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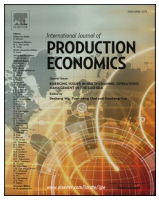

Crises in global supply chains: The role of impression management communications

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ABSTRACT

Manufacturers have long considered the best approach to take after a supply chain disruption occurs. Because serious disruptions likely will escalate into organizational crises announced in the national news, managing the effects of the disruptions and communications with relevant stakeholders becomes critical to mitigating possible damages. One of the major stakeholders of a firm are the shareholders, and the current literature provides no direction regarding the strategies firms should deploy in communicating with shareholders. This study provides direction by examining effectiveness of organizational communication based upon the level of responsibility that a firm claims after a supply chain crisis is announced. An event study methodology (n = 204) was used to investigate the firm's communication and the associated shareholder reaction using abnormal stock returns as a proxy. The results of the study revealed that the less responsibility a firm accepted for the supply chain crisis, the less negative the abnormal stock return. From a short-term corporate financial perspective, it is attractive to assume less responsibility and even blame other firms. However, from a long-term supply chain perspective, more collaboration with buyers and suppliers is critical. The short-term abnormal stock returns could be weathered to assure more long-term collaboration. This research relies upon impression management communications as a theoretical foundation; whereby the results align with attribution theory. This study provides new links between impression management communications and supply chain management literatures.

1. Introduction

Supply chain crises have been shown to have an extremely negative impact on the profitability of manufacturing firms and influence how key stakeholders feel about the organization (Billings et al., 1980; Coombs, 2007b; An and Gower, 2009). In the classic operations management event study, Hendricks and Singhal (2003) found the mean market value of firms declined $251.47 million after the announcement of supply chain glitches ($419.85 million when adjusted for inflation in 2022). This finding is even more important in today's digital age where investors rely on the free flow of information to understand complex situations and the underlying impact to earnings. As such, firms must carefully consider how their message will be interpreted by their stakeholders. This negative publicity associated with crisis events offers firms an opportunity to speak to key stakeholders and provide their account of the crisis by issuing an explanation about what happened.

Using attribution theory and situational crisis communication theory, researchers have found that the more responsibility stakeholders attribute to parties involved in the crisis, the more negative perceptions that stakeholders will have about those firms (Coombs, 1995, 2014; Coombs and Holladay, 2002). Yet, the supply chain context is unique. True responsibility for a supply chain crisis often is difficult, if not impossible, to determine.

Past research has not considered a firm's ability to issue targeted communications to elicit a more favorable reaction from stakeholders in the context of supply chain management. On one hand, if an organization refuses to accept responsibility for a supply chain crisis, it may be possible to maintain favorable reactions from stakeholders by refusing to acknowledge that strategies or execution were flawed, and may leave the door open for an organization to mitigate potential legal liability that may follow. On the other hand, current and future supply chain partnerships may become strained as firms point fingers at each other, and the ability to recover quickly from a crisis may be jeopardized. By accepting responsibility for the crisis, a firm may be acknowledging failed strategies or poor execution, providing a negative signal to stakeholders. Yet, by accepting responsibility for the crisis, a firm may

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be able to maintain good relationships with its supply chain partners and be capable of recovering from the crisis more quickly. This tradeoff is inherently complex, and the link between organizational communication and stakeholder crisis perceptions remains unexplored. This tradeoff is explored in this research.

A key group of stakeholders in a crisis is the equity shareholders. Researchers across disciplines have investigated the link between various organizational announcements and changes in stock price using an event study methodology (Filbeck et al., 2016; Meng and Lee, 2007). Findings have indicated that shareholders respond positively or negatively to the content of a message by buying or selling equity stakes in the firm. Although much is known about different organizational factors that play a role in influencing investor sentiment, additional supply chain factors need to be examined, including communication strategies in the context of supply chain disruptions.

Findings from this study will have important implications for academics and practitioners. This research will add to our body of knowledge in the area of communications at the time of a supply chain crisis. Furthermore, important links between literatures in supply chain management and attribution theory and situational crisis communication theory are established. From a practitioner point of view, this research helps investors optimize their investment strategies, while providing firms communication strategies to manage supply chain partnerships despite crises. This study used a sample of crisis announcements and the associated communication of large U.S. publicly-traded manufacturers to test the hypotheses and determine a firm's ability to manage shareholder impressions. Next, the relevant literature is reviewed to build a basis for this study.

2. Literature review

2.1. Publicly announced supply chain disruptions

Supply chain crisis events can take several different forms, including: defective products resulting in recall or customer injury, emissions or spills resulting in environmental harm, contamination, or even delays within the supply chain because of operational breakdowns, natural disasters, or intentional acts (Kleindorfer and Saad, 2005). Varying international standards, the geographic dispersion of suppliers, and the difficulty of communicating and distributing products to customers across multiple continents have contributed to an increase in supply chain complexity (Holloran, 2015). As such, it is difficult for stakeholders to be aware of the crisis details outside of the information that is released publicly. This information gap allows an organization affected by a supply chain crisis the opportunity to craft a narrative to influence stakeholder perceptions.

Over time, supply chains have played an increasingly important role in impacting organizational profitability, with the uninterrupted flow of materials through the supply chain being critical to success from manufacturing organizations (Craighead et al., 2007). The seminal work of Hendricks and Singhal (2003, 2005b) demonstrated the critical link between supply chain disruptions and short-term and long-term shareholder wealth. Although this work established the relationship between the announcement of the crisis and negative abnormal returns, the market adjusted abnormal returns ranged from a short-term stock return of less than 40 percent to more than 10 percent, with the sample consisting of only 82.85 percent negative returns. The wide range of returns and the existence of at least 17 percent positive values indicates that although some firms are impacted greatly, other firms are less affected. This variance in outcomes suggests that there are a number of variables that have yet to be uncovered. We use this critical work of Hendricks and Singhal (2003) as a foundation in our study as we use the theory of impression management to explain the variation in stock returns.

Disruptions that are published in the national news typically are more severe (Schmidt and Raman, 2012). These disruption events can signal more significant supply chain imbalances, limiting an organization's ability to deliver value for customers and investors in the short-term and the long-term (Baghersad and Zobel, 2021; Hendricks and Singhal, 2003, 2005b; Kumar et al., 2015; Schmitt et al., 2017). Disruption announcements have been known to signal possible damage for key stakeholders, including employees, investors, the community, or even supply chain partners (Hendricks and Singhal, 2003; Jacobs and Singhal, 2017; Wood et al., 2017). In addition, announcements have been linked to increasing public pressure, resulting in additional company liability or reputational damage (Coombs, 2014; Kleindorfer et al., 2003). Because shareholders place such a central role on the health of the company and the ability of the firm to raise capital, firms are particularly sensitive to their perceptions.

Shareholders are one of the primary stakeholders of the firm based on the equity invested. Friedman (2007) argued that it is the responsibility of a firm to raise profits for shareholders. In addition, the literature indicates the significance that shareholders have on firm decisions and communication (Freeman and Reed, 1983; Humber, 2002; Xu and Li, 2013). As a result, firms must demonstrate sensitivity by reacting to shareholder perceptions, implementing policies, and carefully constructing communication to achieve favorable reactions. Yet, there is little focus within supply chain management literature dedicated to understanding the critical role that organizational communication plays in supply chain disruption situations.

Prior studies have shown that investors react to publicly available communication. Such studies provide empirical evidence linking the disruption and shareholder returns, but no known studies have been grounded using a theoretical basis. For example, in the short term, supply chain disruption announcements in the *Wall Street Journal* and the *Dow Jones News Service* have been linked to a negative 10.26 percent shareholder return immediately following the announcement of the supply chain disruption (Hendricks and Singhal, 2003). In addition, similar disruptions have been linked to negative long-term shareholder outcomes, such as a negative 40 percent average stock return and 13.5 percent higher equity risk one year after the announced disruption (Hendricks and Singhal, 2005b). Publicly announced disruptions also have been linked to operational performance issues, including a 7 percent drop in sales, an 11 percent increase in operating cost, and a 14 percent increase in inventory (Hendricks and Singhal, 2005a). While associations are important, investigating the relationship between supply chain disruptions and shareholder returns using the theoretical lens of impression managed communication may provide additional insight.

