Understanding Transparency in Supply Chains

Haslam Scholars Program Thesis

Lucy Nhu Buck
Haslam College of Business
Department of Supply Chain Management
The University of Tennessee, Knoxville
Spring 2022

Thesis Advisor: Dr. John Bell

Abstract

The purpose of this thesis paper is to examine what standards should be used for supply chain product transparency across industries to satisfy the needs of external stakeholders, specifically Gen Z consumers. Sustainability is becoming increasingly important in supply chain management with growing stakeholder pressure, strict government regulations, and scarcity of resources. A scenario-based role-playing experiment is conducted using descriptive vignettes to measure Gen Z consumer reactions to the following factors: timing of transparency, type of product, and type of sustainability.

Online survey methods are used involving 33 students in one of the Honors and Scholars Programs at the University of Tennessee, Knoxville and students in classes in the Haslam College of Business. After performing moderation analysis, our results show that social sustainability matters more to Gen Z consumers than environmental sustainability. In addition, after a supply chain scandal, a company will lose sales from Gen Z consumers. Companies must address social sustainability and transparency in their supply chain to meet the expectations of their stakeholders.

Keywords: supply chain management, sustainability, transparency, traceability, visibility, social responsibility

Introduction

Like many aspects of life, the evolution of technology has impacted the capability of supply chains. As a result of improved technology, the global economy has grown more interconnected than ever. Now, many companies manage highly complex and multi-tiered supply chains with participants located all over the world. The global expansion of supply chains, however, has led to challenges. For example, it is now very difficult for companies to monitor everything that occurs in their supply chain. It is important, however, for companies to know all that occurs in their supply chain. Companies who lack insight in their supply chain will likely find it difficult to share information about their products to their consumers that they desire.

One major concern of consumers is the sustainability practices of companies. As the impacts of climate change become more apparent, sustainability has become a popular buzzword in public discourse. For several years, companies around the world have been working on making business operations in their supply chain more sustainable. To communicate their progress, many companies release an annual Corporate Social Responsibility (CSR) report detailing the steps they are taking to achieve their sustainability goals.

Releasing a CSR report, however, does not make a company immune to criticism from stakeholders. The growing popularity of social media has allowed customers to publicly scrutinize the business practices of companies and hold them to a high standard of sustainability. Customers increasingly desire clear information from companies about the products they buy and how they are made. Thus, companies are facing growing pressure from stakeholders to reveal information about their supply chain.

There have been several instances in the news over the last few years of companies who caused controversy for being unable to locate and share information about their supply chain

with stakeholders. Researchers have noticed this trend and have performed numerous studies analyzing the myriad obstacles that prevent supply chain transparency. There is little consensus, however, over the most effective methods to disclose supply chain information to consumers and other third parties. Thus, this project seeks to answer the research question, "What standards should be used for supply chain product transparency across industries in the eyes of Gen Z consumers?" To answer this question, the study uses a two-prong methodology. First, an extensive literature review is conducted in order to identify current standards and transparency practices used in industry. Then an empirical survey/experiment will be conducted with Gen Z consumers in order to explore their expectations (pre), and test actual transparency need, standards and behaviors (post). Comparing the results of these two efforts leads to insights on how firms can improve transparency and customer satisfaction for different products for this class of customers. The findings reveal that the social aspects of transparency are highly valued by Gen Z consumers, and that the majority of the variation in purchase intentions is explained by the difference in either social or environmental aspects of the scandal, and not the product type.

The rest of the paper is organized as follows. First, we will review the literature in these areas: supply chain sustainability and transparency, stakeholders' perceptions, and scale development. Then we will discuss the method we use, the results, and conclude with a discussion of implications.

Review of Literature

Growing Pressure from Stakeholders

Shareholders and those with financial investment in a company are not the only parties who are impacted by the decisions of a company. To demonstrate, a company's stakeholders include customers, non-government organizations (NGOs), community groups, and governments who have an interest in the actions of the company (Bell et al., 2016). Stakeholders' trust in companies have been tested in recent years with several scandals surrounding supply chain decisions. For example, the Blue Bell Creamery Company was forced to recall all of its products in 2015 after some consumers contracted listeriosis by eating their ice cream (Bell et al., 2016). Additionally, executives at Nestlé came under fire in 2016 when they were unable to conclusively confirm that there was no slave labor in their cocoa and coffee supply chains (Bell et al., 2016). Furthermore, the collapse of the Rana Plaza garment factory in Bangladesh in 2013 resulted in the deaths of over one thousand people, and it prompted stricter disclosure requirements for workplace safety information in the apparel industry (Marshall et al., 2016; Sodhi & Tang, 2019). In the internet era, these scandals can spread faster than ever before. Thus, the reputation of a company can be harmed quickly and tremendously.

One result of these newsworthy scandals is governments instituting more regulations onto firms. For example, the Dodd-Frank Act was passed in 2010 to prohibit the use of conflict minerals in supply chains (Bateman & Bonanni, 2019; Bell et al., 2016; Morgan et al., 2018). Also, product shipments that lack necessary documentation on its origin are being turned away at ports or are being held by customs (Bateman & Bonanni, 2019). To conduct any business at all, a company must adhere to these government requirements.

Risk Management

The larger and more complex a company's supply chain, the more prone it is to disruptions. There are many examples of events that can disrupt the supply chain, including natural disasters and terrorist attacks. Not only do disruptions cause problems in day-to-day business processes, but depending on how a company responds to them, they can either help or hurt a company's reputation. Thus, companies need to have proactive contingency plans in place to adroitly adapt to and recover from whatever problems arise in their supply chain. To create risk management plans, a company may brainstorm likely supply chain disruptions based on regulations, past disruptions, and issues with their suppliers (Bateman & Bonanni, 2019). A problem cannot be fixed until it is acknowledged. Similarly, risk cannot be managed until it is identified.

