Supply chain involvement in business continuity management: effects on reputational and operational damage containment from supply chain disruptions

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'Supply Chain Involvement in Business Continuity Management: Effects on Reputational and Operational Damage Containment from Supply Chain Disruptions

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Abstract

Purpose: Does internal integration extend to business continuity and to managing supply chain disruptions? If so, do managers recognize the potential benefits of internal integration in such settings? Despite the voluminous literature on supply chain integration, evidence on its effectiveness on risk management and disruption response is scant. The purpose of this study is to assess the effectiveness of business continuity management (BCM) and involvement of supply chain in business continuity (SCiBCM) on reputational and operational damage containment in the face of supply chain disruptions.

Design/Methodology: This study draws on Simons' levers of control framework to explain how the involvement of supply chain in BCM affects firm capabilities in containing damages caused by major supply chain disruptions. We develop and test hypotheses by analyzing a large scale questionnaire responses from 448 European companies.

Findings: Results of our data analysis suggest that BCM improves reputational damage containment, while SCiBCM improves operational damage containment. Our findings also show that the significant effects of BCM and SCiBCM on reputational and operational damage containment respectively were amplified for the firms facing higher supply chain vulnerability. Post-hoc analysis further reveals the complementarity effect between BCM and SCiBCM for the companies exposed to high supply chain vulnerability.

Originality/Value: Evidence on the effects of BCM and its internal integration on performance is limited. This study offers empirical evidence on the topic. Also, while supply chain integration can

improve information sharing and coordination, some may not fully recognize its potential benefits in addressing supply chain disruptions. This study theoretically and empirically demonstrates the role played by internal integration, in the form of SCiBCM, in improving organizational damage containment efforts.

1. Introduction

Much is written about the benefits of integrating supply chain functions with other firm activities (Swink and Schoenherr, 2015, Flynn et al., 2010). Much less is known about the possibilities of integrating supply chain activities in risk management efforts. This is despite the fact that risk management literature has emphasized the need to consider a broader and more integrated view of risks facing companies (Wilding et al., 2012).

Business continuity management (BCM) is the holistic management program for identifying risks that could impact continued operations and providing a structure for developing capabilities in effective mitigation and response to disruptions (Blos et al., 2012, Engemann and Henderson, 2011). BCM provides a systemic framework, in which the firm's mitigation practices and contingency tools can be developed, improved, and tested (Kildow, 2011, Blos et al., 2009). However, evidence in support of the effectiveness of BCM, or its integration with other functions, is not well-substantiated (Gosling and Hiles, 2009). For managers, risk management programs such as BCM can be investments similar to an insurance policy: they seem to provide dividends only when faced with disruptions (Engemann and Henderson, 2011). Theoretical arguments regarding the benefits or hindrances of BCM seem mixed, and absent of sound basis (Lindstedt, 2007).

Supply chain involvement is the extent of inclusion of functions engaged in supply chain management with other firm activities (Table 1). As a form of internal integration, supply chain involvement in BCM can offer a broader and informed picture of firm processes and objectives in

risk-related efforts. Given the importance of integrated risk management, identifying how supply chain involvement in BCM can provide benefits is important considerations. However, supply chain involvement in BCM can not only be a costly endeavor but can also prove to be unrewarding (Zsidisin et al., 2005). Critics note that internal integration carries unanticipated costs and hinder organizational response to change (Turkulainen and Ketokivi, 2012).

The possible benefits of BCM, and supply chain involvement in BCM, can be particularly useful when facing major supply chain disruptions. Major supply chain disruptions are unanticipated interruptions in the flow of goods and information in the supply chain that, despite their relatively low probability, exert high damage on the company (Azadegan et al., 2019, Tomlin, 2006). On the one hand, supply chain involvement in response and recovery efforts can be effective during such events because of the central role played by the functions engaged in supply chain management. On the other hand, the additional resources placed in cross-functional meetings, command coordinating, and sharing team status from many functional groups may not be worth the effort (Homburg and Kuehnl, 2014). It is also important to recognize that risk management programs do not develop in isolation, but are heavily influenced by external factors (Finch, 2004). A key consideration in developing and using risk management programs is the organization's vulnerability to disruptions (Jüttner and Maklan, 2011). Focusing on major supply chain disruptions, we ask our research questions: *How do BCM, and supply chain involvement in BCM, help organizational efforts to contain the damaging effects of major supply chain disruptions?* As related to supply chain disruptions, the underlying determinants of supply chain vulnerability is the firm's predisposition to be exposed to, or to be susceptible to damage. We ask: *How do supply chain vulnerability, affect these relationships?*

--- Insert Table 1 About here ---

To explain the relationships noted above, we apply explanations provided by Simons' levers

of control framework (Simons, 1995, Simons, 1994). According to Simons, control systems can be diagnostic or interactive. We argue that as diagnostic controls, BCMs act as formal rules and proscriptions that help monitor and report on response and recovery efforts, which help contain the reputational damage caused by major supply chain disruptions. As interactive controls, supply chain involvement in BCM guides and intensifies response and recovery efforts and helps in containing the operational damage caused by supply chain disruptions. Based on these explanations, this research develops and empirically validates a set of hypotheses using three empirical studies. Study-1 uses questionnaire responses from 448 European manufacturers. Study-2 validates the results from the first study using vignette-based experiments conducted on 110 manufacturing managers and executives. Study-3 builds on the findings of the first two studies and offers evidence on how supply chain involvement in BCM *before* and *during* supply chain disruptions, help in limiting the operational damage by such disruptions. Study-3 uses vignette-based experiments conducted on 117 manufacturing managers and executives.