2.2. Impression managed communication

Organizations attempt to manage the impressions of others by issuing communication about the crisis using account giving (Bradford and Garrett, 1995; Garrett et al., 1989; Schönbach, 1980; Tata, 1994, 2000a, 2000b). An account is a statement released by the firm that provides details about a situation from the firm's own perspective (Schönbach, 1980). Researchers have utilized an account giving framework to classify specific accounts ranging from more defensive to more accommodative (Coombs and Schmidt, 2000; Coombs and Holladay, 1996, 2002). A defensive account would be communication denying involvement, and even going as far as to put the blame elsewhere. On the other hand, an accommodative strategy would be one accepting responsibility for the failure, and could include an apology for wrongful action or offer remediation or compensation. Several researchers have investigated the effectiveness of various communication strategies after crisis events occur (Benoit, 1997; Coombs and Holladay, 2008). In general, past research has indicated that when a firm is more responsible for a crisis, accommodative strategies are more effective in preserving reputation (Benoit, 1997; Coombs and Holladay, 2008). On the other hand, researchers also have acknowledged that communication strategies must consider the complex interaction between the crisis and various stakeholder behavioral intentions (Utz et al., 2013). Often, stakeholder interests are not aligned perfectly, resulting in mixed

reactions to crisis communication strategies. As a result, isolating the context, strategies, and the stakeholder interests could prove to be an effective approach to determine crisis communication effectiveness.

Impression management theory is used to shape opinion, and originated in social psychology as a framework to study human behavior. The theory proposes that people are actors who perform to construct favorable identities of themselves to preserve their reputations (Earley, 1997; Goffman, 1955; Tedeschi, 2013). Historically, the concept of impression management was applied at the individual level, but recently has been generalized to the organizational level (Benoit, 1997; Giacalone and Rosenfeld, 2013; Tata and Prasad, 2015). In this research, the unit of measure was crisis responsibility at the organizational level. In crisis management literature, research using impression management theory to understand shareholder perceptions has yet to be explored.

Attribution theory has been used as a framework to understand crisis responsibility and the psychological circumstances surrounding the link between the cause and the event (Weiner, 1985). The relationship between crisis responsibility and stakeholder perceptions provides meaning to crisis management success or failure (Martinko, 1995). Although attribution theory has been studied extensively to understand the behavior of individuals, it shows significant promise to help address organizational research questions (Coombs, 2007a; Martinko, 1995; Martinko et al., 2011). With increased outsourcing in modern supply chains, attributing responsibility for successes or failures is complex (Power, 2005). As a result, stakeholders draw conclusions about responsibility based on the statements that firms release.

By selectively choosing the details that are shared, crisis communication can be used to manage the perception of the reality and ultimately shape public opinion (Fink, 2013). Firms that effectively manage a crisis can emerge better, stronger, and more respected than before. Dean (2004) found that from a customer perspective, company responsibility played an important role in affecting the attitudinal views about the company. That is, a company claiming more responsibility for a crisis event was regarded more highly by potential customers than a company claiming less responsibility for the crisis (Dean, 2004). Although attribution theory is useful to understand the link between actual responsibility and stakeholder perceptions, by itself, it does not acknowledge the potential flexibility that the firm has to be able to manage impressions. As a result, choosing the right words becomes important for a firm to shape opinions (Coombs, 1995).

A specific impression management taxonomy, which was the focus of this research, is the Schönbach (1980) taxonomy. This taxonomy was valuable for this study because it offered the opportunity to align the accounts that are given with accepted levels of responsibility. Using the Schönbach (1980) taxonomy, accounts are categorized into four different categories (concessions, excuses, justifications, and refusals) based on the level of involvement or amount of responsibility that the actor is willing to accept for the failure event (Cody and McLaughlin, 1990; Schlenker, 1980; Schönbach, 1980). The first category, a *concession account*, is communication admitting a violation has occurred. Although the concession account always identifies involvement, it may express regret, provide an apology, or offer compensation for what occurred. As a result, actors issuing concession accounts accept the highest level of involvement and responsibility. The second category, an *excuse account*, is an admission that an event has occurred, but uses rationale to mitigate causal responsibility. This mitigating plea could introduce additional externals factors contributing to the event or highlight unintentional consequences. In the third category, a *justification account*, the actor does accept causal responsibility for the event, but the action was permissible or legitimate because of the circumstances. The focus of a justification account is to alter perception of the event to limit responsibility. As a firm increases its level of insistence on the action it took despite the crisis occurring, its account is more likely to be classified as justification than as excuse. The fourth category, a *refusal account*, can be framed in three ways. The first is a denial that the event in question occurred. The second is a denial of personal involvement or responsibility, possibly pushing the blame onto another party. The third is refusing to provide details. These account categories, definitions, and distinguishing characteristics are highlighted in the Appendix (Table 11). Aligning with the majority of past research, this study considered the accounts as discrete categorical variables (Fukuno and Ohbuchi, 1998; Takaku, 2000; Tata, 2002).

3. Research questions

The primary focus of this study was to examine the relationship between crisis communication and equity value in the context of supply chains crisis events. Specifically, the following research questions were answered: 1) Does crisis communication affect shareholder responses after a supply chain crisis? 2) Can the firm mitigate negative shareholder returns by issuing accounts that accept lower levels of crisis responsibility?

This research is potentially transformative, as it could provide important links between international supply chain management, crisis mitigation, and impression management theory. The sample used in this study illustrates the critical supply chain dependencies that exist and how these dependencies can expose firms to higher levels of supply chain crisis risk. Furthermore, when a crisis does occur, stakeholders are interested in identifying the causes of the crisis and holding responsible parties accountable. Public accountability provides firms the opportunity to communicate information to key stakeholders to manage the impressions that stakeholders have of the supply chain crisis and the organization.

The findings of this study offer an organization insight into the most effective way to communicate responsibility in a supply chain crisis. In addition, organizations could achieve a higher level of congruence between the desired shareholder perceptions and actual shareholder perceptions. Although this study provides a roadmap for manufacturers to design crisis communication strategies to effectively mitigate crises, investors also can benefit from additional insight into how firms potentially could manipulate a message in a supply chain crisis.

4. Theoretical framework and hypotheses

Attribution of responsibility (Fincham and Jaspars, 1980) and impression management (Benoit, 1997) are the two similar theoretical frameworks relevant to understanding why accounts are issued and how accounts could be interpreted by stakeholders. Grounded in social psychology, the frameworks provide an explanation for why different accounts are effective in managing different perceptions. Each framework is discussed in subsequent paragraphs. In addition, a more comprehensive discussion offers support for why impression management is the more relevant framework for this study.

Based upon attribution of responsibility, there is a causal link between responsibility and punishment (Fincham and Jaspars, 1980; Fiske and Taylor, 2013). When individuals are held responsible for failures, the negative reaction is likely to be mitigated with accounts accepting less responsibility for the failure. In situations where individuals were accused of drunk driving (Riordan et al., 1983), accused of traffic violations (Cody and McLaughlin, 1990), or accused of sexual harassment (Tata, 2000a), offering an account accepting less personal responsibility was viewed more favorably. Those individuals who were accused were less likely to be penalized or receive disciplinary action than those who accepted more responsibility.

Research also has suggested that face concerns play an important role in account giving when individuals feel that communication may pose a threat to others or an existing relationship with others (Brown and Levinson, 1987; Goffman, 1955). Because of a universal desire to preserve face and appear desirable, individuals may issue accounts that are less aggravating to others. Using the Schönbach (1980) taxonomy, the four accounts also have been studied within the context of preserving and threatening relationships with others (McLaughlin et al.,

1983). Although concessions are considered likely to preserve the relationship with others, refusals are considered accounts that are more aggressive, potentially threatening the relationship with others (Cupach et al., 1986). Despite the research that has been done at the individual level in social settings, limited research exists to understand the relationship between issued accounts and stakeholder reaction at the organizational level. In addition, a study investigating this relationship in a supply chain context using financial markets has yet to be explored.

