The opaqueness conundrum in fast fashion global supply chains: the irony of hiding what we are trying to find

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Abstract: Globalisation has increased the complexity of supply chains. Multiple tiers have become more frequent and usually include suppliers in different parts of the world. This complexity has engendered opaqueness across the supply chain, particularly beyond the first tier. Some firms are addressing this challenge with varying degrees of success through monitoring, transparency, and traceability. We assess the problem by evaluating the fast fashion industry and evaluate supply chain tiers, the race to the bottom, and the opaqueness conundrum. We also offer implications for researchers and management.

Keywords: supply chain; fast fashion; opaqueness; transparency; traceability; sustainability; globalisation; monitoring; race to the bottom; opaqueness conundrum.

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1 Introduction

Firms have experienced increased difficulty in managing their international supply chains during the past few decades. Globalisation has added complexity and opaqueness to many supply chains, particularly beyond the first tier (Ferguson et al., 2020; Yoon et al., 2020). Many organisations struggle to address the complex environmental sustainability challenges, forced labour, and other human rights abuses that can exist beyond the first tier (Kumar et al., 2020). Social stakeholders demand that supply chains be free of such concerns, but the extent of the problem and the most effective means of solving it remains elusive. Many firms are not aware of problematic activity that may occur in secondary and tertiary tiers, and those that understand the quandary often struggle to control it. This difficulty lies in the fact that supply chains were not designed to be transparent (Bateman and Bonanni, 2019).

Organisations often pursue three avenues to address complex and opaque supply chains – monitoring, transparency, and traceability. Monitoring helps assess the professional and ethical integrity of tier-1 suppliers and involves formal inspections and performance audits that can include identifying human rights violations. Transparency highlights the entire supply chain from origin to final consumer and includes mapping the suppliers in the chain. Traceability addresses the identification of specific batches or shipments of products to a particular factory, mine, or farm of origin. Traceability establishes conformance to product specifications so that when problems occur, the cause can be linked to the source (Skilton and Robinson, 2009).

Each of these tools helps address opaqueness, but none resolve it completely. Monitoring focuses primarily on tier-1 suppliers and can be fraught with numerous issues that centre around ensuring audits are valid and that standards are maintained once the auditors leave the facility (Ebenshade, 2004; LeBaron et al., 2017). Transparency depicts the map of the supply chain but does not focus on changing suppliers' behaviour, especially those beyond the first tier (Kashmanian, 2017). Traceability holds much promise and has become more commonplace, but its implementation can be costly and complicated.

Supply chain managers face a predicament. Many are under pressure to procure products at a designated specification level while continuously minimising costs. Social stakeholders pressure the company to keep their supply chains environmentally friendly

and free of human rights abuses. However, customers often demand a high level of corporate social responsibility (CSR) from the retailers they purchase from but are not always willing to pay the extra costs associated with making ethically sourced products (Bhardwaj et al., 2018; Bray et al., 2011; Cooper, 2014).

This backdrop creates a strategic quandary. Companies may (knowingly or unknowingly) hide social responsibility costs inside of opaque supply chains that are difficult to codify to maintain low costs. By codify, we mean verifying that the manufacturers in a supply chain are abiding by a set of pre-determined standards that have been specified by the purchasing company, usually a multi-national company (MNC). But the problem gets more complicated. MNCs that set up contracts with suppliers in less developed countries (LDCs) must play a conjuring game of sorts. Monitoring efforts must be implemented to give the appearance of codifying to standards. This game is full of irony; the MNC hides social costs in opaque supply chains, then monitors those chains to find something that is, hopefully, not really there, environmental abuse and worker exploitation (LeBaron, 2014). Firms in the fast fashion industry often employ this strategy, but it is not sustainable.

In this article, we examine the opaqueness problem by reviewing the typical supply chain in the fast fashion sector of the clothing industry. We use this industry as an illustration because its products are consumed widely by price-sensitive customers, and its suppliers hail from numerous developing countries. We do not infer that all global supply chains are inherently problematic or that all MNCs knowingly ignore human rights and environmental problems in their supply chains. Nonetheless, there is ample evidence to suggest that opaqueness is a problem in many firms (Ferguson et al., 2020; Yoon et al., 2020).