Once likely risks are identified, companies ought to consider mapping their supply chain. Existing research implores business leaders to map out the supply chains of individual product lines to locate areas of high network complexity that are at higher risk of disruption (Bell et al., 2016). Knowing the places in the supply chain that are more likely to have issues can help companies prepare for how to handle them when those issues do arise. In addition to identifying areas at high risk for disruption, mapping the supply chain can reveal opportunities to better engage with suppliers, improve their performance, and reduce risk (Kashmanian, 2017). This can help companies advance their larger business strategy and set their corporate goals.

Sustainability

Similar to globalization, sustainability has been a very popular term both in the business world and society (Carter & Easton, 2011). As our understanding of climate science increases, more and more people are conscious of how their actions impact the environment. In a similar

fashion, stakeholders are demanding that companies responsibly moderate the effects their actions have on the environment (Carter & Easton, 2011). In response, many companies release annual sustainability reports that detail how they are tacking environmental issues (Bell et al., 2016; Carter & Rogers, 2008; Kashmanian, 2017). Supply chain managers are in a unique position to make a lasting impact on the wellbeing of the environment, and they ought to take this responsibility seriously. Unfortunately, the literature reveals inconsistencies in the definition of sustainability. Indeed, the terms *sustainability* and *environment* have been used in some cases interchangeably by researchers (Carter & Easton, 2011).

Sustainability, however, does not only imply efforts focused on protecting and replenishing the environment. The most referenced definition of sustainability is from the Brundtland Commission (World Commission on Environment and Development, 1987, p. 8): "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The scope of sustainability is so broad that sometimes, corporate social responsibility (CSR) can be misleading. CSR is now so common in the business world that it has come to mean all sustainability efforts that a business conducts, and its scope is so broad simultaneously meaning everything and nothing (Bell et al., 2016). This vagueness does little to assist companies in meeting the demands of their stakeholders, and there does not seem to be a clear standard for how to approach CSR in relation to sustainability.

Like many systems, sustainability consists of multiple facets that impact one another. Thus, several authors utilize the theory of the triple bottom line to arrive at a definition of sustainability that includes social, environmental, and economic performance (Bell et al., 2016; Carter & Rogers, 2008). Regrettably, much research of CSR and sustainability has been done separately, ignoring the interrelationships between the environment, human rights, workplace

safety, financial performance, etc. (Carter & Easton, 2011). Business leaders ought to recognize the connections between their social, environmental, and economic goals to make more holistic supply chain decisions and enhance their competitive advantage.

Visibility

To have a sustainable supply chain, a company must have visibility. Mapping the supply chain to assess risks allows firms to better visualize the flow of goods through their supply chain (Bateman & Bonanni, 2019). To have proper visibility, a firm must be able to "see" everything both upstream and downstream through the supply chain (Bell et al., 2016). In addition to mapping the supply chain, thorough audits and supplier interviews are recommended steps to develop visibility in a company (Sodhi & Tang, 2019). Information sharing across the supply chain is critical to have visibility, but they are not synonyms. Information sharing is an action while visibility is the result of information sharing (Morgan et al., 2018). Thus, having access to a higher quantity of clear information improves visibility in a company. The information needed to share to have visibility includes the position of inventory and schedules (Bell et al., 2016). When business leaders can access this information, they have the ability to make better and more informed business decisions. Additionally, visibility is being enhanced through improving information technologies. For example, the growing capabilities of the Internet and the Cloud allow firms to exchange important information across various structures (Bell et al., 2016).

Just as mapping the supply chain can help a company identify areas at high risk of disruption, having visibility can help a company identify areas to make the supply chain more effective. For example, after collecting information from their suppliers, a company may realize that one of their suppliers is not necessary and remove them from their supply chain. Eliminating middlemen improves supply chain efficiency and helps to protect the quality of a company's

products (Bateman & Bonanni, 2019; Bell et al., 2016). Furthermore, a company may find ways to improve the capacity and capability of their supply chain. To demonstrate, after gaining more visibility into their supply chain, companies like GE discovered that re-shoring some of their manufacturing to the U.S. would reap them economic benefits (Sodhi & Tang, 2019). In summary, investing in better information sharing within a company can help improve its visibility.

Traceability

Visibility and traceability are related, but they are not interchangeable. Visibility describes a specific product line at the firm level. It can be viewed as a snapshot of a supply chain at one point in time. On the other hand, traceability involves going back in time to determine where a product was in the supply chain. It can be viewed as the history of the visibility of a product (Morgan et al., 2018). To put it another way, it is a firm's ability to determine the provenance of a product (Sodhi & Tang, 2019). One must remember that supply chains are changing every day. The same product line can originate from one supplier today, and it can have a different supplier one year from today. Keeping strong records of these changes in the supply chain is necessary to have traceability in a company.

Like visibility, traceability is being enhanced through improving information technologies. For example, companies in the food industry are using QR codes that when scanned, display sourcing information about the product (Bateman & Bonanni, 2019; Bell et al., 2016). Furthermore, Sourcemap is a software that firms can use to improve their visibility and traceability in their supply chain (Bateman & Bonanni, 2019; Kashmanian, 2017). As I have noted, when a company has visibility, they are able to analyze their supply chain and identify inefficiencies. Removing middlemen from the supply chain improves supply chain traceability

by having fewer steps and helps to protect the quality of a company's products (Bateman & Bonanni, 2019; Bell et al., 2016). Thus, having both visibility and traceability allows a firm to follow a product throughout the entire supply chain.

