chain as a single entity rather than as a set of individual, independently functioning entities. This integrative philosophy suggests that the performance of each supply chain member either directly or indirectly affects the performance of others, or the supply chain as a whole (Cooper et al., 1997). Chaos theory and theory of constraints (TOC) also follow this systems approach. Chaos theory, which is basically an evolutionary systems theory, views systems as complex, interconnected elements with nonlinear relationships, producing unpredictable outcomes from deterministic conditions (Hibbert and Wilkinson, 1994; Levy, 1994; Tetenbaum, 1998). Chaos theory assumes that randomness or chaos, can emerge from an underlying order, and seeks to understand the underlying mechanism causing this chaos. An important assumption of chaos theory is that the system is a set of elements interacting with each other while functioning as a unified whole. Thus, small changes in the initial states of this system can amplify exponentially, which significantly affects the way the system evolves. This sensitivity to initial conditions, also known as the 'butterfly effect' (Wilding, 1998), has been observed in logistics systems, where it has been named as the 'bullwhip effect' (Forrester, 1961; Lee et al., 1997). Researchers increasingly recognize that supply network structures are complex and adaptive systems rather than just a single stable system (e.g. Levy, 1994; Wilding, 1998; Surana et al., 2005; Pathak et al., 2007). In particular, because international supply networks have many partners, they are an extremely complex web of relationships and dynamics, which makes them more accident-prone. This in turn creates further internal or external risks (Hülsmann et al., 2007). Thus, the value of drawing on chaos theory is that it seeks to explain such dynamic systems with unpredictable, non-linear behaviour that continuously develop higher levels of complexity. On the other hand, TOC is a philosophy of continuous improvement, primarily developed by Eli Goldratt (Goldratt and Cox, 1984). According to TOC, every business has at least one constraint, and such constraints determine the overall performance of a system. Thus, because any organization's performance is limited by its weakest link or system constraint, the overall goal is to strengthen that weakest link (Cox and Schleier, 2010).

Therefore, supply chains, generated as a set of inter-related parts, interact and turn into non-linear, complex, and dynamic systems (Warren *et al.*, 1998). This makes sustainability and risk interplay an unavoidable part of business strategies, and requires system risks, induced by sustainability programs, to be identified and mitigated (Goldratt and Cox, 1984).

This interactive and integrative framework of sustainability and risk is increasingly accepted, and the need for research is made explicit in several studies (e.g. Carter and

Rogers, 2008; Seuring and Müller, 2008; Anderson and Anderson, 2009; Krysiak, 2009; Hoffmann et al., 2013). Following the tenets of systems view, chaos theory and theory of constraints, this study shed lights on this research gap, and conceptualizes the interplay between the cost of sustainability-induced risks and risk mitigation strategies.

Methodology

In this study, data was collected through semi-structured interviews among thirty-one experts of food supply chains in an emerging economy, Turkey, and analyzed through content analysis. Food industry is chosen to sample the respondents, as there are critical concerns with cold chain sustainability issues to maintain the quality of raw materials until the products reach the consumers (Rajurkar and Jain, 2011), raising different risks compared to other industries (Singhal et al., 2011).

Using purposive sampling (Eisenhardt, 1989), private companies of various sizes were sampled to gain a comprehensive understanding of risks and sustainability practices regardless of company size. Interviews were made on site, individually and face-to-face; each lasted for about 40 minutes. The recorded interviews were listened to carefully to get a feeling for context and nuances. Later, the interviews were transcribed into text files for systematic analysis of the data (Bernard and Ryan, 2010).

Potential risks are identified and classified into major risk categories. Risk mitigation strategies of sustainability-induced risks are questioned in these face-to-face interviews and discussions are extended to understand whether these mitigation strategies are implemented as part of the sustainability programs or not.

Findings

We find that sustainability programs do indeed induce a variety of risks. Thus, the companies' efforts to improve social responsibility—an increasingly important performance dimension—actually place the companies at risk. Further, we found a trade-off between mitigating risks and "living" with risk.

"The most important thing in cold chain storage is packaging, but it has a cost. When considered in terms of cost, manufacturing company says, ''If I do this packaging, my profit decreases''... However, we say, as the air cargo company, ''Your profit may decrease, but your product will be transported healthy and in good quality. If you do not do proper packaging, you will not only cause damage to your buyer and me, but also you do something risking the transportation; therefore, you will cause customer dissatisfaction, and increase your own cost in return.'' (Air Cargo Company).