The work presented here offers multiple contributions to the literature. To our knowledge, except for three previous studies, evidence on the effects of BCM and its internal integration on performance is limited (cf. Ojha et al., 2013, Prud'homme, 2008, Azadegan et al., 2019). Given the ever-increasing attention on supply chain risk-related issues facing companies, explaining *how* firms can effectively address and limit their damages can provide important insight for practitioners and researchers. Second, while internal integration is highlighted as a useful venue for research, supply chain management research has generally neglected the topic; often because internal integration is overshadowed by interest in studying external supply chain integration (Flynn et al., 2010, Wieland et al., 2016). This study theoretically and empirically demonstrates the role played by internal integration, in the form of involvement by supply chain in BCM, in improving organizational response efforts.

2. Business continuity and supply chain management

BCM helps prevent, mitigate, respond to, and recover from actual disruptions (Gupta et al., 2016, Kleindorfer and Saad, 2005). As related to preventing and mitigating potential disruptions, specific activities within BCM, such as risk identification, and business impact analysis (BIA) help proactively address the risks facing a company before they lead to disruptions. As related to response to and recovery from actual disruptions, BCM includes activities that are meant to lessen the severity of damage from supply chain disruptions (Engemann and Henderson, 2011). For instance, a crisis response plan develops and documents actions necessary in response to disruptions (Engemann and Henderson, 2011). Response and recovery activities advocated by BCM take front and center stage during an actual disruption. Some consider these activities as the most important process in corporate public relations because they demonstrate firm capabilities at a time when the company is under heavy attention and direct scrutiny by its stakeholders. Indeed, for a business continuity manager, effective disruption management is based not only on how well response and recovery efforts are conducted but also in how well they are communicated (Wong, 2009, Lam, 2002) [1].

One way to make BCM more integrative is through supply chain involvement (Norrman and Jansson, 2004, Kildow, 2011, Leat and Revoredo-Giha, 2013). We define supply chain involvement in BCM as the extent of inclusion of supply chain and traditional business functions engaged in supply chain management in BCM. By relying on a broader understanding of risks that the company may face, supply chain involvement in BCM can aid in guiding and intensifying the company's ability to understand and to control the nature and level of risks taken (Braunscheidel and Suresh, 2009, Kildow, 2011). Specific to risk management, Zhao et al. (2013) find how supply

[1] Tables S-1-1 and S-1-2 (Supplement) provide a summary of how the literature views the shift in priorities as a result of the evolution in business continuity. Table S-1-3 (Supplement) offers a summary of the literature on business continuity in supply chain settings.

chain integration limits the effects of upstream supply chain risk on firm performance. However, while many have stressed the importance of supply chain risk management (e.g., Zhao et al., 2013, Tummala and Schoenherr, 2011, Finch, 2004), empirical research that offers a rigorous and thorough assessment of the effectiveness of integrated BCM that involves the supply chain business unit is still scarce.

Two particular observations surface from the literature review. First, empirical research on how well integration of BCM with other functions such as supply chain can limit the damaging effects of disruptions is scant. Damage to operations is particularly concerning because operations encompasses the fundamental activities of any enterprise that fulfill customer expectations. The second is damage to the organization's reputation. Reputational damage, in the form of loss of goodwill or credibility, as well as political or corporate embarrassment, can have detrimental effects on the firm's viability (Petersen and Lemke, 2015, Hiles, 2010). Research has yet to empirically test the effect of external factors on BCM and its integration with other functions. In the upcoming sections, we offer theoretically-based explanations that differentiate between how BCM, and supply chain involvement in BCM, contain operational and reputational damage.

3. Theory and hypotheses

BCM and supply chain involvement in BCM are risk control mechanisms. Control mechanisms are information-based routines and procedures used to maintain or alter patterns in organizational activities (Simons, 1994). According to Simons' Levers of Control framework, diagnostic controls are formalized procedures that are primarily used for "score-keeping" (Bühler et al., 2016). Interactive controls aim to empower the organization by "focusing attention" on what important objectives are to be accomplished (Bühler et al., 2016). In line with how diagnostic controls are defined, BCMs act as feedback systems that specify procedures and safeguards for information handling, recordkeeping and correcting deviations during response and recovery. In

line with how interactive controls are defined, supply chain involvement in BCM helps guide and intensify the incorporation of risk management during response and recovery through enhanced engagement (Pavlov and Bourne, 2011). Rising supply chain vulnerability extends the need for addressing uncertainty and ambiguity in the firm's operating environment (Pich et al., 2002). As will be detailed below, we argue that supply chain vulnerability extends the effectiveness of BCM and supply chain involvement in BCM in containing the damage from major supply chain disruptions.