Supply Chain Transparency

A firm must have both visibility and traceability before it can have transparency in its supply chain (Bateman & Bonanni, 2019; Morgan et al., 2018; Sodhi & Tang, 2019). Visibility, traceability, and transparency all require clear and accurate information sharing. Visibility means seeing everything that occurs in the supply chain, and traceability means tracking a product's journey across the supply chain. The supply chain information that is shared is within the firm or between the firm and its suppliers. In contrast, transparency involves communicating information to those outside of the firm so that they can know what happens in the supply chain (Bell et al., 2016; Morgan et al., 2018; Sodhi & Tang, 2019). Information is shared to external parties who are stakeholders in the company.

Companies have varying degrees of transparency. This is in part determined by the industry the company is in and the infrastructure available to the company. Technologies like radio frequency identification and QR codes are being used to improve transparency (Kashmanian, 2017; Marshall et al., 2016; Morgan et al., 2018; New, 2010). Investing in this technology and other infrastructure needed to collect and disclose supply chain information, however, is time-consuming and costly (Marshall et al., 2016; Sodhi & Tang, 2019). A firm may lack the capital required to have transparency and may be unwilling or unable to spend the money to address it.

In any case, having transparency helps a company to meet the increasing demands of stakeholders to know where and how the products they buy are made. Companies like Patagonia

and Nike are at the cutting edge of transparency best practices (Bateman & Bonanni, 2019; Bell et al., 2016; Kashmanian, 2017; Marshall et al., 2016; Sodhi & Tang, 2019). Other companies, however, fear that disclosing information about their supply chain will allow competitors to steal their competitive advantage (Bateman & Bonanni, 2019; Sodhi & Tang, 2019). Indeed, companies must be careful not to reveal proprietary information that would undermine their suppliers and create distrust (Bell et al., 2016; Morgan et al., 2018). This information ought to be kept secret and should be considered legitimate by stakeholders (Schnackenberg & Tomlinson, 2016). On the other hand, transparency gives companies the ability to improve competitive advantage by evaluating the whole supply chain instead of only end product (Morgan et al., 2018). Firms should evaluate their core business strategy to match their business needs with the appropriate degree of transparency.

Third-party Certifications and NGOs

In addition to transparency, third-party certifications from NGOs and other advocacy groups can ensure sustainability claims of a company. As previously discussed, pressure on firms to be more transparent from NGOs and other consumer groups has grown in recent years (Bateman & Bonanni, 2019; Bell et al., 2016). Third parties monitor the behavior of companies to ensure that no one acts unethically or illegally (Carter & Rogers, 2008). An example organization is the Rainforest Alliance that certifies the sourcing of materials that do not contribute to deforestation (Bell et al., 2016; Kashmanian, 2017). Greenpeace is another example of an NGO that targets deforestation and the harvesting of palm oil (Kashmanian, 2017; Sodhi & Tang, 2019).

To be most effective, companies should make sure that the third-party organization bases their analyses on high-quality data (Bell et al., 2016). Also, the goals of the third party should

align with the goals of the firm. Additionally, using reputable third parties to certify a firm's supply chain practices can positively impact the reputation of the firm in the eyes of stakeholders. It is important to note that certification does not replace traceability, and many firms lack the traceability to confidently prove that they meet certification requirements (Kashmanian, 2017). Certifications from NGOs and other groups should complement a company's transparency and not be the only way a company shares supply chain information with stakeholders. However, companies and industries still need to identify what those transparency standards should be.

Stakeholders' Perceptions

The success of a company's transparency is determined by their stakeholders' perceptions of the supply chain information shared with them. In the internet era, social media and other digital channels allow information to be spread very quickly. To reiterate, media headlines detailing scandals in supply chains can harm the reputation of a company. Indeed, "critical events" can provoke large shifts in public opinion that generate massive changes in the disclosure practices in affected industries (Marshall et al., 2016). The collapse of the Rana Plaza factory in Bangladesh in 2013 is an example of one such event that produced several changes in requirements for the divulging of workplace safety information in the apparel industry (Marshall et al., 2016; Sodhi & Tang, 2019). Another example is in 2016, Nestlé was unable to determine if there were no unethical labor practices in their cocoa and coffee supply chains (Bell et al., 2016). Nestlé lacked the visibility and traceability needed to share with their stakeholders the information they desired to know, resulting in poor transparency. Thus, having transparency can help a company complete damage control after the negative press from a supply chain scandal

(Morgan et al., 2018). There remains, however, a lack of consensus on the extent of supply chain information companies should share with stakeholders after such a scandal occurs.

Since transparency is a form of communication between a firm and its stakeholders, transparency is inextricably linked to information, intentional information sharing, and the perception of the quality of the received information (Schnackenberg & Tomlinson, 2016). That is to say, stakeholders must be able to perceive and comprehend relevant information about the supply chain. To have transparency, information shared must be disclosed in a timely manner, it must be easy to comprehend, and it must be correct and precise enough for stakeholders to recognize the actual impact of the information (Schnackenberg & Tomlinson, 2016). If a company overly uses industry jargon and highly technical terms when communicating with stakeholders, then stakeholders will not be able to understand. Despite disclosing supply chain information, the end result is a de facto lack of transparency.

Furthermore, how much consumers value shared supply chain information will impact the effectiveness of a company's transparency efforts. Indeed, consumer confidence is affected by their emotion of trust in a firm, their awareness of formal and informal information available to consumers, and their sociodemographic features (Wang & Alexander, 2018). Firms who proactively engage in supplier monitoring activities and disclose information signal to consumers that they are a legitimately responsible company, positively influencing consumers' opinion of the firm and purchase intention (Duan et al., 2020). This is particularly challenging as the growth of e-commerce has reduced customers' patience and increased their desire for goods to be delivered as soon as possible (Daugherty et al., 2018). Thus, to satisfy the expectations of Millennial and Gen Z consumers, companies must have an expedient supply chain while also

improving their sustainability. Without clear standards for supply chain transparency, companies lack guidelines for how to best act.