If the risks manifest, they can cause supply shortages or consumer safety concerns, severely impacting firm performance and image. Yet, if managers acknowledge the sustainability-induced risks and invest in risk mitigation, the costs of the sustainability programs increase—often dramatically. The higher costs make it difficult for managers to justify the sustainability initiative. In order to expedite the long-term return on sustainability investments, and gain an immediate financial benefit from the sustainability initiatives (Fawcett et al., 2015), the focal companies in our study consistently choose to underinvest in risk mitigation practices.

"There is such as risk; something increasing the cost factor: hot air always wants to replace cold air. If we do not prevent this by using proper equipment, then the hot air comes in, and our fans consume much more energy to clear it out as cold air and replace it. Its consuming serious energy, meaning that it will return us as a cost. That is, when it gets hot inside, then the cold chain gets damaged. At the same time, this will return as a cost for the company. These kinds of heat leakages, heat transfers may increase out electricity bill by 5%, 10% or 20%. However, companies do not watch out this kind of

factors and invest to mitigate that risk; therefore, they pay the cost." (Food manufacturer 1).

"The biggest problem in food sector is qualified staff. Human-resource is a significant shortfall because the risk is high. Trainings should be carried out continuously and seriously in our sector, but again, this has a cost. However, even one mistake made by one of the employees within the factory may affect the whole production and the truckload. And when the results from the laboratory come out bad quality, your products on the truck, I mean, the products of that batch are rejected. Moreover, it is harder to withdraw an export product; it's cost is much higher - time and customer loss become another cost factor." (Food Manufacturer 2).

"In fishing, water and energy are consumed the most in incubation process. There are different methods to decrease this consumption. Closed circuit system is one of them. Alternatively, there are solar-powered systems. But these are quite expensive. It's always about the cost. Nobody cares about energy, water consumption or additional costs of environmental impacts. However, any decision related to the farm affects the money to be obtained, and at the end, this affects the whole chain." (Food Manufacturer 3).

"The approach in the industry is: whatever you do, do it as cheap as possible, have the products transported at a cheap price. However, when a problem occurs, the incurring cost is beyond all of these." (Road Transportation Company).

Specifically, our results reveal that companies' short-term orientation and intense focus on cost-cutting increase the probability and potential negative impact of sustainability-induced risks. These risks threaten the viability of not just their sustainability initiatives but also the companies themselves. The costs associated with these risks go beyond the cost of overlooked risk mitigation practices, and undermine the viability of sustainability practices in the long run. In effect, sustainability programs often initiate a vicious cycle that is not discussed in the literature or in corporate boardrooms as presented in Figure 1.

Companies need to make this vicious cycle visible, carefully and accurately identify sustainability-induced risks, and consciously evaluate the costs of mitigating them or living with them. This analysis is needed to break the vicious cycle throughout the supply chains operating in the global arena.

Mitigation Strategies to Break the Risk-Cost Vicious Cycle in Food Industry

The discussions during the interviews outlined several mitigation strategies to break the risk-cost vicious cycle and stop increasing costs of sustainability-induced risks. Table 1 presents mitigation strategies indicated for the sustainability-induced risk dimensions in food supply chains in Turkey, which were grouped under five categories through iterative coding of interview data: behavioral, exploitation, value-added routines, organizational routines, and systems design.