At the organization level, a shareholder is interested in how a crisis will impact a firm's future earnings (Ni et al., 2016). Past research has already sufficiently established the link between supply chain disruptions and short-term negative shareholder returns. We present H_1 both to confirm the findings of Hendricks and Singhal (2003) using a more recent data set, and to offer a foundation for our subsequent comparative analysis. As such, we hypothesize:

H1. The announcement of a supply chain crisis will result in a negative abnormal stock return.

Assessing the impact of supply chain responsibility after a crisis event is complicated. On one hand, denying responsibility for the crisis can result in supply chain partners that may look culpable. A denial of responsibility or assigning guilt to a partner firm may further disrupt or delay the efficient flow of product through the supply chain. On the other hand, if a firm accepts responsibility for the crisis, it is admitting their business strategies may be flawed. Similarly, an admission of guilt also may imply a willingness to accept responsibility for financial damages associated with the crisis. Both scenarios could be viewed as potential warning signs to investors and reasons to question future earnings and future strategies.

When issuing a concession account, the firm is accepting the highest degree of responsibility. The account could include a declaration of guilt, an acknowledgement of failure, or even an apology to stakeholders or the general public. This is considered a mitigating account or a penitential account where there is admission of full or partial responsibility and the person or firm issuing the account is identifying causal responsibility (Schönbach, 1990). In addition, issuing a concession account may alleviate pressure or responsibility on supply chain partners (suppliers, distributors, retailers) that also may be connected to the crisis. According to attribution theory, stakeholders react negatively to those whom they assign responsibility. By taking responsibility for the crisis by issuing a concession account, organizations are offering a declaration of guilt. As a result, we hypothesize that:

H2. Issuing a concession account after a supply chain crisis will result in a short-term abnormal stock return that is more negative (than the abnormal return of the rest of the sample).

An excuse account is a mitigating account where the person or the firm accepts responsibility for the crisis, but pleads for mitigation on the basis of limited responsibility (Schönbach, 1990). In a supply chain management scenario, this may include an event that is outside of the firm's control; however, poor planning or poor strategic implementation may have contributed to failed execution. Because the firm still is acknowledging a causal link between their responsibility and the crisis event, we hypothesize that:

H3. Issuing an excuse account after a supply chain crisis will result in a short-term abnormal stock return that is more negative (than the abnormal return of the rest of the sample).

A justification account is considered an aggravating account where the actor or the firm accepts causal responsibility for the crisis, but also claims that the actions taken were permissible under the circumstances (Schönbach, 1990). In this situation, the actor or the firm may claim that the standards of performance are unreasonable and that a reasonable firm would have acted the same under the circumstances. Compared to a concession or an excuse, the firm is not issuing a declaration of guilt, and is further decoupling their strategies and actions to the negative outcome. Because shareholders may be less willing or able to attribute the result of the negative event to the firm, we hypothesize:

H4. Issuing a justification account after a supply chain crisis will result in a short-term abnormal stock return that is less negative (than the abnormal return of the rest of the sample).

A refusal account is considered the most aggravating account, where an actor or a firm either denies that the event or outcome occurred, denies involvement, or denies responsibility for the outcome (Schönbach, 1990). This distances the firm from responsibility, and subjects others to potential causal responsibility. According to attribution theory, because shareholders are unlikely to establish causal responsibility or attribute the disruption to the firm, we anticipate that the negative short term impact to shareholder returns will be less severe. As a result, we hypothesize that:

H5. Issuing a refusal account after a supply chain crisis will result in a negative short-term abnormal stock return that is less negative (than the abnormal return of the rest of the sample).

Supply chain systems often are complex networks, with dependencies connecting upstream operations with downstream ones. The exact cause of the crisis might be unclear or a result of interactions between buyers and suppliers, which may not be obvious to the general investor. In addition to issuing an account, a firm could offer a statement that another party may be responsible (blame) for the supply chain crisis. According to attribution theory, this additional information further distances the firm from responsibility and future liability, and investors will have additional difficulty attributing the disruption to the firm. As such, we hypothesize that:

H6. Issuing an account that includes evidence that another specific party may be responsible for the crisis (blame) will result in an abnormal return that is less negative (than the abnormal return of the rest of the sample).

5. Methods

Building upon past research in crisis management (Coombs, 1995; Fink, 2013), this study utilized a collection of published news articles as a mechanism to identify relationships (including parameter estimates) between crisis communication strategies and abnormal stock market returns. In this study, we use the original event study methodology described by Hendricks and Singhal (2003) as a foundation, and then incorporate several event study best practices and recommendations as outlined in Ding et al. (2018).

5.1. Sample and research design

The data used in this study were gathered by locating supply chain disruption announcements in the Business Premium Collection database and by selecting wire feeds and newspapers. Specific press releases and articles were found in *PR Newswire*, *The Wall Street Journal,* and *Dow Jones News Service*. Similar to prior research, other common business databases also were searched, such as LexisNexis, Bloomberg, and Factiva, as these databases have been identified as the data sources in operation and supply chain management (OSCM) event studies published in top supply chain journals (Ding et al., 2018). The risk of selection bias in this study was minimized by taking a broad-based approach and using past research as a guide for the data source. Typically, an account issued by the company was provided directly within the article. If an account was not provided, additional steps were taken to search for an account in other articles, the company's website, and social media, as outlined in Fig. 1.

The time period used in this study was 2001 through 2017. This date range was chosen for two primary reasons. First, it was important to collect enough observations to achieve statistical power in the study. To distinguish a statistical difference between the groups, G*Power 3.1 software was used in this study to determine the sample size required.

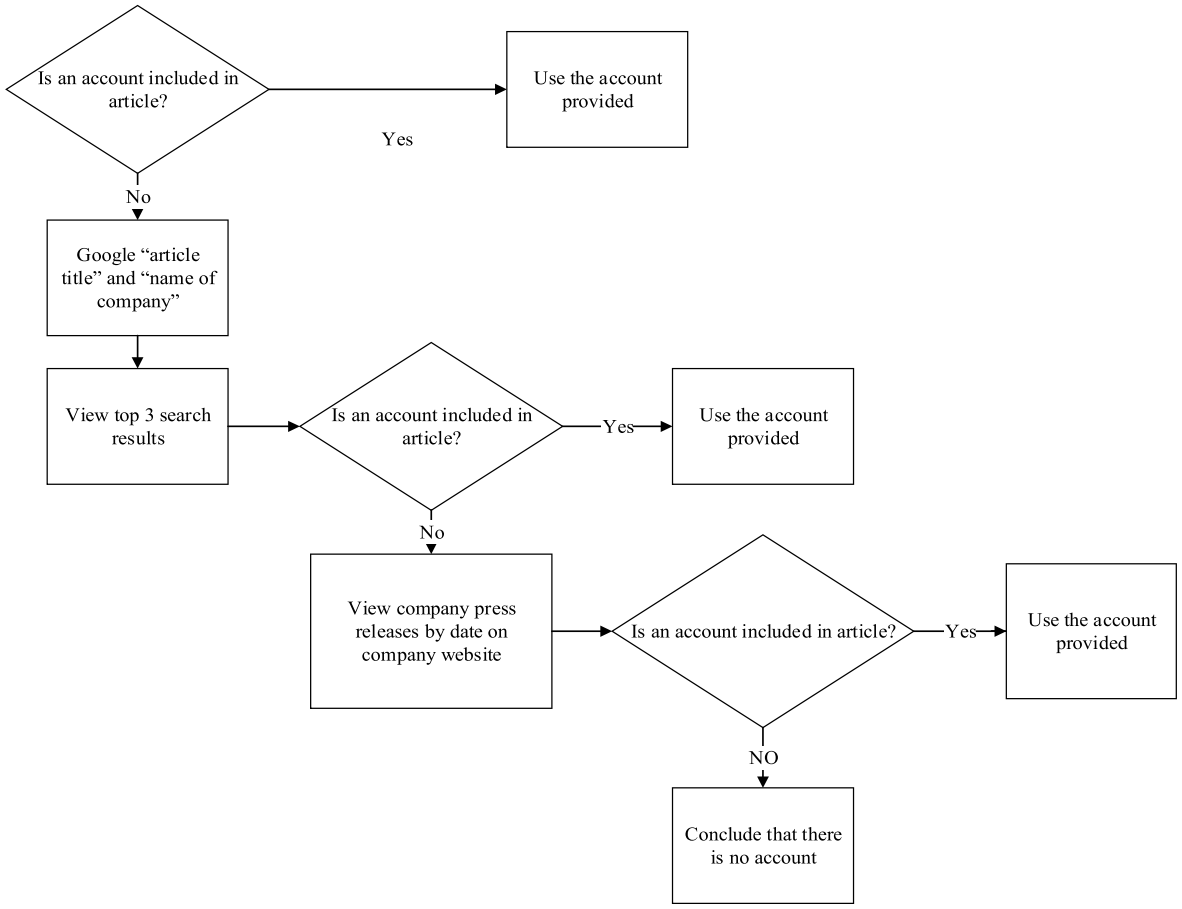

Fig. 1. Decision making process for limited account.