Organizational Culture

Once a company has strong transparency, stakeholders will be more likely to perceive the organization as trustworthy. In fact, some authors argue that transparency is a prerequisite for trustworthiness (Duan et al., 2020). As previously mentioned, some companies fear disclosing information to the public because it puts them in a vulnerable position where the information shared could be used against them (Bateman & Bonanni, 2019; Bell et al., 2016; Schnackenberg & Tomlinson, 2016). Indeed, disclosing what happens in the supply chain becomes a frightening prospect when it would reveal dishonest behavior.

Therefore, many authors recommend that firms develop an organizational culture that encourages high ethical standards (Bateman & Bonanni, 2019; Bell et al., 2016; Carter & Easton, 2011; Carter & Rogers, 2008; Castillo et al., 2018; Schnackenberg & Tomlinson, 2016). It is much easier to share information across the supply chain when there are no suspicious aspects to hide. Moreover, research shows that risk management, transparency, and other aspects of sustainability are connected to organizational culture and corporate integrity (Carter & Rogers, 2008; Castillo et al., 2018). Therefore, having a company culture that encourages honesty at all levels is very important to have a sustainable supply chain. Early research into the concept of supply chain integrity proposes that integrity is required before a company can have transparency (Bell et al., 2016; Castillo et al., 2018).

Scale Development

With all of this in mind, several authors offer methods to measure the current state of transparency in a company's supply chain and then take actionable steps to improve. First,

Bateman and Bonanni create a scale that compares the depth of a supply chain interaction to milestones on a model path to complete transparency (2019). Next, Carter and Rogers utilize the triple bottom line to arrive at a holistic framework for sustainable supply chain management (2008). Also, authors build on Carter and Rogers's framework to make a scale that evaluates the level of visibility and traceability a firm has with its suppliers (Morgan et al., 2018). Finally, authors develop a method for supply chain managers to envision their current information collecting and disclosure strategy, a matrix to show examples of information disclosure strategies, and a matrix to determine the appropriate level of disclosure for a firm (Marshall et al., 2016).

A common first step for a company to measure their supply chain transparency is to 1) analyze their impending risk and 2) set goals to determine their strategy for improving supply chain transparency. A company's supply chain transparency strategy will depend on its risk profile and what questions their supply chain managers want to answer with the information they seek. These questions ought to be determined by what supply chain information internal and external stakeholders value the most. Furthermore, a common next step is to 3) determine the current state and capabilities of the supply chain. In other words, supply chain managers should identify the current amount and quality of critical information in the supply chain. This will allow supply chain managers to establish the effectiveness of their current supply chain visibility and traceability so that they can collect actionable information and use it to make decisions. Namely, this knowledge can guide supply chain managers on how to best disclose their supply chain information to their stakeholders.

In general, stakeholders do not desire to know the same depth of information about a supply chain from a company as the company desires to know from their suppliers (Bell et al.,

2016). Broadly, end consumers want to know that the products they buy and use were created sustainably. When customers go shopping, they want to have the ability to quickly compare options and decide which product best satisfies their needs. So, the language a company uses to communicate to their end consumers should be simple and able to be understood by anyone. A good starting practice is to have products certified by a credible third party (Kashmanian, 2017). Seeing a trustworthy, recognizable symbol certifying the sustainability of a product helps consumers quickly evaluate it. Furthermore, companies do not need to share every detail about their supply chain activities with their stakeholders. In fact, revealing information on multiple aspects of sustainability in a supply chain may not improve consumer attitude or purchase intention (Duan et al., 2020) Thus, companies should distill the information shared with end consumers to include only what is most important to them.

Actions companies can take to monitor and improve their supply chain transparency is a topic that has been thoroughly studied. However, further study of what supply chain information consumers desire from companies will lead to better understanding. For example, do the current measures and scales reflect the aspects of transparency that customers desire? Which are the most important aspects and when do customers need that information? With this knowledge, more uniform standards for supply chain transparency could be created for a coordinated effort to improve sustainability across the supply chain. Therefore, the following research question is raised: what standards for transparency should companies in different industries be required to follow to satisfy the needs of external stakeholders, including the end consumer who ultimately buys and uses the product? The next section describes the methods for collecting data to answer this question.

Methods

To answer the proposed research question, moderation analysis was utilized. The sampling frame consisted of students in one of the Honors and Scholars Programs at the University of Tennessee, Knoxville as well as students in classes in the Haslam College of Business. It was easy to reach out to these students and ask if they were willing to participate in the study. Only students who were age 18 or older and a member of Gen Z could participate in the study. Following the guidance of the Pew Research Center, we defined Gen Z as anyone born in 1997 onward (Dimock, 2019). Participants were contacted about the study via email either directly or through the UT Honors and Scholars e-newsletter, and the participants completed the study online. All data were collected using Qualtrics survey software and no personally identifiable information was collected to ensure confidentiality. Based on the literature review and learning gained from previous empirical studies (Hartmann & Moeller, 2014; Morgan et al., 2018; Nichols et al., 2019), we developed a survey instrument, and the items are in Appendix A.

To understand how Gen Z consumers make judgements and respond to supply chain transparency, we conducted a scenario-based role-playing experiment. We created descriptive vignettes that provided realistic situations for a study participant to respond to, allowing us to measure their reactions (Rungtusanatham et al., 2011). Each vignette placed the participant in the role of a customer. Following the design by Nichols et. al (2019), we had participants engage with fictional companies: coffee manufacturers Quality Roasts and Excellent Roasts, and computer manufacturers Tech Logic and Computer Logic. We used two different companies for each product type to distinguish for the participants the environmental scenario from the social scenario.

The vignettes were differentiated based on our factors of interest: timing of transparency (pre- and post-scandal), type of product (coffee and computer), and type of sustainability (environmental and social). After reading a scenario, participants responded to a series of questions to measure their purchase intention, recovery importance, and remedy satisfaction. All questions in the survey were measured with existing, seven-point Likert scales (e.g., 1 = "strongly disagree," 7 = "strongly agree").