3.1 BCM and reputational damage containment of supply chain disruptions

Reputation is the stakeholders' perception of the image, status, and popularity of a company (Lindgreen et al., 2009, Petersen and Lemke, 2015). Major supply chain disruptions are often chaotic and confusing situations that can stakeholders to speculate about the cause and effects of the disruption on the company (Kim and Cameron, 2011). Internally, what aspect of the damage to prioritize, where to allocate resources, and what matters to postpone can be difficult to determine. Externally, the effectiveness of the company's response and recovery efforts is undetermined and thus subject to interpretation. Effective crisis communication can help limit speculations, prevent damage to the company's brand equity, and reverse possible reputational loss (Benoit, 1995).

BCM can help with effective communication. BCM allows for the firm to quickly understand the cause and scope of damage (Greyser, 2009). With well-developed hazard assessment, business impact analysis, and crisis management plans, the company is able to swiftly decipher facts, frame the scope of the damage, and develop an accurate message in anticipation of what external constituents may need (Elliott et al., 2010). BCM allows the firm to effectively monitor the response and recovery activities. Crisis response plans developed as part of BCM can help with the assessment of performance variables (i.e., recovery time objectives) to more promptly report on the response recovery progress (Henri, 2006), which help better predict what type of information to share with

others. BCM also helps with message clarity. Through better monitoring, BCM ensures that the company spokespersons are better informed about the impact of the disruption and its response efforts (Hiles, 2010). For instance, knowing that dedicated recovery facilities with workspace, equipment and telecommunications capabilities are ready to be used can help better articulate the situation to stakeholders and establish credibility. Also, common among BCMs is the inclusion of routinely scheduled status reports as part of crisis management plan (Engemann and Henderson, 2011). Such reports not only provide up-to-date (or up-to-the-hour) information with the company spokesperson, but also streamline information to what is important to share.

Policies established through BCM make it easier to not only better understand the situation caused by supply chain disruptions but also to more quickly and clearly report on them. In line with Simons' depiction of diagnostic controls (Simons, 1994), BCMs act as feedback systems that specify procedures and safeguards for information handling, recordkeeping and correcting deviations may help limit reputational damage of disruptions. Hypothesis 1 captures this argument:

> **H1** –*BCM is positively related to reputational containment of major supply chain disruptions.*

3.2 Supply chain involvement in BCM and damage containment

Supply chain involvement in BCM helps limit the operational damage from major supply chain disruptions by guiding the response and recovery efforts. For instance, supply chain involvement in BCM makes the company better aware of supply chain risks and threats, as well as its suppliers' risk management capabilities (Norrman and Jansson, 2004). As we noted earlier, the supply chain includes boundary-spanning activities that can offer a broader and systemic view of the effects of the disruption. It also includes activities that are fundamental to how the business provides value to its customers (Musson, 2007). When expertise from production, delivery, and

sourcing activities are embedded early in the recovery process, poor or incomplete scope of the disruption is avoided. In line with how interactive controls are defined (Simons, 1994), supply chain involvement in BCM helps broaden the scope of helps with faster recognition, diagnosis, and resolution of issues caused by the disruption, which helps guide and intensify the incorporation (Pavlov and Bourne, 2011).

Supply chain disruptions are distinct from operational disruptions in that they lead to measurable loss by more than one party in the supply chain (Azadegan et al., 2019). Without including the expertise offered by those engaged in supply chain management, it can be easy for the organization to disregard the ramifications of the disruption on its suppliers and customers. Instead, when the supply chain expertise is embedded in BIA (Business Impact Analysis), identifying the extent of the potential impact of the disruptions is broadened to consider the damage to suppliers, to customers and the company's relationship with these external constituents (Kildow, 2011).

Simons highlights how interactive controls help focus on managerial attention (Simons, 1994). Interactive controls encourage dialogue across functions by providing a framework for conference, and by enhancing information gathering across the organization. Supply chain involvement in BCM helps limit the damage of disruptions by intensifying the level of attention placed on the situation at hand. Through frequent and regular interactions, functional units can learn quickly that inadequately addressing the disruption can have important consequences. Such observations can lead to shared commitment and improved motivation in being involved in addressing the disruption. When information about response and recovery efforts are disseminated quickly, mistakes are easier to identify and corrections simpler to administer. Better guidance offered by supply chain involvement helps address deviations and correct the recovery path. In line with explanations about interactive controls, the coordinative role of supply chain management (Mentzer et al., 2001) suggests that supply chain involvement in BCM can help guide and intensify

risk management efforts in containing the operational damage caused by major supply chain disruptions (Pavlov and Bourne, 2011, Henri, 2006). Hypothesis 2 captures the above arguments:

> **H2 –** Supply chain involvement in BCM is positively related to operational containment of major supply chain disruptions.