We begin by explaining how the quest for low prices inherent in all free economies can benefit consumers while creating unintended consequences for other stakeholders. We then explain how opaqueness has become a problem in the fast fashion industry, especially in the second and third tiers of the supply chain. We explain how some firms can become engulfed in a race to the bottom that exacerbates the problem. We analyse the fast fashion industry and conclude with implications for researchers and managers to help alleviate the opaqueness.

2 Literature review

2.1 Introduction

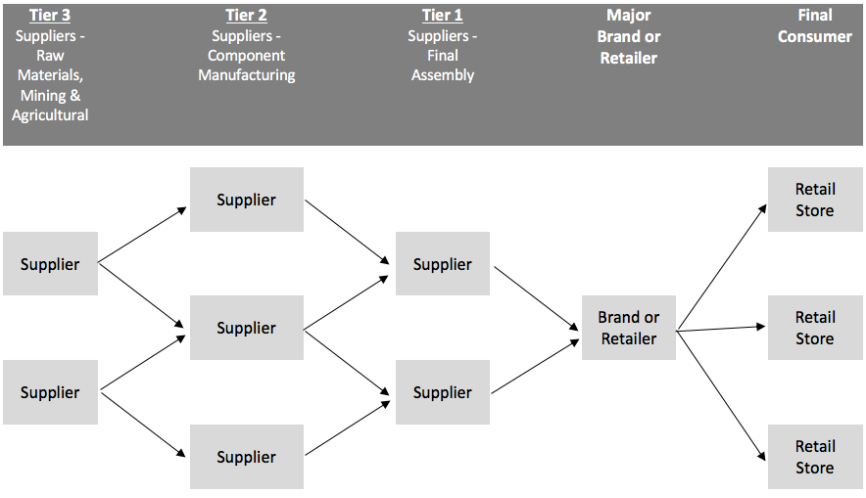
Prior to the 1980s, many companies were vertically integrated to some degree and outsourcing was primarily a domestic phenomenon. For example, in the US market during the 1960s, 95% of the clothes were made in the USA, while today, that figure is at only 2% (Ndubisi and Nygaard, 2018). The international outsourcing boom in the 1980s created global supply chains (Ballinger, 2011; Cline, 2012). During this growth period, big box retail discount chains in the US such as Wal-Mart, flourished, promoting less expensive, but lower quality items. Consequently, globalisation expanded supply chains into LDCs to lower labour costs and, ultimately, lower per-unit manufacturing costs. Retail and clothing firms demand both low prices and ethical supply chains. This situation requires supply chain managers to source from the most economical suppliers

worldwide while maintaining a desired product quality level and ethical integrity within their supply chain (Preiss, 2019; Yun et al., 2020).

We provide insight by examining the fast fashion industry, whose members typically employ a low-cost business model. Fast fashion firms strive to provide multiple seasons of clothing in a single year to a price-sensitive market driven by young buyers (McNeill and Moore, 2015). This trend benefits consumers and creates employment for unskilled workers in LDCs but can become a detriment when appropriate employment standards and environmental practices are not considered. Clothing brands that source production to suppliers in LDCs inevitably lose some control over working conditions and environmental practices in those factories. Also, the brands may not be aware of problems that might exist at the second tier and beyond. These hidden tiers are labelled 'opaque' because they are difficult to see.

Figure 1 depicts the starting point for our discussion. Tier-1 is primarily a final assembly facility. Tier-2 involves manufacturing components that go into the final assembly at tier-1. Tier3 represents a source of raw materials secured from mining or agriculture industries. Whereas suppliers are usually located in LDCs, the brand or retailer is not. For example, a clothing firm may be based in the European Union (EU) or the USA. Because clothing firms typically include many brands, we use the two terms interchangeably.