Purchase Intention Hypotheses

Following theory and knowledge in the literature review and dialogue with several supply chain academic experts, we believe that the purchase intention of a product may vary depending upon the product type and sustainability type. In particular, we believe that a product consumed by an individual may be more important to consumers, and that the well-known environmental aspect of sustainability may matter more to Gen Z customers. Therefore, the following hypotheses were proposed for the study related to purchase intention:

H1a: Gen Z purchase intention decreases for a company's product after the consumer learns about a supply chain scandal at the company.

H1b: Gen Z purchase intention decreases more for coffee than computer after the consumer learns about a supply chain scandal at the company.

H1c: Gen Z purchase intention decreases more for environmental sustainability than social sustainability after the consumer learns about a supply chain scandal at the company.

Recovery Intention Hypotheses

Similarly, it was believed that both product type and sustainability type would impact the importance of recovery intention and the following hypotheses were offered:

H2a: Recovery intention is more important for Gen Z consumers after a coffee supply chain scandal than after a computer supply chain scandal.

H2b: Recovery intention is more important for Gen Z consumers after an environmental supply chain scandal than after a social supply chain scandal.

Remedy Satisfaction Hypotheses

Finally, it was believed that the external remedies would be valued more than internal remedies to Gen Z customers and that remedies for coffee products (a consumable product) would matter more to Gen Z customers. Therefore, the following were proposed:

H3a: Gen Z consumers are more satisfied with an external remedy to a supply chain scandal than an internal remedy.

H3b: Gen Z consumers are more satisfied with a remedy to a coffee supply chain scandal than a computer supply chain scandal.

H3c: Gen Z consumers are more satisfied with a remedy to an environmental supply chain scandal than a social supply chain scandal.

Results

Improved technology, lean processes, and growing global markets have allowed supply chains to become increasingly international and efficient by lowering costs while maintaining high quality products. Today, many companies operate very complicated, multi-tiered supply chains that span the globe. While the globalization of supply chains has led to many benefits, it has also created tough challenges. Despite QR code and Radio-frequency identification (RFID) technology being available and in use for several years, widespread, in-depth traceability applications have yet to be adopted by companies (New, 2010). It is expensive for companies to invest in supply chain monitoring, tracking, and auditing capabilities, and without a clear business case for sustainability, companies are reluctant to make the costly investment (Marshall et al., 2016; Sodhi & Tang, 2019). However, companies without clear visibility in their supply chain may be unable to meet Gen Z consumers' transparency expectations.

Indeed, consumers are increasingly becoming concerned with the sustainability practices of companies. The growing negative effects of greenhouse gas emissions, pollution, deforestation, etc. have kept sustainability in the public eye. Companies have attempted to lessen the environmental impact and improve the social impact of their business operations for many years. To share their progress with their stakeholders, companies release annual CSR and sustainability reports. However, there is no uniform standard for what to include in these reports nor how to record and display information.

Furthermore, CSR reports do not shield a company from criticism on their sustainability efforts. Through the World Wide Web, consumers can access more information than ever before about a company. Gen Z consumers have grown up with the internet, so they are used to easily searching and finding information. Social media has allowed customers to publicly scrutinize

companies, condemning decisions that result in social and environmental harm and holding companies accountable. Also, Gen Z consumers utilize smart technology like smartphones to gather data on products and make purchases online (Daugherty et al., 2018; Priporas et al., 2017). Therefore, the digital environment has changed customer expectations of companies, and customers are placing more pressure on companies to be more transparent.

Despite this growing pressure from stakeholders, especially from Gen Z, there are numerous examples of companies being embroiled in controversy from their lack of transparency. To illustrate, Blue Bell could not manage an outbreak of listeria, and Nestlé could not determine the initial source of their cocoa and coffee to ensure there was no slave labor in their supply chain (Bell et al., 2016). Several authors have created frameworks and strategies to assist companies with collecting data from their supply chain and properly disclosing information to the public (Bateman & Bonanni, 2019; Carter & Rogers, 2008; Marshall et al., 2016; Morgan et al., 2018). NGO and third-party certifications can complement a company's transparency and sustainability strategies, but they do not replace the need for companies' internal tracking and sharing of supply chain activities (Bell et al., 2016; Kashmanian, 2017). Without clear standards for supply chain transparency across industries, companies struggle to satisfy the expectations of their stakeholders.

Thus, this project seeks to answer the research question, "What standards should be used for supply chain product transparency across industries in the eyes of Gen Z consumers?" After performing a scenario-based role-playing experiment using descriptive vignettes, we found that social sustainability has a large impact on Gen Z consumer behavior. However, the terms *sustainability* and *environment* have been used as synonyms by many researchers (Carter & Easton, 2011). More research needs to occur to understand social sustainability better.

First, Gen Z purchase intention drops by over 2 points after a supply chain scandal (H1a $p < .05$). See the full statistical results in Appendix B. For example, after a Gen Z consumer learns of a scandal involving the supply chain of a company, their desire to buy a product from that company drops from neutral to disagree. This means that if a company has a supply chain scandal, it will lose sales from its Gen Z consumers. The R^2 indicates that 38% of the variation in purchase intention is explained by the variation in timing of transparency (pre- and post-scandal).

Next, Gen Z purchase intention drops by 0.4 point more for a computer versus coffee (H1b $p < .05$). After a Gen Z consumer learns of a supply chain scandal, their purchase intention was higher for coffee than computer. Purchase intention dropped off more for computer after a supply chain scandal than for coffee. Thus, timing of transparency (pre- and post-scandal) mattered more for computer than coffee since purchase intention lowered more. However, the R^2 of 0.01 indicates a weak relationship between type of product and purchase intention.