The analysis revealed that approximately 28 observations were needed per account to calculate statistical power (Faul et al., 2007). This aligns with published research suggesting, as a rule of thumb, sample sizes of 20–30 observations per group are needed to determine a difference between groups reliably (Hox, 1998; VanVoorhis and Morgan, 2007). As a result, 15 years of data was estimated to be needed. Second, the Hendricks and Singhal (2003) supply chain disruption event study utilized a sample ending in 2000. A sample beginning in 2001 enabled this study to confirm the Hendricks and Singhal (2003) finding of a negative association between the disruption announcement and the stock market returns. Building upon this work, this study then tested the hypotheses using a sample consisting of more recent data. Although a minimum of 112 observations was estimated to be needed, 204 observations were collected. Ultimately, this number was estimated to be sufficient to account for variation in the distribution of accounts from the preliminary sample to the final sample, and to account for observations that needed to be eliminated because of missing stock market return data. The number of observations reported by year are listed in Table 1. Consistent with other event studies investigating supply chain disruptions, the number of announcements can vary significantly from year to year (Baghersad and Zobel, 2021; Hendricks and Singhal 2003 Zsidisin et al., 2016). We found the largest number of observations in 2016, driven primarily by a larger number of recalls within the automotive sector. A greater number of observations in more recent years is consistent with other event studies where more recently published articles are most readily available (Filbeck et al., 2016; Hendricks and Singhal, 2003).

Our search for news announcements captured a range of disruptions, including manufacturing and production delays, shipping delays, vendor delays, defective products, emissions or spills, product contaminations, or delays attributed to natural disasters. To locate these announcements, we conducted an initial search using combinations of search terms used in past supply chain disruption event studies (Baghersad and Zobel, 2021; Hendricks and Singhal, 2003). We used terms and word truncation techniques to account for significant letter variations of each word, including: supply chain, glitch, shortage, disrupt*, delay, recall, complicat*. We read and reviewed the articles that this initial search returned, and then expanded the list of terms that were used based on the verbiage within the articles to include combinations of our initial search terms and additional words found within the articles. For example, our secondary search included search terms such

Table 1
Sample distribution by year.

Year	Number of Observations
2001	4
2002	3
2003	3
2004	4
2005	11
2006	2
2007	7
2008	5
2009	3
2010	10
2011	15
2012	7
2013	13
2014	20
2015	30
2016	50
2017	17
Total	204

as "supply complications" and "inventory shortfalls." Within Bloomberg, the category SUPPLYCHAINDISRPT was used to search the database. Because the search criteria generated a list of both private and public companies, Yahoo Finance then was used to identify the ticker symbols of publicly traded companies. All private firms subsequently were removed from the sample. The remaining sample of announcements was filtered based on the following criteria:

1) Firms had to have a minimum of 40 trading days in the estimation period (similar to Hendricks and Singhal [2003] prior to the announcement).
2) The sample was limited to only manufacturing firms. Disruptions related to service firms were outside the scope of this study.

After collecting the articles based on the search criteria above, the total sample consisted of 204 articles. Using these 204 articles, the next step was to collect the crisis communication for each observation. To find the crisis communication, four primary sources of information were targeted: quoted statements from company representatives within the article, press releases about the crisis on the company's website, company statements on social media (Facebook and Twitter), and U.S. Securities and Exchange Commission 8-K filings. This communication then was coded for analysis, as outlined in the next section. In our study, we found that 71.58% of the firms in our sample released an account on the same day that the disruption was announced. As such, a boundary condition in our study was to capture the joint short term impact of the announcement of the disruption and an immediate response scenario, up to one day after the event.

5.2. Coding process

There were two primary coders and one secondary coder as part of the study to classify the crisis communication. Two individuals were designated as primary coders because of their extensive knowledge pertaining to the study context and the theory of impression management. An additional coder was used to resolve potential coding disagreement. The three coders were given definitions of each account as outlined in the Appendix, and examples of communication were coded into each of the five account categories. All three coders have advanced degrees, each with over ten years of work experience in industry and academia. In addition, the two primary coders have experience conducting research using the theory of impression management. Prior to the coding exercise, all three coders were given a binder containing 204 articles and a coding sheet to record the data. The coders were instructed to read each article and classify each article according to the Schönbach (1980) taxonomy as a concession, excuse, justification, or refusal. A fifth classification option, "limited account," was added to classify observations where the firm did not release an account in the originally published article. For articles coded "limited account," an additional set of steps was incorporated, identified in Fig. 1, to ensure that additional resources were searched prior to making the final determination of limited account. Specifically, an internet search was done to identify other articles reporting on the same crisis. The top three search results were investigated to determine if an account was provided in another article. If an account was provided in another article, this account was used. If no account was found in other articles, the company website press release section was visited to determine if the company issued a press release discussing the event. If an account was provided in the company press release, this account was used. After this additional investigation, seven observations were recoded from "limited account" to one of the other four account classifications.

The two primary coders were used to establish agreement on the categorization of the account communication. Each coder was instructed to code each article into only one account category. After initial coding, the two primary coders agreed for 63 percent of the total sample. For the remaining 37 percent of the sample, the two coders did not agree on the account classification, and the secondary coder's classification was considered. For cases of disagreement between the primary coders, coding responses were matched to the secondary coder's classification. Similar to other studies' coding categorical variables (Stapleton et al., 2006; Tulsky et al., 1995), the secondary coder's classification aligned with one of the two other coders, and served as the tie-breaker for another 31 percent of the total sample. If all three coders disagreed, a formal negotiated coding process was used among all three coders to discuss the article, and the account and then reconcile differing perspectives. Negotiated coding is a process in which each coder can defend their coding classification with additional explanation, and potentially change their coding response based on additional detail (Garrison et al., 2006). For example, a list of twelve articles and coding responses was provided to each coder where there was 100 percent disagreement. Each coder provided a written response to either defend their position or shift their classification after reading the classification and rationale of the other coders. The coders highlighted the account within the article and offered rationale for the positions. A statement provided by one coder was: "This is a refusal because [...] denies the occurrence of a negative untoward event." This negotiated coding process was used to resolve disagreement and classify the remaining 6 percent of the sample.

5.3. Interrater reliability

Interrater reliability was conducted as part of the study to ensure that the communication was coded consistently and accurately. Interrater reliability is defined as a process where independent coders evaluate a characteristic of a message and arrive at the same conclusion (Lombard et al., 2002). To assess the level of interrater reliability in this study, Cohen's kappa (Ķ) and Krippendorff's alpha (α) were used. Both measures are considered conservative measures of interrater reliability and adjust for the likelihood that raters could agree by chance (Krippendorff, 2004). Cohen's Ķ interrater reliability revealed that the two primary coders were aligned with a Ķ value of 0.54, which was statistically significant at the 0.01 level. For robustness purposes, Krippendorf's α also was used to measure the reliability of all three coders. Krippendorff (2004) identified three types of reliability that should be assessed: reproducibility, accuracy, and stability. Reproducibility refers to the measure of coding errors among coders; accuracy refers to difference between the coding and a defined standard; and stability refers to coding that is consistent over time. In this study, training in the form of sample coded observations was provided for primary and secondary coders to ensure the highest level of accuracy. In addition, all the coding was done at the same time to ensure stability over time. As a result, reproducibility was the primary measure assessed to ensure that there was a high level of consistency among the three coders. Krippendorff's α was generated using the KALPHA macro in SPSS version 24 (Hayes and Krippendorff, 2007). After the negotiated coding, the Krippendorf's α was 0.79. In social sciences research, 0.75 traditionally is considered the threshold for acceptable reliability (Milne and Adler, 1999). As a result, this study met acceptable standards of reliability.