3.3 Effects of supply chain vulnerability

We define supply chain vulnerability as the susceptibility and exposure of the company's supply system to disturbances that can lead to the obstruction of flows and to the breakdown of its operations (Jüttner and Maklan, 2011). Simons suggests that with rising uncertainty, the need for controls rise. That is, the higher the uncertainty associated with one's operating environment, the more monitoring is necessary to decipher useful information (Simons, 2000). BCM becomes more beneficial in containing the reputational damage of disruption with rising vulnerability. First, BCM includes a thorough assessment of organizational vulnerabilities. A cornerstone step in the business continuity program is a business impact analysis (BIA). BIA identifies how much resource is needed to protect or recover – and how quickly it can re-establish its critical functions (Kildow, 2011, Zsidisin et al., 2005). Second, BCM offers policies and procedures that help clarify information about the availability of resources that can be used for response and recovery efforts. As we noted earlier, detailed documentation, prioritization of activities and consensus on a company's critical functions help focus organizational efforts on what is necessary. Such understanding can help provide a more accurate and timely assessment of the progress in response and recovery efforts. Finally, the assurance provided by the information from BCM allows managers to concentrate on positioning their message to stakeholders and employees to focus on the response and recovery efforts that help contain the damage from supply chain disruptions. Procedures that clearly differentiate between constructive communications and those that are

potentially damaging to company reputation can offer important lines of defense for those operating in high vulnerability settings (Blos et al., 2009). In line with Simons' explanations on the effectiveness of diagnostic controls under uncertainty (Simons, 1994), with rising supply chain vulnerability, the need for accurate information rises, leading to BCM to have a more positive effect on containing the reputational damage from major supply chain disruptions. Therefore:

H3a – Supply chain vulnerability amplifies the effects of BCM on containing the reputational damage of major supply chain disruptions.

With rising vulnerability, it becomes more difficult to know what information is necessary, where to collect accurate information from or how to correctly interpret the observations (Schrader et al., 1993). These effects can be reduced through integration mechanisms that establish common meaning among those involved (Pich et al., 2002). Among the most beneficial aspects of internal integration is better information flow. Supply chain involvement in BCM helps with information flows through improving information transparency, and exchanging information across organizational functions that are involved in the response and recovery efforts. For instance, supply chain involvement in BCM includes supply chain risk planning activities that include supplier monitoring and information exchange with suppliers (Wagner and Neshat, 2012).

Second, the boundary-spanning (i.e., inter-organizational) information insights offered by supply chain involvement in BCM helps provide more clarity to the response and recovery road-map to develop a better analytical baseline and thus a better diagnosis of the issues caused by major supply chain disruptions and how to tackle them. In line with Simons' depiction of integrated controls in uncertain settings (Simons, 1994), the involvement of supply chain in BCM provides a clearer view into the challenges that supply chain vulnerability may cause, thereby limiting the effects of major supply chain disruptions. Therefore:

H3b –Supply chain vulnerability amplifies the effects of supply chain involvement in BCM on containing the operational damage of major supply chain disruptions.

4. Data collection and data analysis

To capture the effects of BCM and supply chain involvement in BCM on disruptions, we apply a multi-method approach. In Study-1, we analyze questionnaire responses from companies. In Study-2, we use vignette-based experiments to validate the findings from Study-1 and offer nuances about managerial assessment on supply chain involvement in BCM. In Study-3, we extend the findings from Study-1 and Study-2 using vignette-based experiments to evaluate the effects of *pre-disruption* supply chain involvement in BCM (i.e., involvement before a disruption occurs) and *intra-disruptio*n supply chain involvement in BCM (i.e., involvement while a disruption is occurring). The three studies are detailed below.

4.1 Study-1 – Cross-sectional survey of manufacturing firms

This research focuses on questions that required collecting data about organizational capabilities (i.e., BCM and supply chain involvement) and performance (i.e., operational and reputational damage containment) when facing supply chain disruptions. To our knowledge, there are no publicly available data sets that collect such data. In Study-1, we developed a questionnaire to help collect and analyze data from qualified managers about their companies. The questionnaire was developed with insight from academic and professionals in supply chain management and business continuity. It was pilot tested in multiple ISM (Institute for Supply Management) regional conferences [2].

4.1.1 Study-1 Measures

Independent variables. To the extent possible, we used existing measures from prior studies. Given the novelty of empirical research in business continuity in general, and as related to supply chain

[2] Details of the sampling frame for Study-1 are outlined in the Supplement document.

management in particular, some new measures were necessary. We relied on extant literature and close engagement with academic experts and practitioners. We measured BCM using five items in line with previous measurements proposed and used in business continuity literature (Kildow, 2011, Revilla and Saenz, 2014, Zsidisin et al., 2005). Our questions asked about the extent of consideration given to hazard assessment, the extent of consideration given to business impact analysis, how thoroughly the company's recovery plans are developed, how often plans are tested and the extent of involvement by personnel and executives in BCM.