Also, Gen Z purchase intention drops by 0.5 point more for social sustainability than environmental (H1c $p < .05$). Gen Z purchase intention was higher after an environmental supply chain scandal than after a social supply chain scandal. Put another way, purchase intention dropped off more after a social scandal than after an environmental scandal. Thus, timing of transparency (pre- and post-scandal) mattered more for social sustainability. Moreover, a majority of the 38% R^2 between purchase intention and timing of transparency is from the difference between social and environmental sustainability.

Gen Z consumers demand that computer supply chain scandals be addressed more than coffee ones (H2a $p < .05$). The mean scores for recovery intention importance were higher for computer than coffee. Also, Gen Z consumers demand companies to address social supply chain scandals more than environmental ones (H2b $p < .05$). For both coffee and computer, mean

scores were higher for recovery intention importance. This shows that a company's intention to fix a supply chain scandal mattered more for social sustainability. Gen Z remedy satisfaction for coffee was higher for social sustainability than environmental sustainability (H3c $p < .05$). This supports our finding that social sustainability matters more than environmental sustainability for Gen Z consumers. However, our hypothesis testing for consumer satisfaction with remedy type (H3a) and computer remedy satisfaction (H3b) came back with results that were not statistically significant ($p > .05$).

Discussion and Implications

Supply chain scandals lower a firm's sales. Firms can no longer turn a blind eye to what occurs in their supply chain. Consumers, NGOs, community groups, lobbyists, governments, shareholders, and more are pushing companies to be more sustainable. Gen Z is leading the charge, and they expect better transparency from companies. This requires companies to first improve their visibility and traceability in their own supply chain. Companies need to have knowledge of their own supply chain information before they can responsibly disclose it to their stakeholders.

Additionally, social sustainability should matter to firms because it matters to Gen Z consumers. The Triple Bottom Line includes social performance, yet social sustainability is less understood than environmental sustainability. A lot about social sustainability remains unknown, and more research is required. Gen Z consumers will not buy products whose production caused social harm and will hold firms accountable. In this study, forced labor, slavery, and child labor had much more powerful effects on consumer behavior than firms realize.

Limitations and Strengths

Like most studies, our vignette development process has limitations. First, we had a small sample size of 33 complete responses (n=33). Also, we used a convenience sample with University of Tennessee, Knoxville honors students and business students. This made our study efficient and simple to implement. However, our conclusions are biased by missing out on large chunk of the population of Gen Z consumers. Thus, our sample is unrepresentative of the population, and our results are not generalizable.

Thus, we do not know if the biased sample made some results not statistically significant or if the vignette design was flawed. For the sake of time, we did not validate our vignettes for clarity and effectiveness in measuring the desired response. Similarly, we did not measure the impact of interaction variables in our 2x2x2 experimental design. There is also the potential of anchoring bias based on the order of the vignettes in our survey. To try and reduce this bias, we altered the names of the fictional companies to distinguish between the environmental and social scenario. However, environmental sustainability vignettes being asked first may have influenced the respondents' scores.

Future Research

Further research is needed to discover what actions supply chain leaders can take to improve visibility, traceability, and transparency. Researchers could examine Gen Z consumers' transparency expectations for other products and industries. We chose to study coffee and computers to compare a functional/consumable product with an innovative/non-consumable product. Thus, we focused on the manufacturing industry with a product supply chain. We propose that researchers determine whether consumers have different transparency expectations

for the service industry. It could also be beneficial to discover the economic and financial implications of sustainability. We used Gen Z purchase intention to measure economic impact. It would be interesting to explore Gen Z consumers' willingness to pay for transparency. Specifically, are Gen Z consumers willing to pay more for sustainable supply chain management? Additional research could examine how supply chain scandals impact a publicly traded company's share price. Also, we focused on large, multinational companies, but it may be interesting to examine the impact small to medium companies have on sustainability and transparency. That is to say, are small to medium firms able to be more transparent than large firms? Are they able to respond faster to supply chain scandals? Finally, more research is needed on the impacts of social sustainability. Our study demonstrates that poor social sustainability negatively affects Gen Z consumers' purchasing intention. Researchers could investigate how socially unsustainable supplier behavior impacts contract prices and other operational costs. Also, marketing researchers should determine the long-term effects of social sustainability on brand equity.

References

Bateman, A., & Bonanni, L. (2019, August 20). What Supply Chain Transparency Really Means. *Harvard Business Review*. https://hbr.org/2019/08/what-supply-chain-transparency-really-means

Bell, J., Mollenkopf, D., Meline, J. S., & Burnette, M. (2016). Creating a Transparent Supply Chain, Best Practices. *Innovations In Supply Chain 3*, 1–40.

Carter, C. R., & Easton, P. L. (2011). Sustainable supply chain management: Evolution and future directions. *International Journal of Physical Distribution & Logistics Management*, *41*(1), 46–62. https://doi.org/10.1108/09600031111101420

Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, *38*(5), 360–387. https://doi.org/10.1108/09600030810882816

Castillo, V. E., Mollenkopf, D. A., Bell, J. E., & Bozdogan, H. (2018). Supply Chain Integrity: A Key to Sustainable Supply Chain Management. *Journal of Business Logistics*, *39*(1), 38–56. https://doi.org/10.1111/jbl.12176

Daugherty, P. J., Bolumole, Y., & Grawe, S. J. (2018). The new age of customer impatience: An agenda for reawakening logistics customer service research. *International Journal of Physical Distribution & Logistics Management*, *49*(1), 4–32. https://doi.org/10.1108/IJPDLM-03-2018-0143

Dimock, M. (2019, January 17). Defining generations: Where Millennials end and Generation Z begins. *Pew Research Center*. https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/

Duan, Y., Hofer, C., & Aloysius, J. A. (2020). Consumers care and firms should too: On the benefits of disclosing supplier monitoring activities. *Journal of Operations Management*, *67*(3). https://doi.org/10.1002/joom.1129

Hartmann, J., & Moeller, S. (2014). Chain liability in multitier supply chains? Responsibility attributions for unsustainable supplier behavior. *Journal of Operations Management*, *32*(5), 281–294. https://doi.org/10.1016/j.jom.2014.01.005

Kashmanian, R. M. (2017). Building Greater Transparency in Supply Chains to Advance Sustainability. *Environmental Quality Management*, *26*(3), 73–104. https://doi.org/10.1002/tqem.21495

Marshall, D., McCarthy, L., McGrath, P., & Harrigan, F. (2016). What's Your Strategy for Supply Chain Disclosure? *MIT Sloan Management Review; Cambridge*, *57*(2), 37–45.