The coding distribution by account is reported in Table 2. In total, the 204 articles in the sample were coded into one of the five different categories. The number of observations was distributed as concession account totaling 42 observations (20.59 percent), excuse account

Table 2
Sample distribution by account classification (frequency, percent, and cumulative percent).

Account	Frequency	Percent	Cumulative percent
Concession	42	20.59	20.59
Excuse	39	19.12	39.71
Justification	26	12.75	52.46
Refusal	39	19.12	71.58
Limited Account	58	28.43	100.00
Total	204	100.00	

totaling 39 observations (19.12 percent), justification account totaling 26 observations (12.75 percent), refusal account totaling 39 observations (19.12 percent), and limited account totaling 58 observations (28.43 percent).

The sample was divided into two groups based on whether the firm offered an account placing blame on its supplier. Issuing blame on a supply chain partner can potentially signal that the firm is not responsible and should not be liable. Table 3 shows that 21.07 percent of the firms (43) in the sample placed blame on their supply chain partners, and 78.92 percent of the sample (161) did not.

5.4. Control variables

Past research has investigated whether endogenous and exogenous variables moderate the firm's abnormal return after a supply chain disruption. All six control variables used in this study (time, net income, sales, debt to equity, market to book value, and industry) have been found to influence the abnormal return in past studies (Filbeck et al., 2016; Hendricks and Singhal, 2003; Kumar et al., 2015) and were included as control variables in this study.

5.4.1. Time

Time was used as a control variable to test the potential change in abnormal returns over time because this variable also was tested by Hendricks and Singhal (2003). Their hypothesis proposed that because of the competitive environment, the negative abnormal return should be greater over time. A more competitive environment must be balanced with a present-day organizations' increased ability to diagnose and react to a crisis more quickly (Jüttner and Maklan, 2011). Each observation in the sample was given a number corresponding with the year the crisis occurred, from 1 through 17, corresponding to 2001 to 2017.

5.4.2. Net income, debt to equity, market to book value

Past research has found that the past financial performance, asset values, and financing structure impact the risk of a firm and the underlying value of the assets (Brown and Warner, 1980). As a result, a disruption further escalating risk for the firm is likely to impact firms differently based on past financial performance and financing structure. Thus, net income, debt to equity, market to book value, and industry were variables retrieved from the Center for Research and Security Prices (CRSP) database. After executing a query for the 204 observations, the CRSP system generated a report with 176 of the 204 observations (86 percent). The report did not include 29 observations because these firms either were delisted due to bankruptcy or acquisition, or did not have sufficient historical data to meet the minimal reporting threshold.

The data reported in Table 4 illustrates the descriptive statistics for the continuous variables in the study. The first observation was that the sample varied because of observations not included in the Center for Research and Security Pricing (CRSP) and Wharton Research Data Services (WRDS) databases. The CRSP report returned values for 176 of the 204 observations in the study for income, debt to equity, and market to book value. A total of 22 firms had missing or non-reported data. In addition, the WRDS report returned between 164 and 170 observations out of 204 observations, depending on the event window. The missing observations reflect firms that were no longer publicly traded after the crisis or did not have the minimum number earnings or returns values to be reported in the database. Because of the missing data, listwise deletion was used to account for any missing dependent variable observations (abnormal return values), and pairwise deletion was used to account for any missing control variables observations.

Table 3
Descriptive statistics: Blame.

Disruptions involving Blame	Number of Observations
Blame	43
No Blame	161
Total	204

Table 4
Descriptive statistics: Continuous variables.

Variable	*N* (Sample)	Mean	*SD*	Minimum	Maximum
Time	204	12.72	4.227	1	17
Net_Income ($)	176	346,329	2,549,250	−30,860	19,600,000
Debt_to_Equity	176	1.081	2.039	−11.775	14.091
Market_to_Book	176	5.219	10.002	−45.241	76.441

5.4.3. Industry

Evidence suggests that disruptions impact industries differently (Hendricks and Singhal, 2003; Zhao et al., 2013). To control for the industry impact, the four-digit industry Standard Industrial Classification (SIC) code for each firm was retrieved from CRSP. Each firm was classified into one of eight SIC industry ranges similar to the Hendricks and Singhal (2003) methodology as referenced in Table 5. Each observation was coded into the respective dummy variable category, and coded as 1 if belonging to the respective industry category and 0 if otherwise, with Industry 8 as the baseline. The SIC code information was not available for 21 firms because of missing or non-reported data in CRSP.

5.5. Event study methodology

This research used an event study methodology to collect stock price data. An event study is a valid measure of an event's financial impact if three assumptions are satisfied: 1) markets are efficient, 2) the event was unanticipated, and 3) no confounding events occurred within the event window (McWilliams and Siegel, 1997). The first assumption relies on the premise of market efficiency (Bowman, 1983; Brown and Warner, 1980) and dictates that prices of individual securities will adjust quickly and appropriately to reflect any information that is publicly available, resulting in abnormal positive or negative returns (Fama1998). The second assumption is that the event must be unanticipated. Anticipated events have the potential to result in a reaction prior to the official announcement. When the event is unanticipated, the magnitude of the abnormal performance is a more direct measure of the impact of the event. Finally, the approach taken in this study controlled for

Table 5
Descriptive statistics: Industry.

SIC Code	Industry Category	Number of Observations
0001 to 1999	Industry 1 (agriculture, natural resources)	6
2000 to 2999	Industry 2 (food, tobacco, textiles, lumber wood, furniture, paper, and chemicals)	53
3000 to 3569 or 3580, 3659, 3800, and 3999	Industry 3 (rubber, leather, stone, metals, machinery, equipment)	15
3570 to 3579 or 3699, 3760, and 3789	Industry 4 (computers, electronics, communications, defense)	23
3700 to 3759 or 3790, and 3799	Industry 5 (automobiles, airlines, transportation)	52
4000 to 4999	Industry 6 (logistics, supply)	1
5000 to 5999	Industry 7 (wholesaling products, retailing products)	26
6000 to 9999	Industry 8 (products for government, products for service organizations/ financial services)	7
Total		183

Note: $n = 183$.

confounding events using best practices. A confounding event is any other event that happens within the event window that also could influence changes in stock price for the individual security. To isolate the impact of the event that is being studied, best practices for short-term event studies dictate that firms with confounding events be removed from the sample (McWilliams and Siegel, 1997). Three observations were removed from the sample due to earnings announcements, and one firm was removed from the sample due to an announcement of an acquisition.

In this study, we used a market model for estimating the CARs. According to Ding et al. (2018), the market model has consistently (25/29 of event studies) been used within OSCM literature. Other more sophisticated models are discussed in the literature, such as the Fama-French four-factor model (Carhart, 1997), but the "relative improvement is conservative" and "usually yield similar results to the market model" (Ding et al., 2018, p. 340). In addition, Fama-French four-factor model (Carhart, 1997) is preferred when there are clusters in the data set or when big and small stock portfolios need to be controlled for. In this study, accounting for clustering and big/small portfolios was not necessary. As such, we used the market model.

The relationship between the return of an individual investment and the market portfolio can be specified as:

$$r_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \text{ with}$$

$$E(\varepsilon_{i,t}) = 0 \text{ and } var(\varepsilon_{i,t}) = \sigma_{\varepsilon i}{}^2,$$

where $r_{i,t}$ is the return of the particular investment i at time t, $R_{m,t}$ is the corresponding market portfolio return, $\varepsilon_{i,t}$ is the zero mean disturbance, and α_i and β_i are estimated for each investment over the respective time horizon. The abnormal return $A_{i,t}$ for each investment i at the event day t is then obtained.

$$A_{i,t} = r_{i,t} - \left(\widehat{\alpha}_i + \widehat{\beta}_i R_{m,t}\right)$$

We calculated the market return ($R_{m,t}$) using the market model and the dominant index in the country where the stock was publicly traded, similar to past OSCM event studies (Ding et al., 2018). In this study, we used the Standard and Poor's (S&P) 500. This market model has proven to be effective in capturing the return attributed to the event by controlling for systematic risk of the individual stock and the change in overall market movements (McWilliams and Siegel, 1997).