We measured supply chain involvement in BCM using a four-item scale proposed by Kildow (2011; Appendix A). The questions asked about the extent of inclusion of supply chain management in BCM activities. Supply chain vulnerability is defined as the firm's susceptibility and exposure to potentially damaging events (Gualandris and Kalchschmidt, 2015, Cardona, 2004, Wagner and Bode, 2006). In line with this depiction, we measured supply chain vulnerability using a four-item construct that considers the factors and how they make the company susceptible to major man-made or natural supply chain disruptions.

Dependent variables. Our interest was in how well response and recovery efforts helped contain (i.e., limit) the damaging effects of a major disruption on operational and reputational performance. We label these as *operational containment* and *reputational containment*. As noted earlier, supply chain disruptions are different from operational ones because they cross-organizational boundaries by affecting multiple entities (Azadegan et al., 2019, Lukina et al., 2018). To make sure that respondents are attuned to our definition of major supply chain disruption, we offered a number of examples that explained the type of major supply chain disruptions experienced by a typical manufacturer. We measured *reputational containment*, by asking how the response and recovery efforts influenced the reputation, stature, popularity and public image damage of the disruption (Gatzert, 2015, Pallas and Svensson, 2016, Rose, 2004). To measure *operational containment*, we

combined commonly applied dimensions used in measuring operational performance regarding on-time delivery, product quality, manufacturing cost, order fulfillment and cash-to-cash cycle (e.g., Bode et al., 2011, Klassen and Whybark, 1999). Respondents were asked to evaluate the effect of response and recovery activities in reducing the effects of a major supply chain disruption. Firm size, firm age, frequency of small disruptions, and environmental dynamism, industry, and country were used as control variables[3].

Methodological Checks on validation and bias

Table 2 presents the descriptive statistics of constructs in the structural model. An array of methodological tests was conducted prior to running our analysis. These are detailed in sections S-1-2 through S-1-4 of the Supplement. These include late and non-response bias (Section S-1-4-1) measure validation checks (Section S-1-4-2), Common Method bias check (Section S-1-4-3), Measurement invariance check (Section S-1-4-4), and tests for normal distribution and multicollinearity (Section S-1-4-5).

Structural model fit. We assessed the model fit of our structural model through confirmatory factor analysis (CFA) before running a regression analysis. We used a chi-squared statistic (χ^2), comparative fit index (CFI), goodness of fit index (GFI), Bentler-Bonett normed fit index (NFI), Tucker-Lewis index (TLI), root mean squared error approximation (RMSEA) and standardized root mean square residual (SRMR) to assess the measurement model fit. The CFA revealed χ^2 (629) = 1846.5; RMSEA = 0.042; SRMR = 0.03; CFI = 0.963; GFI = 0.977; TLI = 0.959. The model fit indices were above the recommended thresholds (Hu and Bentler, 1999), indicating the measures of our model variables were acceptable.

--- Insert Table 2 About Here ---

4.1.2 Study-1 Results

[3] Details on the operationalization of control variables can be found in the supplementary file.

We tested our hypotheses in Study-1 using stepwise hierarchical regression models shown in Table 3. Our main hypotheses were analyzed using StataIC 13.0, while robustness checks were performed in SPSS 22.0 and AMOS 22.0. Model 2 in Table 3a shows that BCM is positively and significantly related to *reputational containment* ($p < 0.01$, $b = 0.150$), supporting H1. Model 8 in Table 3a shows that *supply chain involvement in BCM* is positively and significantly related to *operational containment* ($p < 0.01$, $b = 0.270$), supporting H2. Regarding the moderating effects of *supply chain vulnerability*, Model 4 in Table 3a shows that *supply chain vulnerability* significantly moderates the effects of *BCM* on r*eputational containment* ($p < 0.01$, $b = 0.170$). Figure 1a shows that the positive effects of BCM on *reputational containment* is amplified with higher levels of *supply chain vulnerability*. The statistical results and graphical depiction support H3a. Model 10 in Table 3a shows that *supply chain vulnerability* significantly moderates the effects of *supply chain involvement in BCM* on *operational containment* ($p < 0.01$, $b = 0.135$). Graphical representation of this result on Figure 1b indicate that the positive effects of *supply chain involvement in BCM* on *operational containment* is amplified with higher levels of *supply chain vulnerability*. The statistical results and graphical depiction support H3b. We performed additional tests to check for the endogeneity concerns in our key variables [4].