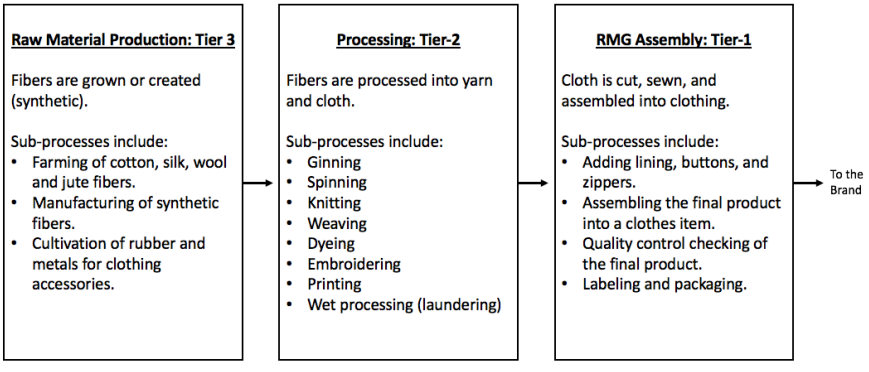
Table 1 The supply chain by tier



2.2 The fast fashion supply chain

The fast fashion supply chain can be dissected into three tiers, each with unique challenges (Shahriar et al., 2014). Tier-1 processes embody the assembly of the final item of clothing. Tier-2 processes involve transforming yarn into cloth so that it can be further cut and sewn at the tier-1 stage. Tier-3 includes the raw materials stage, where cotton, wool, jute, and synthetic materials are cultivated or manufactured. Figure 2 depicts these three processes and their associated activities.

Figure 2 The fast fashion supply chain: production side overview



Source: Adapted from Shahriar et al. (2014)

Each tier has unique characteristics that can create opaqueness problems. We evaluate each of these tiers in kind.

2.3 The problems at tier-1

Tier-1 suppliers are primarily involved in manufacturing the final garment. They obtain materials from their suppliers and assemble and inspect the final product. Tier-1 receives the most attention in the supply chain literature when it comes to compliance (Wicks, 2013; Yoon et al., 2000). Two issues are prominent in the fast fashion industry, unauthorised sub-contracting, and problems with the audit process.

Unauthorised subcontracting makes it challenging to monitor the supply chain. In the fast fashion industry, this scrutiny is further exasperated by unauthorised subcontracting that can occur without the knowledge or consent of the brand (Comyns and Franklin-Johnson, 2018; Jacobs and Singhal, 2017). This occurred with the 24 April 2013 collapse of Rana Plaza in Dhaka, Bangladesh that resulted in over 1,100 deaths and countless injuries. Unfortunately, 28 clothing brands found their goods under the rubble of a collapsed factory, unaware their products had been subcontracted to one of the five clothing factories in Rana Plaza (Comyns and Franklin-Johnson, 2018; LeBaron, 2014).

Unauthorised subcontracting can occur when a tier-1 factory receives a large order but cannot fulfil it by the contract deadline. Contracts may be under six weeks in some cases, which gives the tier-1 factory little time to complete the order (LeBaron, 2014). For example, a fashion brand may place a large order to its tier-1 manufacturer. However, if the supplier needs help to stay on schedule, it may subcontract part of the order to another manufacturer without informing the brand (LeBaron, 2014).

The tier-1 auditing process can be problematic for all firms in the chain. Most monitoring (e.g., code monitoring) efforts are facilitated by non-governmental organisations (NGOs) and occur at the first tier. Unfortunately, monitoring has been limited in its effectiveness (Egels-Zandén and Hansson, 2016; LeBaron et al., 2017). Even if NGOs are qualified and impartial arbiters of the monitoring regime, they lack the human resources to oversee activity in the industry (Wells, 2009). Tier-1 suppliers can even be wearing the guise of compliance to an agreed ethical code of conduct mandated by their customers when there is evidence to suggest they are using sophisticated techniques to fool inspectors (Ählsröm, 2010). Some monitors have reported that

employees may be coached on how to respond when questioned. Frank (2008) elaborates on his experience as a sweatshop monitor where he encountered pregnant employees who were coached and even hidden from inspectors. In instances like these, deception is the goal.

2.4 The problems at tier-2

Tier-2 encompasses a wide array of processes that transform raw materials into subcomponents that are sewn into a final garment at tier-1. In the second tier, the number of suppliers in the chain increases exponentially, increasing the opaqueness of the chain as well. Each tier-1 supplier has its own set of tier-2 suppliers, which means the complexity and number of suppliers can only increase. Many brands are challenged to manage this degree of complexity in the supply chain (Ferguson et al., 2020).

The opaqueness of the supply chain increases markedly at the second tier. The inability to identify all tier-2 suppliers in a firm's supply chain makes it more challenging to manage. As the opaqueness increases, it becomes less able to identify labour abuses within the supply chain.

Within this backdrop, efforts to increase transparency, and ultimately traceability, have emerged. Indeed, the transparency/traceability movement has spawned new industries that will be disruptive in the future.