Because we had multiple stocks in our sample, we calculated the mean Cumulative Abnormal Return $\overline{CAR}\ (t_1,t_2)$ using the $CAR_i\ (t_1,t_2)$ abnormal returns over the event window (t_1,t_2) where t_1 is day 0 and t_2 is day 1 for securities i = 1, …, N as follows:

$$\overline{CAR}_{(t1,t2)} = \frac{1}{N}\sum_{i=1}^{N} CAR_i(t_1,t_2)$$

Given there is no clustering among the securities, we can safely assume independence among $CAR_i\ (t_1,t_2)$, and the covariance across the various securities to be zero. As such, the $\overline{CAR}_{(t1,t2)}$ distribution follows:

$$\overline{CAR}_{(t1,t2)} \sim N\left[0,\ var(\overline{CAR}\ (t_1,t_2)\right],$$

where

$$var\left(\overline{CAR}_{(t1,t2)}\right) = \frac{1}{N^2}\sum_{i=1}^{N}(t_2 - t_1 + 1)\sigma_{\varepsilon_i}^2$$

We can specify a t-test for H_1 as follows:

$$t' = \frac{\overline{CAR}\ (t_1,\ t_2)}{var(\overline{CAR}\ (t_1,t_2))} \sim N\left(0,\ 1\right)$$

and t-test for H_2 as follows:

$$t' = \frac{\overline{CAR}_1(t_1,\ t_2) - \overline{CAR}_2(t_1,\ t_2)}{\sqrt{\frac{var\ \overline{CAR}_1(t_1,\ t_2)}{n_1} + \frac{var\ \overline{CAR}_2(t_1,\ t_2)}{n_2}}} \sim N(0,\ 1)$$

whereby $\overline{CAR}_1$ is the cumulative abnormal return for concession with a corresponding sample size of n_1 and $\overline{CAR}_2$ is the cumulative abnormal return for concession for all other account types with a sample size of n_2. Similarly, we can obtain t-values for H_3–H_6.

Table 6 and Fig. 2 illustrate the parameters of the study, showing the estimation period beginning 300 days prior to the disruption and ending 15 days prior to the disruption. The hypotheses were tested using a two day event window (0, 1), similar to the majority of other short-term event studies published in top OSCM journals (Ding et al., 2018). As an additional measure of sensitivity and aligning with other event studies, three other event windows were tested ([−5, 5], [−3, 3], [−1, 1]) in a post hoc analysis to test the robustness of the results. Based on the event window specified, the window opened either five days prior to disruption, three days prior to the disruption, one day prior to the disruption, or on the day the disruption occurred. Similarly, the event window closed five days, three days, or one day after the disruption occurred. Excluding the disruption occurring on day 0, the event windows consisted of a total 10-day window, six-day window, two-day window, and one-day window. Consistent with past event studies in operations management, a minimum of 40 returns was needed for the observation to be included in the sample, and when the announcement was made on a non-trading day or after the market closes, the next trading day was used as Day 0 (Filbeck et al., 2016; Hendricks et al., 2009; Kumar et al., 2015; Schmidt and Raman, 2012). We collected the data using the Wharton Research Data Services Package WRDS database, and the event study application was used to obtain stock return data.

5.6. Dependent variable (cumulative abnormal return)

To collect our data, we ran four different reports to collect returns data for our four different event windows. Using the date when the crisis occurred and the ticker symbols for U.S. firms, returns data from each of the four reports then were consolidated into a single document to be used as the dependent variable in the study. The aggregate descriptive statistics are reported in Table 7 as dependent variables. The CARs among the different event windows ranged from −1.762 percent for the (−5, 5) window to −0.989 percent for the (−3, 3) window, with a CAR of 1.675 at the (0, 1) window.

6. Analysis and results

The results of the event study are reported in Table 8. The abnormal returns were tested to determine if the cumulative abnormal return mean and median for each of the four event windows was significantly different than zero. The null hypothesis was that the abnormal returns were the same as the expected market returns. Aligning with past event studies published in OSCM literature, three statistical tests were performed to determine whether the stock returns for the firms in the sample were significantly different from zero. These tests included: the one sample t-test, the Wilcoxon signed-rank test, and the one sample binomial test (Ding et al., 2018). First, the classic t-test, used in 55

Table 6
Event study window parameters.

Day	Parameter
−300	Estimation Start
−15	Estimation End
0 (and −5, −3, −1)	Event Window Start
0	Disruption Announcement
1 (and 5, 3)	Event Window End

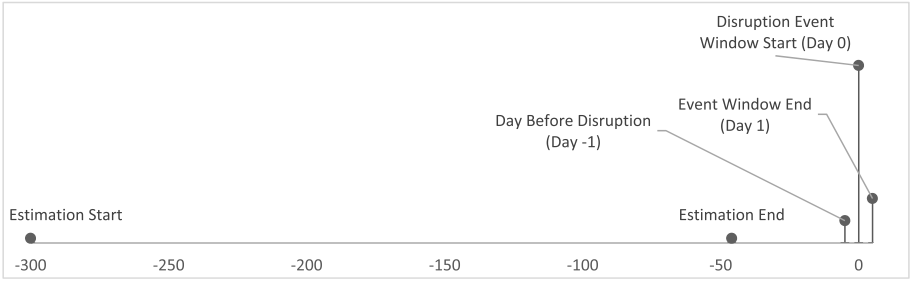

Fig. 2. Event study timeline.

Table 7
Abnormal returns descriptive statistics by event window.

Variable	Observations	Mean	*SD*	Minimum	Maximum
CAR (0, 1)	166	−1.68%	0.05	−2.82%	9.32%
CAR (−1, 1)	165	−0.99%	0.04	−2.61%	7.53%
CAR (−3, 3)	164	−1.22%	0.06	−2.56%	16.65%
CAR (−5, 5)	170	−1.76%	0.07	−3.30%	15.14%

percent of short term event studies, allows a researcher to analyze the probability that the mean values of each sample are significantly different than zero. Next, the Wilcoxon signed rank test, a nonparametric test, was used to determine if the median values are significantly different than zero. Finally, the binomial sign test was conducted to analyze whether the negative return values were significantly different than zero.

The mean CAR values for the sample were fairly consistent across the four event windows with a CAR of −1.68 percent associated with the (0,1) window. The *t*-tests revealed that the mean returns associated with each window were significantly different than 0 at the 1 percent level (two-tailed) for each event window, except for the (−1, 1) time window, which was significantly different from zero at the 5 percent level. Next, the Wilcoxon signed-rank test was performed to determine if the median return for each sample was significantly different than zero. The results of the test illustrated that the median CARs for the samples ranged from −1.21 percent at the (−5, 5) window to 0.41 percent at the (−1,1) window. The median CAR for the (0, 1) window was significantly different than zero at the 1 percent level, the median CAR value for the (−5,5) window was significantly different than zero at the 5 percent level, and the median CAR value for the (−1, 1) window was significantly different than 0 at the 10 percent level. Finally, the binomial sign test revealed that the percent negative returns for the (0,1) and (−1, 1)

Table 8
Abnormal returns (mean, median, and percentage negative).

Event Days	*N*	Mean	*t*-value	Median	Wilcoxon Sign Rank (z-statistic)	percent Negative	Binomial Sign Test (z-statistic)
(0, 1)	166	−1.68%	−4.17***	−0.67%	−3.60***	59.39%	2.16**
(-1, 1)	165	−0.99%	−2.25**	−0.41%	1.64*	58.18%	2.02**
(-3, 3)	164	−1.22%	−2.41***	−0.68%	1.23	55.48%	1.01
(-5, 5)	170	−1.76%	−3.28***	−1.21%	2.49**	63.53%	2.64***

*p <.10, **p < .05, ***p <.01, one-tailed test.