--- Insert Tables 3a/3b and Figures 1a through 1d About Here ---

4.1.3 Study-1 Post Hoc Analysis

Our four hypotheses (H1, H2, H3a, H3b) were all supported. The fact that all three factors had significant effects on at least one dimension of damage containment, led us to contemplate on whether BCM and supply chain involvement in BCM, would have complementary effects on one another under high supply chain vulnerability settings. Theoretically, Simons suggests that diagnostic and interactive controls can be complementary because they can work simultaneously

[4] Details on the endogeneity tests using Durbin–Wu–Hausman can be found in the supplement file.

but in different ways to enhance performance (Simons, 1994). When combined, diagnostic controls can provide the structure for interactive controls to intensify attention and guide the organization's resources (Tuomela, 2005). To test the interaction effects of BCM and supply chain involvement in BCM in high supply chain vulnerability settings, we conducted step-wise regression analysis on the 25 percentile of the sample with high supply chain vulnerability scores (112 out of a total of 448). Results are summarized in Table 3b. Results show that *supply chain involvement in BCM* significantly moderates the effects of *BCM* on r*eputational containment* ($p < 0.05$, $b = 0.102$) as well as on *operational containment* ($p < 0.05$, $b = 0.112$) in Model 4 and Model 8 respectively. Graphical representation of these results in Figure 1c and Figure 1d provide further credence to these statistical findings. Thus, both statistical results and graphical interpretations support our post-hoc conjecture.

4.2 Study-2: Vignette–based experiment on BCM and Supply Chain Involvement effects

To validate the results from Study-1 and post-hoc analysis on the link between a BCM and reputational containment, and the link between a supply chain involvement in BCM and operational containment, we conducted a 2X2 factorial design experiment. Participants in Study-2 were provided with vignette–based scenarios and asked questions about how a hypothetical company would recover from a supply chain disruption. The vignettes were generated through iterative discussions with supply chain and risk managers using the three-stage process suggested by Rungtusanatham et al. (2011). First, information about the context of disruption and identified measurement factors was gathered. Second, we applied the principle of form postponement, comprising two separate but related modules of information: a common module and an experimental cues module (Rungtusanatham et al., 2011). The common module of the vignette includes a short description of the hypothetical company (ABC Corporation), and the characteristics of the disruption it is facing. The experimental module included written statements about the factors

of interest. The full text of the common and experimental cues modules of the scenario is available in the Supplement (Section A4). We carefully pretested the survey to ensure that the questions were correctly understood by a wide range of respondents [5]. During post-design stage, measures were taken to confirm that the scenario was clear, realistic, and complete.

4.2.1 Study-2: Results

Zero–order correlations for variables used in Study-3, sample size of respondents assigned to each scenario, manipulation checks show that the experiment successfully created differentiated conditions for both dependent variables in the study and other pertinent information are provided in the Supplement document (Section S-2, Tables S-2-1 through S-2-5). A regression analysis based on the responses from 110 participants confirms a positive and significant association between BCM and reputational damage containment from supply chain disruptions ($\beta = .247$; $p < 0.001$, Model 2-2, Table 4) and a positive and significant association between supply chain involvement in BCM and operational damage containment ($\beta = 0.229$; $p < 0.001$, Model 2-5, Table 4). These findings confirm the earlier results from Study-1. Moreover, some interesting nuances also surface with regards to the differences between what Study-1 and Study-2. These will be explained in the discussion section.

—— Insert Table 4 About Here ——

4.3 Study-3: Experiment on Supply Chain Involvement before and during supply chain disruptions

Study-1 and Study-2 confirmed that supply chain involvement in BCM positively enhances a company's ability to contain operational damage from supply chain disruptions. However, as we detailed earlier in the paper (See Section 2), BCM includes specific activities aimed at prevention/mitigation of potential disruptions and other activities aimed at response/recovery from actual disruptions. Whether integration is worthwhile through involvement in proactive activities

[5] Pre-testing was conducted in three separate occasions in undergraduate business supply chain management classes, and graduate MBA supply chain classes at a university in Northeast United States. Pre-testing was also conducted at a local conference in Northeast United States. The three pre-testing sessions included groups of 9-13 participants.

aimed at prevention/mitigation of potential disruptions (i.e., *pre-disruption involvement*) or in reaction to actual disruptions through response/recovery (i.e., *intra-disruption involvement*) is the focus of Study-3. In Study-3 participants were exposed to vignettes where the level of pre-disruption involvement and intra-disruption involvement was experimentally manipulated in a 2x2 factorial experiment.

4.3.1 Study-3: Results

Zero–order correlations for variables used in Study-3, sample size of respondents assigned to each scenario, manipulation checks show that the experiment successfully created differentiated conditions for both dependent variables in the study and other pertinent information are provided in the Supplement document (Section S-3, Tables S-3-1 through S-3-5). Regression analysis based on the responses from 117 participants confirms a positive and significant association between pre-disruption supply chain involvement in BCM and operational damage containment from supply chain disruptions ($\beta = .192$; $p < 0.01$, Table 4, Model 3-2). Results also confirm a positive and significant association between intra-disruption supply chain involvement in BCM and operational damage containment from supply chain disruptions ($\beta = .249$; $p < 0.01$, Table 4, Model 3-3). These findings suggest that pre-disruption and intra-disruption involvement are both related to operational damage containment.