2.5 The problems at tier-3 and beyond

In the fast fashion industry, tier-3 involves the processes that grow and produce the cloth needed to produce garments. It also consists of the extraction and manufacturing of metal and plastic required in clothing accessories, including zippers, buttons, and clips. Unfortunately, firms in the extractive and agricultural industries are diverse, both geographically and structurally. Some of these firms have been involved in labour abuse (Drumea, 2011; International Labor Organization, 2017).

The opaqueness problem in all tiers is amplified by the widespread application of just-in-time (JIT) inventory management systems. JIM promotes cost-cutting by allowing producers to reduce the capital tied up in unsold inventory, distributors to save on fuel and wages, and retailers to reduce the capacity of their distribution centres. However, JIT's success hinges on accurate demand forecasts and minimal disruptions. Disruptions in the supply chain can force a factory shutdown due to tight coupling. A failure in one subsystem (e.g., supply sourcing) can impact another subsystem, such as manufacturing (Perrow, 1999; Skilton and Robinson, 2009).

The risk inherent in JIT became apparent during the COVID-19 pandemic when food producers and grocery stores in the USA sold four to six weeks inventory in only a few days. In the fast fashion industry, some western retailers abruptly cancelled shipments of garments from Asia because of declining demand at the retail level and concerns about product contamination. In other instances, COVID-19 forced Asian suppliers to halt production anyway. Over the long-term, this upheaval in the supply chain will likely result in new players at various tiers, further complicating brand efforts to oversee the entire process (Gasparro et al., 2020).

In sum, monitoring efforts focus primarily on tier-1 practices, but the opaqueness problem is more acute in subsequent tiers (New, 2010). Many social stakeholders are concerned about human rights abuses and environmental degradation. When a major

clothing brand is supplied by a company accused of human rights abuses or environmental transgressions, the brand is presumed guilty by association, regardless of the involvement or tier in the supply chain. The competitive pressure on clothing brands is intense. While consumers seek both low prices and responsible supply chains, their spending patterns often emphasise the former as the fast fashion industry continues to flourish. With this backdrop, we consider another phenomenon.

3 The race to the bottom

Clothing brands often pressure factories in LDCs to cut costs. The resulting business globalisation emanates from comparative advantage, the notion that certain products may be produced more cheaply or at a higher quality in particular countries due to advantages in labour costs or technology (Parnell, 2020). Even if one nation enjoys an absolute advantage over another in most areas, the LDC must participate in some form of business to develop economically and employ its citizens. Firms in these nations tend to participate in areas where the absolute advantage is lowest, which often means producing products at a low per-unit cost relative to other countries. Participant nations benefit economically from such an arrangement, but there is a downside, worker abuse, and environmental degradation may occur within LDCs (Eckes, 2011).

Because of the need for LDCs to secure economic enhancement opportunities, government leaders of those countries often seek to foster comparative advantage at the national level. Many LDCs lack the infrastructure and technology to compete on factors other than their ability to produce low-cost products for the global market. As a result, government leaders of LDCs promote policies that encourage the production of goods for those markets. To reduce costs, LDCs must maintain minimal labour and environmental standards. When companies compete for contracts in LDCs based on cost alone, it is referred to as the race to the bottom (Chan and Peng, 2011).

Critics of globalisation have noted that multinational firms cut costs at the expense of worker safety and well-being. This race to the bottom involves more than the suppliers seeking orders from the fast fashion brands. It includes the countries that house these suppliers as well. When firms contract with suppliers in a LDC, they promote economic development, create needed jobs, and infuse cash into the economy. This economic incentive is welcomed since many workers in clothing factories are poor and unskilled (Ma et al., 2016).

The suppliers need orders from fashion brands. Many of these suppliers are small, entrepreneurial ventures attempting to survive in an unstable economy. They must be willing to produce at a low per-unit cost because their margins are already lean (Locke, 2013). Brands can easily change suppliers in the same or other developing countries as necessary to reduce costs further. Because brands are under pressure to keep their clothing prices in check, they often resort to a low-cost production strategy. This strategy can quickly become a race to the bottom because it results in low prices for consumers while shifting the burden to suppliers (Brown, 2010; Shell, 2009).