Table 9
T-test cumulative abnormal return account comparison.

	H_2 Concession	H_3 Excuse	H_4 Justification	H_5 Refusal	H_6 Blame
***n* (0, 1)**	31	30	20	34	37
Hypothesis Result	**Confirmed**	Not Confirmed	Not Confirmed	**Confirmed**	**Confirmed**
Mean abnormal return	−3.143%	−1.107%	−3.323%	0.633%	0.641%
t-value	2.085**	0.189	1.276	−3.414***	−4.129***
Median abnormal return	−2.202%	−0.122%	−0.902%	0.741%	0.715%
Wilcoxon Sign Ranked Test (z-statistic)	3.123**	1.131	1.466	−3.419***	−4.616***
Coronado Rank Test (z-statistic)	2.117**	1.101	1.642	−3.122***	−4.214***
***n* (-1, 1)**	33	30	18	34	36
Mean abnormal return	−2.398%	−0.193%	−3.199%	0.888%	1.150%
t-value	−1.472*	−1.287	2.707***	−2.963***	−4.160***
Median abnormal return	−1.625%	−0.241%	−0.435%	0.804%	0.926%
Wilcoxon Sign Ranked Test (z-statistic)	1.412*	0.474	1.141	3.214***	5.616***
Coronado Rank Test (z-statistic)	1.399*	0.412	1.154	3.412***	5.214***
***n* (-3, 3)**	29	30	19	34	38
Mean abnormal return	−1.498%	−1.194%	−3.218%	1.024%	0.742%
t-value	0.289	0.629	1.440	−2.323***	−2.8158**
Median abnormal return	−0.685%	−1.187%	−1.277%	1.299%	0.940%
Wilcoxon Sign Ranked Test (z-statistic)	0.414	0.451	0.646	5.445***	2.334**
Coronado Rank Test (z-statistic)	0.462	0.456	0.622	5.115***	2.412**
***n* (-5, 5)**	34	31	19	35	37
Mean abnormal return	−2.327%	−2.445%	−1.339%	0.488%	−0.212%
t-value	0.744	0.646	3.145%	−2.4313**	−1.6373*
Median abnormal return	−0.943%	−2.449%	0.803%	−0.188%	0.420%
Wilcoxon Sign Ranked Test (z-statistic)	0.515	0.331	0.141	0.689	1.568*
Coronado Rank Test (z-statistic)	0.519	0.333	0.157	0.664	1.545*

*p < .10, **p < .05, ***p < .01, one-tailed test.

windows were significant at the 5 percent level, the (−5, 5) window was significant at the 1 percent level, and the (−3, 3) window was significantly different from zero at the 10 percent level. Collectively, the results of the *t*-test, the Wilcoxon signed-rank test, and the binomial sign test showed that the market reacts negatively to announcements related to supply chain crisis events for all four event study windows, and our results hold up to mean and median significance tests. These findings align with Hendricks and Singhal (2003) and confirm H1.

Prior to comparing the samples, mean and median CAR values were generated for each of the account categories, as reported in Table 9. The mean cumulative abnormal returns across the four different account categories and the blame variable offered the opportunity for interesting comparisons. First, as expected, most of the account categories were associated with negative abnormal returns; however, both the refusal account category and the blame variable were associated with slightly positive returns for the first three event windows (0,1), (−1,1), (−3,3). The next step was to determine whether the differences in abnormal return were statistically significant.

To test our hypotheses and to determine whether the CARs associated with the five categories were significantly different from the rest of the sample, we ran five t-tests for each of our four event windows (20 *t*-tests total). The results of the t-tests are presented in Table 9 with the hypotheses of the study tested using the (0,1) window. The results show that three of our five hypotheses were confirmed. The concession account was associated with significantly lower CAR values at the 5 percent level, and the refusal account and the accounts using blame were associated with significantly more positive CAR values at the 1 percent level. As we increase the length of our event study window to 3 days (−1,1), 7 days (−3,3), and 10 days (−5,5), we have similar categorical significance that is not as pronounced over time. In addition, we also ran non-parametric tests to test the robustness of our results using median values (Wilcoxon Sign Ranked Test and Coronado Rank Tests). The results of these tests also indicated that our median CAR values associated with the concession account was significant at the 5 percent level, and the median CAR values associated the with the refusal account and the account blame variable were significant at the 1 percent level.

Table 10 reports the significance of the control variables. Of the five control variables used in this study, four of the variables (time, net income, debt to equity, and market-to-book value) were used as continuous variables. Industry classification was coded as a dummy variable. The only control variables that were significant for our hypothesis window were net income and debt to equity. As a robustness test, we compared the net income and debt to equity values across associated with each account to the rest of the sample using t-tests. We did not find any net income or debt to equity differences across the account categories, providing a higher level of confidence that the relationship between the account and the abnormal return is not the result of external factors.

Table 10
Regression results: Control variables (model 1-model 4).

Control Variable	Model 1 Dependent Variable *CAR (0,1)*	Model 2 Dependent Variable *CAR (-1,1)*	Model 3 Dependent Variable *CAR (-3, 3)*	Model 4 Dependent Variable *CAR (-5, 5)*
Time	0.000	0.000	0.001	0.004
	(0.451)	(0.662)	(0.114)	(0.002)***
Industry 1	0.013	0.032	0.017	0.039
	(0.632)	(0.143)	(0.596)	(0.224)
Industry 2	0.015	0.007	0.028	0.029
	(0.404)	(0.673)	(0.203)	(0.176)
Industry 3	−0.005	−0.015	−0.013	−0.027
	(0.831)	(0.427)	(0.643)	(0.294)
Industry 4	0.025	0.033	0.040	0.033
	(0.210)	(0.045)	(0.112)	(0.163)
Industry 5	−0.002	0.003	0.028	0.038
	(0.921)	(0.853)	(0.215)	(0.080)*
Industry 6	0.013	0.018	0.031	0.053
	(0.805)	(0.694)	(0.644)	(0.417)*
Industry 7	0.028	0.021	0.029	0.054
	(0.148)	(0.189)	(0.224)	(0.023)***
Net_Income	0.000	0.000	0.000	0.000
	(0.041)**	(0.079)*	(0.050)*	(0.098)**
Debt_to_Equity	0.010	0.000	0.004	0.000
	(0.070)*	(0.095)*	(0.283)	(0.005)***
Market_to_Book	−0.001	−0.001	−0.001	−0.002
	(0.149)	(0.207)	(0.481)	(0.033)***
Number of observations (*n*)	176	176	176	176
Model F Value	0.684	1.273	0.820	3.12***
R^2	0.050	0.090	0.061	0.189
Adjusted R^2	(0.023)	0.0193	(0.013)	0.129

*$p < .10$, **$p < .05$, ***$p < .01$. Two-tailed *p*-values are reported in parentheses.

7. Discussion

Supply chain disruptions and crisis situations are a serious threat for manufacturing organizations. As such, organizations invest considerable resources in preventing the occurrence of these events; yet, not all crisis situations can be avoided. As a result, organizations must find ways to effectively manage these crisis situations after they occur. Although the OSCM literature related to identifying and assessing proactive structural supply chain strategies is vast, limited research exists within the OSCM domain investigating supply chain communication after a crisis occurs. Using a sample of supply chain crisis events, we investigated the relationship between crisis communication and abnormal stock returns, and found that accepting less responsibility for the crisis leads to more positive short-term stock outcomes. This study is valuable because constructing an optimal message after a crisis requires little investment. Given the relationships found in this study, organizations would be wise to understand how offering accounts with varying levels of responsibility result in different short-term stock changes.

Determining actual supply chain responsibility is difficult given the complexity of supply chains organizations. As such, organizations have a wide range of responsibility that they could accept for the supply chain crisis. Results of the study indicate that significant differences do exist between account categories and abnormal stock returns. Specifically, we found that CAR values associated with concession accounts were significantly lower than other account categories, and the CAR values associated with refusal and blame were associated with significantly higher CAR values. These findings aligned with our hypotheses. Our results also were confirmed by our finding regarding the blame variable. Instead of simply denying responsibility for the crisis, many firms also blamed another firm. In the short term, investors may have responded favorably, assigning blame along the chain as it further distances the firm from the crisis, and hence the potential liability.