Morgan, T. R., Richey, J. R. G., & Ellinger, A. E. (2018). Supplier transparency: Scale development and validation. *The International Journal of Logistics Management*, *29*(3), 959–984. https://doi.org/10.1108/IJLM-01-2017-0018

New, S. (2010, October 1). The Transparent Supply Chain. *Harvard Business Review*. https://hbr.org/2010/10/the-transparent-supply-chain

Nichols, B. S., Stolze, H., & Kirchoff, J. F. (2019). Spillover effects of supply chain news on consumers' perceptions of product quality: An examination within the triple bottom line. *Journal of Operations Management*, *65*(6), 536–559. https://doi.org/10.1002/joom.1033

Priporas, C.-V., Stylos, N., & Fotiadis, A. K. (2017). Generation Z consumers' expectations of interactions in smart retailing: A future agenda. *Computers in Human Behavior*, *77*, 374–381. https://doi.org/10.1016/j.chb.2017.01.058

Rungtusanatham, M., Wallin, C., & Eckerd, S. (2011). The Vignette in a Scenario-Based Role-Playing Experiment. *Journal of Supply Chain Management*, *47*(3), 9–16. https://doi.org/10.1111/j.1745-493X.2011.03232.x

Schnackenberg, A. K., & Tomlinson, E. C. (2016). Organizational Transparency: A New Perspective on Managing Trust in Organization-Stakeholder Relationships. *Journal of Management*, *42*(7), 1784–1810. https://doi.org/10.1177/0149206314525202

Sodhi, M. S., & Tang, C. S. (2019). Research Opportunities in Supply Chain Transparency. *Production and Operations Management*, *28*(12), 2946–2959. https://doi.org/10.1111/poms.13115

Wang, S., & Alexander, P. (2018). The factors of consumer confidence recovery after scandals in food supply chain safety. *Asia Pacific Journal of Marketing and Logistics*, *30*(5), 1379–1400. https://doi.org/10.1108/APJML-10-2017-0232

World Commission on Environment and Development. (1987). *Our Common Future*. Oxford University Press.

Appendix A

Demographic Questions
What is your age?
What is your sex?

Coffee environmental scandal:
Pre-scandal

Quality Roasts is a company that sells coffee. Quality Roasts beans are sourced from Colombia.

1. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You also find out that Quality Roasts uses coffee beans farmed using environmentally friendly agriculture practices.

2. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You then discover that Quality Roasts is certified by a reputable third-party organization (e.g., the Rainforest Alliance)

3. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

While searching Quality Roasts' website, you see a webpage that displays the names and locations of their suppliers from around the world.

4. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You then learn that Quality Roasts includes a QR code on their packaging that when scanned, will display the exact supplier the coffee in the package came from.

5. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

Post-scandal
It has come to light that Quality Roasts uses toxic pesticides to grow their coffee beans.

After you learn of this news, to what extent do you agree with the following statements:

6. It is enough for Quality Roasts to share that they source their coffee beans from Colombia to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

7. It is enough for Quality Roasts to share that they farm coffee beans using environmentally friendly agriculture practices to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

8. It is enough for Quality Roasts to be certified by a reputable third-party organization (e.g., the Rainforest Alliance) to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

9. It is enough for Quality Roasts to display the names and locations of their global suppliers on their website to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

10. It is enough for Quality Roasts to include a QR code on their packaging that when scanned, will display the exact supplier the coffee in the package came from to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

11. How important is it for Quality Roasts to stop using toxic pesticides?
    a. 1-7 Likert scale from not important at all to very important

Internal Remedy
Quality Roasts installs a software to track the proper use of pesticides in their harvest.

12. To what extent does this satisfy your expectation for Quality Roasts to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

External Remedy
Quality Roasts undergoes an audit from a reputable third-party organization (e.g., the Rainforest Alliance) on pesticide use.

13. To what extent does this satisfy your expectation for Quality Roasts to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

Coffee social scandal:
Pre-scandal

Excellent Roasts is a company that sells coffee. Excellent Roasts beans are sourced from Brazil.

1. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You also find out that Excellent Roasts renounces slavery and human trafficking.

2. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You then discover that Excellent Roasts is investing in improving the quality of their farmers' lives.

3. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

While searching Excellent Roasts' website, you see a webpage that displays their goals regarding diversity and inclusion (e.g., achieving racial and gender equity).

4. To what extent do you agree this is enough information to warrant purchasing the product?
    b. 1-7 Likert scale from strongly disagree to strongly agree

You then learn that Excellent Roasts collaborates with outreach programs to serve the needs of their local communities (e.g., donating to food banks).

5. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

Post-scandal
It has come to light that Excellent Roasts uses child labor to harvest their coffee beans.