Figure 3 depicts the race to the bottom in a hypothetical, albeit simplified format. Companies in LDCs exhibit cost lines regarding the production of goods. The cost lines in this figure are on a per-country basis to illustrate the competition that exists among LDCs to attract orders from fashion brands. Because cost is typically a prominent factor

for global producers, firms in LDCs have strong incentives to minimise wages and relax working standards. Shell (2009, p.209) painted a bleak picture of the process:

> "When competition is mostly about price, innovation too often takes a back seat to cost-cutting. Laying off workers and hiring cheaper ones is one sure way to enhance the bottom line. Another is to scour the world for low-wage workers, especially those in countries with lackluster enforcement of environmental and worker rights regulations."

Figure 3 A hypothetical and simplified depiction of the race to the bottom

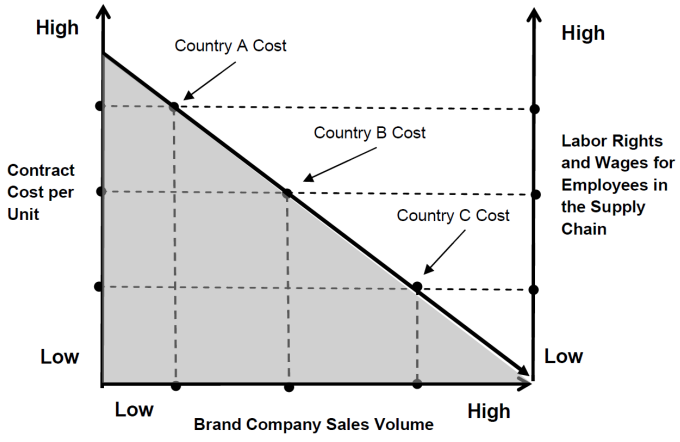
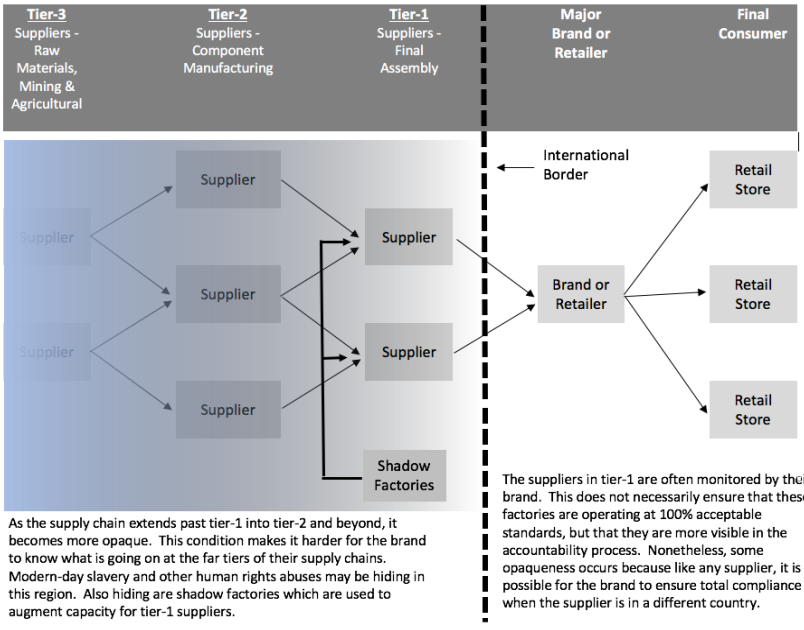


Figure 4 The opaqueness of the supply chain and the presence of shadow factories (see online version for colours)



When fashion brands succumb to the race to the bottom, critics question the job-creation benefits that they provide LDCs. Asking factories to improve their human rights environments in cost driven industries like fast fashion is a problematic endeavour since the economic incentive to do so is prohibitive, and profit margins for suppliers are already lean (Hoang and Jones, 2012; Locke, 2013).

Within this context, we can now see how the opaqueness of the supply chain intensifies at the latter tiers. Figure 4 depicts the opaqueness of tiers 2 and 3. Tier-1 is also opaque, but much less so because it is these factories that are often monitored by the brands; hence, tier-1 is somewhat visible. Tiers-2 and -3 are more hidden from the brands with cultural and geographic boundaries covering up a wide array of practices. Moreover, because the tier-1 factory is under tremendous pressure to keep its per-unit costs low, it must mandate the same from its suppliers.

Brands in developed countries can monitor the tier-1 factory and insist that it monitors its suppliers. Competitive pressures, social pressures, and the regulations in developed nations provide checks and balances for the brands, but suppliers have a very different set of incentives and expectations. They are heavily dependent on low costs. Shadow factories are also present in figure 4. Although they are opaque and completely hidden, we show them at the tier-1 level because these suppliers that shadow factories typically augment capacity.