We did not find the excuse or justification accounts to be associated with significant abnormal returns. Because excuse and justification accounts offer less direct explanations pertaining to level of responsibility that a firm accepts for the event, investors may perceive these accounts too ambiguous to act on. According to signaling theory, one of the key characteristics indicating a high-quality signal to investors is the clarity of the signal (Warner et al., 2006). Because both excuse and justification accounts could be interpreted differently, investors may perceive this to be a low-quality signal.

Given the controls that were used in the study, these findings are consistent across time and industry. We did find that higher levels of income tend to mitigate lower abnormal returns. This aligns with the body literature in operations and supply chain management demonstrating the importance of having slack resources to buffer supply chain shocks (Hendricks et al., 2009; Wood et al., 2017). Furthermore, similar to Zsidisin et al. (2016), the moderate and positive significance of our debt to equity coefficient indicates that firms in our sample with higher debt to equity values are associated with less negative abnormal returns,

given the more significant shock that debtholders (less significant for equity holders) absorb after the announcement of the disruption (Hendricks and Singhal, 2003).

7.1. Implications for research

Given the variance in prior event study findings relative to stock market returns, this study provides additional insights on how communication strategies can influence returns at the time of a supply chain crisis. Furthermore, this study provides interesting and new connections between the supply chain management and organizational communication literatures.

This is the first known study that applies the theory of impression management in a supply chain context, potentially opening new avenues for research. Although this theory has been used at both an individual and an organizational level, the results suggested that impression management also is generalizable to the supply chain context. The evidence from this study indicates that impression management can be a useful theoretical foundation to understand how organizations can issue accounts after a supply chain crisis to control the reactions of shareholders. As such, we have extended the supply chain body of knowledge by empirically testing the impact of crisis communication using the account giving taxonomy (Schönbach, 1980).

In the supply chain literature, Paulraj et al. (2008) propose inter-organizational communications as a relational competency that could yield strategic advantages for supply chain partners. It would be interesting to explore how impression management theory could be generalized from the organizational level to the supply chain level, where multiple partners coordinate in providing consistent messaging in times of a crisis. Furthermore, it would be interesting to examine how the account giving taxonomy (Schönbach, 1980) could be applied within the supplier-buyer context. Perhaps the account giving communication could be a prelude to a successful long-term relationships or superior strategic advantages.

7.2. Implications for practice

These findings can be relevant for firms and investors in several ways. In the short term, firms can minimize the negative impact to stock price by accepting less responsibility for the crisis and blaming another party for the crisis. There are obvious ethical implications associated with always aligning managerial decision making to optimize short-term market efficiencies (Ghoshal, 2005). In our study, establishing a culture of blame or deception could become an expedient way to deal with disruptions. If such patterns of blame or deception become commonplace, it could render their accounts less meaningful. Furthermore, research has shown that a firm suffers short-term and long-term financial losses when it is revealed that it has engaged in unethical behavior (honesty with the public) (Price and Sun, 2017; Rao and Hamilton, 1996).

From an investor perspective, investors who already are holding equity stakes in firms that faced a supply chain crisis and issued a concession should expect the equity to trade lower. An immediate sale could minimize losses. Similarly, investors holding equities in firms issuing a refusal account after a crisis should understand that the equity values are unlikely to trend significantly lower, as one would expect. Holding the equity is not likely to result in significant short-term losses.

Both firms and investors should be advised that the results of the study apply only to short-term returns. Across the four different event windows, the results were most significant at the (0,1) and the (−1,1) windows. As we increased the window, the results became less significant. Buying a dip in share prices on day 1 may provide short-term augmented returns for investors. However, leveraging our findings for long-term decision making needs to be made with care by both firms and investors. From a firm perspective, although denying responsibility and issuing blame may be an effective short-term strategy to improve the CAR, there could be negative long-term consequences associated with strained supply chain partnerships. There is an extensive body of literature that focuses on the long-term positive impact of supply chain collaboration associated with supply chain disruptions (Duong and Chong, 2020; Soosay and Hyland, 2015). Despite the short-term results of this study, we still advocate for a long-term collaborative approach. According to Corporate Social Responsibility (CSR) theories, when making decisions, managers must balance profits, political performance, social demands, and ethical values (Garriga and Melé, 2004). Several studies have found a link between corporate social responsibility and higher long-term stock returns (Dorfleitner et al., 2018) and long-term financial performance (Von Arx and Ziegler, 2014).

This research recognizes the dichotomy of short-term financial metrics (e.g., stock market) returns with longer-term supply chain outcomes (e.g., lead-times, total cost of ownership). A more balanced approach might be better for organizations and their supply chain partners.

7.3. Limitations and future studies

This research provides the first ever connection between event studies in OSCM and impression management communications. The focus of this study was to investigate associations between issued accounts and abnormal returns in the context of supply chain crises. Because the focus was only on the account provided, this study did not investigate whether the firm actually was responsible for the supply chain crisis. As a result, future studies could identify a proxy for actual responsibility, such as uncontrollable events including pandemic related shocks or legal judgements. Similarly, this study was conducted over a short window, and did not investigate supply chain recovery after the crisis. Many of the accounts provided offered clear recovery plans and timeframes for when the crisis was expected to be resolved. As such, an extension to this study would be to investigate whether the accounts provided were associated with different supply chain recovery timeframes or differences in long-term abnormal returns. A longitudinal study tracking stock performance over the longer term could offer insight into this research question. For example, it may be possible for a firm to manage impressions in the short-term only for investors to react more gradually to longer-term operating performance.

Furthermore, the time horizon for this study avoided the advent of the pandemic and other transformative events to not confound the results. The pandemic is alternating the very nature of underlying the supply chain structure: sourcing from new countries, moving away from JIT systems, and so on. In future studies, it would be interesting to explore how impression management communications strategies are being deployed when supply chains are morphing.

Investigating the specific news source was outside the scope of this study. An interesting future research project might be to investigate the impact associated with the type of news media channel releasing the communication. Different channels may result in different abnormal returns across social media, television, and print. Variables could be incorporated to investigate bias and whether articles written by certain media outlets are associated with different abnormal returns. Similarly, an interesting angle to investigate is whether the abnormal return changes based on who announces the disruption. Rather than waiting for a third-party news source to announce the disruption, firms could announce disruptions themselves. A proactive response may give firms more credibility with their stakeholders. Finally, we investigated only the impact of accounts that firms offered immediately after the disruptions. A firm could issue an account at a later point in time, or could change their account. This was outside of the scope of our study, but could be an interesting path for future research. Future research might examine the cumulative effect of communications following multiple disruptions over time based upon the impression management strategy. It is possible that assigning blame to other parties along the supply chain network would have a lesser impact, or even turn the tables and have a

negative impact on the returns.

8. Conclusions

For most manufacturing firms, supply chain crisis situations are inevitable. As a result, firms must focus on how to manage supply chain crises after they occur. The primary focus of our study was to investigate how firms use impression management communication after a crisis. Aligning with an attribution theory perspective, the hypotheses specified that firms would be able to manage the impressions of shareholders by refusing to accept responsibility for the crisis. As expected, the results of the study illustrated that, in the short term, firms see significantly less of a stock market decrease when they deny responsibility for the crisis, and significantly more of a stock market decrease when they accept responsibility for the crisis.

Declaration of competing interest

None.

Appendix

Table 11
Account definitions.

Variable	Definition	Distinguishing Characteristics
Concession	An admission that a violation has occurred	• Expressing regret • Issuing an apology • Offering compensation
Excuse	An admission that an event has occurred, but uses rationale to mitigate causal responsibility	• Introducing other external causes • Using rationale as an explanation
Justification	The acceptance of causal responsibility for the event, but the action was permissible or legitimate because of the circumstances	• Altering perception of the event • Increasing level of insistence on actions taken
Refusal	Limiting the responsibility or involvement in the crisis	• Denial the event in question occurred • Denial of involvement • Blaming another party

Note. Definitions adapted from Schönbach (1980); and Tata (2000b).

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