5. Discussion and conclusions

Research and practice need to know whether investing in risk management programs such as BCM offers any value. Whether companies should spend resources and managerial attention on developing and integrating their BCMs into enterprise-wide risk management programs has been the subject of much debate (e.g., Bailey, 2015, Duncan et al., 2011, Selden and Perks, 2007). The empirical results and theoretical arguments offered in this paper help in recognizing the potential value offered by BCM and by supply chain involvement in BCM. These results and theoretical

expectations also help in understanding the nuances associated with the benefits of BCM in facing supply chain disruptions; why implementing BCMs may prove to be more, or less advantageous for some companies and in some situations.

Study-1 and Study-2 support the argument that BCM helps limit the reputational damage from major supply chain disruptions (Hypothesis 1). Firms that emphasize the fundamental aspects of BCM (e.g., BIA, hazard assessment, and crisis response plan) can lower the damage on the stature and public image of their company. These results are in line with how the conceptual depictions in the literature explain the effects of BCM (e.g., Herbane et al., 2004, Hiles, 2010). The structured and rehearsed policies established through BCM ensure that the company is prepared in a way that can readily engage in protecting its reputation. Indeed, the volume of published books and guidelines on the matter would suggest that reputational containment is well embedded in how BCM is developed (c.f., Sellnow and Seeger, 2013, Fink, 2013).

Study-1 and Study-2 support the argument that supply chain involvement in BCM helps limit the operational damage caused by major supply chain disruptions (Hypothesis 2). Commonly reported benefits of internal integration are enhanced information sharing and improved use of company resources (Chen et al., 2009, Adams et al., 2014). By integrating the expertise and insights that activities in supply chain business unit and functions engaged in supply chain bring to the table, supply chain involvement in BCM helps in preserving operational capabilities of companies. Field reports from industry-based associations suggest that firms are recognizing the value provided from supply chain integration in risk management efforts (Burson and Mersteller, 2009). From 2009 through 2016 many have continually raised the emphasis on firm-wide engagement in their BCM activities (Business Continuity Institute, 2016).

Results also support the arguments about the effects of BCM on reputational damage with rising supply chain vulnerability (H3a) and that effects of supply chain involvement in BCM on

operational damage with rising supply chain vulnerability settings (H3b). Companies operating in high supply chain vulnerability settings benefit more from both BCM and supply chain involvement in BCM. More interestingly, when H1, H2 and H3a/b are considered in tandem, they offer a more articulate picture of the effects of BCM and its integration with supply chain activities of the firm. Combined, the two mechanisms (BCM and supply chain involvement in BCM) help improve diverse dimensions of firm capabilities and therefore lead to a better outcome in terms of damage containment through response and recovery efforts. Moreover, the fact that rising supply chain vulnerability augments the effectiveness of both mechanisms highlights the significance of the presence of both for firms to effectively address the ramifications of supply chain disruptions.

A third interesting finding is the complementary role played between BCM, and supply chain involvement in BCM, for companies exposed to high supply chain vulnerability. Based on post-hoc analyses in Study-1, supply chain involvement in BCM positively moderates the effects of BCM on reputational containment. Theoretically, one shortcoming for diagnostic controls is that they can act as filters that homogenize information (Simons, 1994). Sole reliance on BCM procedures may hinder managerial attention on the particularities of the situation at hand. On the other hand, one shortcoming of interactive controls is the increased time and effort in decision-making. Debate and dialogue may surface unnecessary tensions and may require more time for decisions to be made. The diagnostic use of BCM enables managers to benchmark against targets and better determine how to leverage the involvement of supply chain in limiting operational and reputational damage. This makes it easier to define the underlying concerns and helps groups define their boundaries and roles. BCM positively moderates the effects of supply chain involvement in BCM on operational containment. These results offer confirmation of the suggested complementarity between controls, as suggested by Simons (Simons, 2000), which makes them an interesting finding. The combined use of diagnostic and integrative control systems is associated

with improved decision making because their potential complementarities help compensate for the other's shortcoming (Bisbe and Otley, 2004). In other words, whereas feedback from BCM assures that decisions and actions are within company expectations, the feedforward from integrating the supply chain in BCM provides guidance and motivation to fine-tune actions, and adjust the recovery strategy (Pavlov and Bourne, 2011).

Interestingly, the evidence on the complementary nature of BCM and SCiBCM were not evident in Study-2. Given that supply chain management includes the systemic, and strategic coordination of traditional business functions (Mentzer et al., 2001), its involvement in risk related efforts can offer means to further enhance the benefits of BCM as well, as evidenced by Study-1 finds. However, such nuances may not be at the forefront of how managers assess the value of internal integration efforts such as supply chain involvement in BCM. A possible explanation for this (lack of) finding about the interaction effects of supply chain involvement in BCM in Study-2 is that in their attempt to assign causal specificity, managers may fall short in recognizing the complementary advantages generated by the combination of multiple factors.