After you learn of this news, to what extent do you agree with the following statements:

6. It is enough for Excellent Roasts to share that they source their coffee beans from Brazil to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

7. It is enough for Excellent Roasts to renounce slavery and human trafficking to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

8. It is enough for Excellent Roasts to invest in improving the quality of their farmers' lives to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

9. It is enough for Excellent Roasts to display their goals regarding diversity and inclusion (e.g., achieving racial and gender equity) on their website to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

10. It is enough for Excellent Roasts to collaborate with outreach programs to serve the needs of their local communities (e.g., donating to food banks) to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

11. How important is it for Excellent Roasts to stop using child labor?
    a. 1-7 Likert scale from not important at all to very important

Internal Remedy
Excellent Roasts stops hiring children below the minimum working age and invests in nearby schools.

12. To what extent does this satisfy your expectation for Excellent Roasts to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

External Remedy
Excellent Roasts undergoes an audit from a reputable third-party organization (e.g., the Human Rights Watch) on working conditions.

13. To what extent does this satisfy your expectation for Excellent Roasts to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

Computer environmental scandal:
Pre-scandal

Tech Logic is a company that sells personal computers (PCs). It assembles computers using parts that are manufactured in South Korea.

1. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You then find out that Tech Logic PCs contain energy efficient parts.

2. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You also discover that Tech Logic is certified by a reputable third-party organization (e.g., the U.S. Environmental Protection Agency)

3. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

While searching Tech Logic's website, you see a webpage that displays the names and locations of their suppliers from around the world.

4. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You then discover that Tech Logic includes a QR code on their packaging that when scanned, will display the exact supplier the semiconductor chip in the PC came from.

5. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

Post-scandal
It has come to light that Tech Logic dumps chemical waste into nearby waterways when manufacturing computers.

After you learn of this news, to what extent do you agree with the following statements:

6. It is enough for Tech Logic to share that they source their computer parts from South Korea to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

7. It is enough for Tech Logic to share that their PCs contain energy efficient parts to warrant my purchase.

   a. 1-7 Likert scale from strongly disagree to strongly agree

8. It is enough for Tech Logic to be certified by a reputable third-party organization (e.g., the U.S. Environmental Protection Agency) to warrant my purchase.
   a. 1-7 Likert scale from strongly disagree to strongly agree

9. It is enough for Tech Logic to display the names and locations of their global suppliers on their website to warrant my purchase.
   a. 1-7 Likert scale from strongly disagree to strongly agree

10. It is enough for Tech Logic to include a QR code on their packaging that when scanned, will display the exact supplier the semiconductor chip in the PC came from to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

11. How important is it for Tech Logic to stop dumping chemical waste into nearby waterways?
    a. 1-7 Likert scale from not important at all to very important

Internal Remedy
Tech Logic installs effluent testing devices in their manufacturing plants to monitor waste emission.

12. To what extent does this satisfy your expectation for Tech Logic to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

External Remedy
Tech Logic undergoes an audit from a reputable third-party organization (e.g., the U.S. Environmental Protection Agency) on chemical waste disposal.

13. To what extent does this satisfy your expectation for Tech Logic to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

Computer social scandal:
Pre-scandal

Computer Logic is a company that sells personal computers (PCs). It assembles computers using parts that are manufactured in Taiwan.

1. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You also find out that Computer Logic PCs contain platinum that was mined in Africa.

2. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You discover that Computer Logic is investing in improving the quality of their miners' lives.

3. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

While searching Computer Logic's website, you see a webpage that displays their goals regarding diversity and inclusion (e.g., achieving racial and gender equity).

4. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

You then learn that Computer Logic collaborates with outreach programs to serve the needs of their local communities (e.g., donating to underserved schools).

5. To what extent do you agree this is enough information to warrant purchasing the product?
    a. 1-7 Likert scale from strongly disagree to strongly agree

Post-scandal
It has come to light that Computer Logic is sourcing platinum from a company that uses slave labor in Africa.

After you learn of this news, to what extent do you agree with the following statements:

6. It is enough for Computer Logic to share that they source their computer parts from Taiwan to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

7. It is enough for Computer Logic to share that their PCs contain platinum that was mined in Africa to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

8. It is enough for Computer Logic to invest in improving the quality of their miners' lives to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

9. It is enough for Computer Logic to display their goals regarding diversity and inclusion (e.g., achieving racial and gender equity) on their website to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

10. It is enough for Computer Logic to collaborate with outreach programs to serve the needs of their local communities (e.g., donating to underserved schools) to warrant my purchase.
    a. 1-7 Likert scale from strongly disagree to strongly agree

11. How important is it for Computer Logic to stop using slave labor?
    a. 1-7 Likert scale from not important at all to very important

Internal Remedy
Computer Logic partners with local governments to increase prosecution efforts against human traffickers and joins global collective initiatives to prevent forced labor (e.g., ILO Global Business Network on Forced Labour).

12. To what extent does this satisfy your expectation for Computer Logic to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

External Remedy
Computer Logic undergoes an audit from a reputable third-party organization (e.g., the Human Rights Watch) on working conditions.

13. To what extent does this satisfy your expectation for Computer Logic to address the problem?
    a. 1-7 Likert scale from very dissatisfied to very satisfied

Appendix B

Main Hypothesis Results

Purchase Intention **With Transparency**

Pre-scandal Linear Regression	**P Value**	**R^2**	**Coefficient**
	8.07E-120	0.38	2.27

Coffee Linear Regression	**P Value**	**R^2**	**Coefficient**
	0.0001	0.01	0.41

Environmental Linear Regression	**P Value**	**R^2**	**Coefficient**
	7.13E-07	0.38	0.53

Recovery Intention Importance

Coffee Paired t Test	**Environmental**	**Social**	**P Value**
Mean	5.78	6.45	0.0008

Computer Paired t Test	**Environmental**	**Social**	**P Value**
Mean	6.45	6.79	0.0008

Remedy Satisfaction

Coffee Paired t Test	**Environmental**	**Social**	**P Value**
Mean	5.29	5.61	0.04