4 The opaqueness conundrum in fast fashion global supply chains: the irony of hiding what we are trying to find

4.1 The opaqueness conundrum – Act 1

At this point, we encounter a strategic quandary. On the one hand, fast fashion brands have enacted a low-cost business model by sourcing the production of clothing to opaque supply chains in LDCs. Their goal is to lower manufacturing costs but doing so creates unintended consequences. Opaque supply chains essentially conceal illegal and unethical activities that could harm the environment or endanger workers. Because social costs incurred by firms are lower in developing countries, a brand can reduce their total production costs, thereby increasing margins or reducing prices.

Unfortunately, this process puts environmental and worker stakeholders in those LDCs in a compromising situation. Environmental regulations may be abandoned altogether as factories emit unacceptable levels of pollution into the atmosphere or the water. Worker welfare can decrease as unsafe working conditions, low pay, and even indentured servitude (modern-day slavery) may become common practice. Hence, a brand can, with or without full knowledge, conceal environmental and labour abuses within an opaque supply chain when sourcing to an LDC.

Companies and social stakeholders have become of aware of social abuses. Consequently, efforts to monitor the suppliers in LDCs are widespread. This is ironic. On the one hand, companies may be choosing a strategy that seeks to conceal a wrong, in the context of this discussion, environmental and worker abuse. On the other hand, these same companies are simultaneously seeking and paying for a strategy that seeks to uncover the very wrong that is being concealed. This creates a problem.

The strategy for the fast fashion brand becomes paradoxical because the brands may be inadvertently concealing and revealing abuses simultaneously. From a cost

perspective, concealing abuses in effect reduces social costs while monitoring the supply chain raises social costs. The strategy for the brand then is to hope that monitoring costs do not outweigh the benefits of cost reductions that occur when abuses are concealed. This strategy is paramount with ethical problems and is not sustainable. While directly harming human stakeholders (e.g., workers), this strategy deceives others. In essence, the firm is pushing unethical practices deep within an opaque supply chain, while giving the appearance that it is seeking to eradicate those same practices. This concealing and revealing is the first part of the conundrum.

4.2 The opaqueness conundrum – Act 2

Inherent in any discussion involving CSR is the problem of trade-offs. Indeed, the trade-off hypothesis maintains that CSR costs can decrease profits, which can detract from the value of the firm, a detriment to shareholders (Haffar and Searcy, 2017). But to have profits, a fast fashion brand needs sales. Fast fashion is driven by short cycles, a young, primarily female market, and low prices. If increasing social costs in the supply chain raises consumer prices, then a problem results if the final consumer is not aware of the social implications. This backdrop creates what has been labelled a fast fashion conundrum (McNeill and Moore, 2015). We adapt the conundrum paradigm and redirect the focus to the problem of opaqueness.

Figure 5 overviews the opaqueness conundrum described herein. This hypothetical graph depicts a negative sloping demand curve with CSR costs and firm sales on the axes. Consumers of fast fashion are primarily price-sensitive and may have little regard for social responsibility initiatives put forth by the brand. As CSR costs increase, the opaqueness of the supply chain decreases. This is depicted by the low opaqueness region at the top of the graph. Monitoring costs are necessary to reduce opaqueness, thus driving up CSR costs (from C_1 to C_2), but also reducing firm sales (from S_2 to S_1) since the brand must raise prices. The resulting demand is at point $D_{1,2}$ on the consumer demand line.