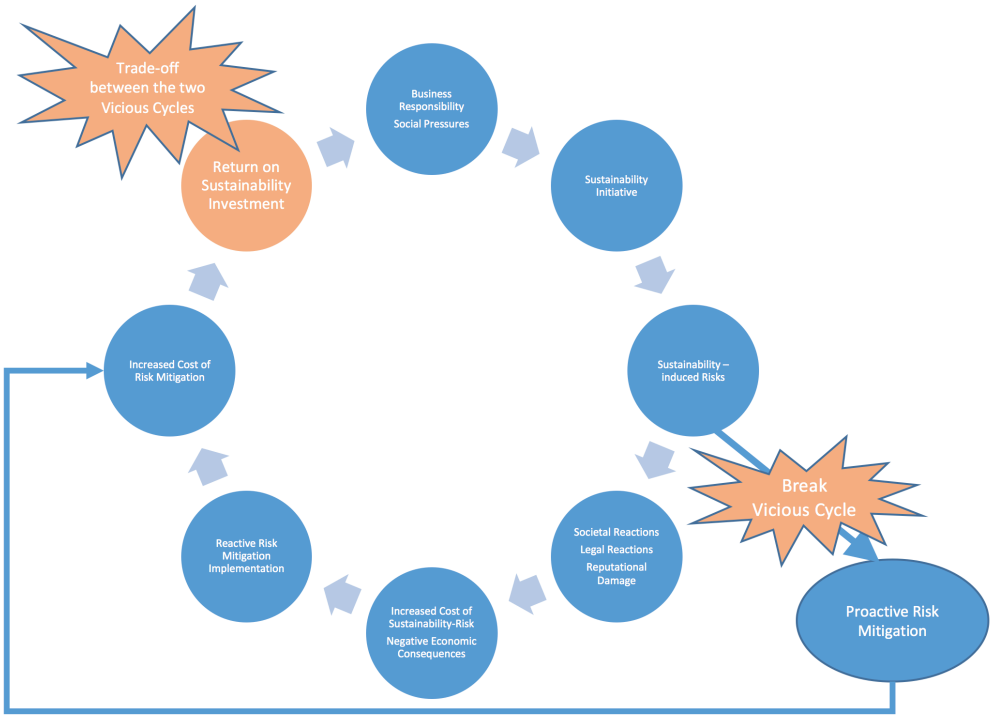

Figure 1: Risk-Cost Vicious Cycle: Cost of Sustainability-induced Risk and Risk Mitigation

Table 1: Mitigation Strategies to Break the Vicious Cycle in Food Industry

Risk Dimension	**Risk Mitigation Strategy to Break the Risk-Cost Vicious Cycle**
Behavioural	Information sharing, Improve control, Training from early ages, Cooperation with universities (e.g. opening education centers for training employees), Job-specific training, Employ quality technicians at critical processes (licensed employees), Adapt technological advancements
Exploitation	Improve control, Adapt technological advancements, Product-focused planning to avoid shelf life expiration, Strong collaboration or vertical integration with partners, Implement win-win approach in business agreements, Improve consumer attention.
Value-Added Routines	Horizontal integration to combine forces along the supply chain, Work with selective suppliers, Train logistics partners, Improve controls, Invest on specialized equipment/vehicles/materials, Use resource friendly equipment, Improve qualifications (including hygiene) of equipment, vehicles and facilities (e.g. heat isolation in facilities, loading/unloading area, storage area), Invest on technology (e.g. tracking systems, use quick freeze, automatic milk makers, use sensor, focused cooling), Adapt proactive risk management procedures (e.g. probability and impact analysis, risk mapping, risk and hazard analysis), Close coordination and communication among supply chain members.
Organizational Routines	Vertical integration, Improve controls, Build industry-specific regulations, Employee-level control, Financial support, Implement incentive/sanction system, Increase control of legal reporting and certification, Collaborate with upward chain members, Train supply chain members, Supply chain-wide governance of conflicts, Implement waste management, Work with certified companies, Work with qualified suppliers instead of low cost ones, Improve flexibility of supply chains, Invest to protect the environment, Environmental performance

	management (e.g. measure the pollution), Improve security, Adopt technological advancements, Continuous follow up and analysis, Establish control mechanisms to analyze, test and differentiate additives (e.g. antibiotics) in food products, Develop an integrated supply chain perspective in all logistics processes, Build long-term relationships with stakeholders, Backup suppliers.
Systems Design	Outsource only when necessary, Global/Local sourcing assessment, Improve adaptation and flexibility, Follow external changes, market trends and rules/regulations

There are the mitigation strategies, which were mentioned commonly to mitigate sustainability-induced risks in food supply chains. These are, improving awareness by training and education starting from the early ages for all individual supply chain members including the consumers, improving information sharing throughout the supply chains, improving technological capabilities, ensuring strict controls at almost every stage of logistics processes, improving integration throughout the supply chains, implementing supplier performance management systems, implementing environmental performance measurement systems, and putting strict control on consumer side activities. These address the risk mitigation strategies to be primarily considered for breaking the vicious cycle of cost of risk and cost of risk mitigation in food supply chains.

Conclusion

We not only identify and describe the vicious cycle but also propose a process for mitigating the risks in a cost-effective manner. Companies should make the up-front risk mitigation investments as part of the sustainability implementations to ensure the long-run viability of their sustainability programs. If the mitigation costs are too high, the sustainability programs should be postponed. Taking such a holistic, total-cost approach to sustainability design and implementation is the best way for companies in emerging countries to manage the tension between implementing developing world social practices in the face of emerging world operating conditions.

Future research should take a deeper look into the risk-cost vicious cycle in sustainable systems, and offer guidance to take a more proactive approach to mitigate risk that would help to increase the viability of sustainability programs in the long run.

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