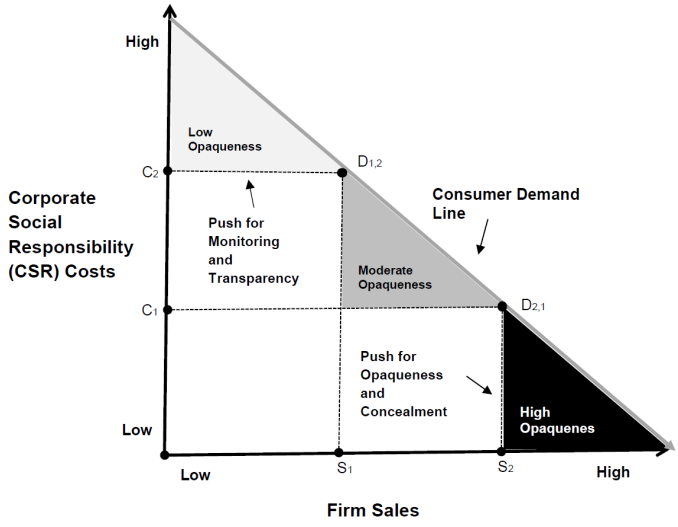
At the bottom of the graph, a region of high opaqueness is depicted, characterised by high firm sales (from S_1 to S_2) and low CSR costs (from C_2 to C_1). The resulting demand is at point $D_{2,1}$ on the consumer demand line. The push for opaqueness results in concealment of supply chain abuses. These include possible environmental abuses such as water, chemical and air pollution violations as well as worker abuses such as long hours, poor wages, and unsafe working conditions.

The opaqueness conundrum is based on the economic assumption that factories in LDCs have little incentive to improve their own social responsibility programs since these will raise the price of the final product. Factory owners are well aware that if they raise their own operating costs, they may have to increase their contract prices as well. Doing so could cause them to lose contracts. Consequently, these factories have little incentive to raise social costs, although the contracting brand would prefer they do since it enhances the brand's reputation. Unfortunately, raising CSR costs at the factory level and keeping the contract price low is not feasible. Hence, some environmental and worker abuses must be hidden within an opaque supply chain.

The opaqueness conundrum also assumes that consumers are price sensitive and somewhat neutral regarding the brand's CSR initiatives. Consumers of fast fashion are more concerned about their fashion identity and their ability to be fashionable than about ethical issues (McNeill and Moore, 2015). For the clothing brand, the conundrum is how to compete strategically in a manner that is both ethical, and able to attract sales. Raising

CSR costs, either at the brand level via monitoring or at the plant level within the LDC, raises operating costs, which usually raises the final price of the product. Hiding ethical abuses in an opaque supply chain lowers operating costs and consumer prices but is neither ethical nor sustainable.

Figure 5 The opaqueness conundrum in the fast fashion industry



4.3 Strategic alternatives

The fast fashion industry is facing an opaqueness conundrum. Increasing the transparency of the supply chain and reducing opaqueness will result in higher manufacturing costs and ultimately, higher prices for consumers.

As with any business decision, long-term solutions that ensure the viability of the firm must come from a combination of lower costs and increased demand. The fast fashion industry has sought a low-cost strategy that reduces costs vis-à-vis outsourcing to LDCs and increasing demand by offering frequent seasons of clothing at lower prices. A low-cost strategy might be workable, but it must be ethical to be sustainable (Parnell, 2008). Reshoring the clothes manufacturing process on a large scale to the US or EU is unlikely. It would also have a downside in that economic development within LDCs would be put at risk because those jobs would be lost. At present, many of the workers in the clothing manufacturing industry are poor females with few job skills. These jobs are desperately needed and, when implemented well, can greatly benefit the economy of the host country. When brands source to LDCs, and the process is done ethically, the brands, consumers, and the LDC can benefit, the proverbial win-win scenario. Reducing costs via sourcing to LDCs is still feasible and possible, but an accelerated movement towards transparency will be necessary.

Increasing demand is the second facet needed for sustainability. For the fast fashion industry, re-education of the consumer will be necessary. Responsible business practices can enhance brand value and lower costs in some instances (Parnell, 2020). However, in some instances, the brands that encouraged their consumers to buy in frequent cycles at low prices must be able to communicate that CSR is an acceptable part of the purchase

price. The additional costs needed to decrease supply opaqueness by increasing transparency is a feasible solution.

5 Implications for researchers and management

Efforts to monitor supply chains have improved recently, but they are still a work-in-progress. Regulations and industry standards encourage monitoring at all tiers, especially tier-1, but enforcement is not always straightforward. Rules and best practices vary markedly across nations. Because global supply chains are international entities, enforcement involves various governments, NGOs, private firms that conduct monitoring, and labour unions. The fast fashion supply chain is ripe for disruptors to emerge and make supply chain mapping, transparency, and traceability easier. With this backdrop, we offer the following takeaways for researchers and management.

5.1 Ethics cannot be outsourced; indeed, it is the mainstream of the brand

Ndubisi and Nygaard (2018) note that ethics should not be outsourced to irresponsible suppliers to save the brand money. They propose that the entire product life cycle is somehow characteristic of the brand. Following this logic, the name and reputation of a company are all entwined not only with the final product, but every activity that precedes the making of that final product.

Juxta positioned with the supply chain perspective is the even more encompassing, stakeholder perspective. Companies exist to satisfy multiple stakeholders within and outside of their supply chains. However, expanding the notion of stakeholders to include political and social groups has also been advocated (Byerly, 2012; Carroll and Buchholtz, 2012). Bales and Gogle (1979) noted that business must acknowledge its most critical audient is society itself. This realisation brings into focus that LDCs, labour unions, and NGOs have a vested interest in providing suitable employment for workers. Consequently, subcontractors at tiers-1, 2, and 3 in LDCs warrant attention.

It should also be noted that the brands do not have the excuse of saying they did not authorise a certain supplier within an LDC, even if it turned out to be a shadow factory. This is akin to what some 28 fashion brands noted when the Rana factory collapsed in Bangladesh. Stakeholders expect that if the fashion brand is capable of being a successful company, then it is also cognisant of what is transpiring in their supply chains at tier-2 and tier-3.

5.2 Publicly disclosing tier-1 suppliers is now considered a best practice

Fashion revolution, a prominent activist organisation, contends that 70 of the 200 major fashion brands now publish their tier-1 suppliers (Fashion Transparency Index, 2019). Many are also reporting factories at tier 2. Hence, the tier-1 supplier lists from such high-profile companies as Adidas, Esprit, H&M, Nike, and Patagonia can be easily downloaded and analysed. The available data includes the name of the supplier, the address, and the number of workers at the unit.

Publicly disclosing all tier-1 suppliers does not eliminate supply chain opaqueness, but it is an essential first step. This best practice provides the springboard to identify tier-2 suppliers, which can then lead to additional suppliers at subsequent tiers. Some

companies, such as Nike, list their tier-1 suppliers on Google Maps for external stakeholders to review (Fashion Transparency Index, 2019).

5.3 Complete supply chain disclosure is not yet a common practice, but it will be soon

Disruptors are forces that substantially change an industry. If current trends continue, full supply chain transparency will occur eventually. Disrupters can expedite the process.

However, in the fast fashion industry, companies resist change because of higher expenses, demands to share sensitive data, and the possible need to retrain workers (Leonards, 2019). This phenomenon is not limited to the fast fashion industry but overcoming resistance will be a necessity if companies are to move forward in clearing the opaqueness from their supply chains.

Social networking platforms are also disrupting the industry by linking suppliers in a free exchange of information among those suppliers. To participate, companies must join one of these networks and then enlist their suppliers to do the same.

Blockchain technologies can disrupt and enhance supply chain traceability. Blockchain applications have been used successfully in increasing transparency and traceability in the diamond, fine wine, and luxury goods industries (Garrett, 2017). There is clear potential for similar progress in the fast fashion industry.

5.4 Opaqueness is more than a race to the bottom; it is about the bottom line

Dealing with opaqueness has both social and profitability ramifications. A supply chain crisis can be costly. In the short run, customers influenced by negative publicity might boycott the brand, resulting in an immediate hit to profitability. Over the long-term, opaqueness can result in greater NGO involvement and government regulation, both of which can be costly for the enterprise. Ignoring opaqueness in the supply chain can cut costs in the short-term but can be detrimental to a firm's long-term cost structure.

6 Conclusions

Opaqueness continues to be a concern for firms involved in the fast fashion supply chain. Addressing it requires both transparency – seeing the supply chain as a whole – and traceability – identifying the origins of specific lots of clothing, including the path from farm to processing, to the factory. The fast fashion industry, like many others, is transitioning from opaqueness to full transparency and traceability. Complete visibility of the supply chain is possible and likely to occur. However, it is currently hindered by time, the application of technology, and resistance to change.

Resolving this problem can create other challenges, however. If the steps required to reduce opaqueness increase supplier costs, then brands will have less incentive to source from firms in LDCs, potentially resulting in closed factories and a loss of critical jobs for unskilled workers. Put another way, if wages and working conditions in LDCs rival those in other nations, firms in LDCs will lose their primary competitive advantage. Cost reductions involve trade-offs and provide benefits to firms, consumers, and unskilled workers. We support efforts to reduce opaqueness through greater transparency. We believe progress is both realistic and beneficial to all parties involved.

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