Results from Study-3 are particularly important in highlighting the significance of pre-disruption and intra-disruption involvement. Some argue for proactive risk management practices (Scholten et al., 2014). Others highlight the need for adjustment in how resources are used in order to combine mitigation and response capabilities (Cheng and Lu, 2017). Here we note that supply chain involvement should take different forms depending on whether a disruption is imminent or the firm is proactively planning for its potential.

5.1 Contributions to the literature

There are multiple interesting and important contributions from this work to the literature in business continuity and supply chain management that make it impactful to these fields (Cachon, 2012). First, our empirical and theoretical explanations contribute to the scant empirical evidence

about BCM, its integration, and its effect on disruption management (Zsidisin et al., 2005, Ojha et al., 2013, Prud'homme, 2008). Specifically, this study offers empirical evidence on how BCM helps minimize the reputational damage of supply chain disruptions. Whereas calls for (internal) integration of BCM have been prominently made, evidence of the usefulness of an integrated BCM is missing. Our study not only confirms the claims regarding the benefits of integrating BCM by studying the effects of supply chain involvement, but it also offers supporting evidence on how BCM integration broadens the effects of BCM on a different dimensions of damage containment.

This paper offers an important contribution to the literature on internal integration, a generally neglected the topic (Flynn et al., 2010, Wieland et al., 2016). While ample studies have shown the benefits of internal integration in the new product development, others suggest that the relationship between internal integration and performance can be complicated (Zhao et al., 2015). Internal integration requires dedication of firm resources and managerial attention, and can be difficult to implement because functional groups can be fixated in their own perspective. This paper shows that not only is supply chain involvement in BCM is an effective means to limit operational damage, but that the effectiveness is amplified for firms that are faced with high supply chain vulnerability.

A small stream of literature relates control systems to supply management activities (Gunasekaran and Kobu, 2007). This stream advocates for extending control system such that risk management controls (Pernot and Roodhooft, 2014). For instance, Cantor et al. (2014) highlight risk mitigation activities as one type of management controls that can enable the firm to become more responsive to customer demand. Buhler et al. suggest for companies to adopt “risk metrics to account for external turbulence and to monitor the potential impacts of this turbulence” (Bühler et al., 2016). Svensson labels this broader consideration of risks as "holistic vulnerability approach", or the ability to consider a system-wide view of the disruption (Svensson, 2000). Study-3 is

particularly important in this area. Findings from this study highlight how a holistic perspective accomplished through pre-disruption and intra-disruption involvement can enhance damage containment efforts. Indeed, such a holistic view allows for properly placing company resources in front of the more urgent, or more damaging facets of the disruption.

The fourth contribution of the paper is in extending the use of Simons' levers of control model to risk management by exploring the effects of BCM. Empirically, this study provides evidence on the relations among control systems in the levers of control framework and contributes to the small but growing body of work that investigates relations among control systems (Anderson and Dekker, 2005). While Simons (1995) acknowledges the complementary nature of the two systems, only a few studies explicitly test relationships between types of uses of control systems or specify and account for their interactions.

5.2. Contributions to practice

From a practical standpoint, we offer evidence and explanation on when pursuing an integrated BCM is a valuable undertaking. Business continuity is receiving increased "board-level" attention because of increased geopolitical, socio-political and socio-economic risks across the globe. However, many are reluctant to invest time and resources on initiatives that are not only complex but also unproven. Our findings suggest that, all things considered, a narrow view of risk and response in BCM may not be enough to ensure readiness against supply chain disruptions. Rather, investing in internal integration in risk management can offer companies the ability to recover from supply chain disruptions with less damage. Moreover, such investments should be made on activities aimed at mitigation and response to disruptions. Businesses that are competing in complex (e.g., automotive), rapidly changing (e.g., electronics), and knowledge-intensive (e.g., pharmaceutical) contexts are likely to be exposed to supply chain vulnerability. For them, BCM is a more justified investment.

6. Limitations and future research

The results shared here should be viewed alongside their potential limitations. First, we focused on reputational and operational damage caused by major supply chain disruptions. Supply chain disruptions can affect other dimensions of firm performance, such as profitability, market share, innovation, and staff loyalty. Expanding the dimensions of performance affected by disruptions can be of value in better understanding their effect and the mitigation role played by an integrated BCM that involves other activities such as supply chain business unit.

Several articles in management and operations management have offered evidence in support of the viability in use of subjective and objective interchangeably (Ketokivi and Schroeder, 2004, Voss and Voss, 2000). Ideally, one would use both subjective and objective performance measures side-by-side to compensate for the deficiencies of using either in isolation. However, since we did not have access to objective performance measures, using perceptual data as part of the limitations of the study.

We focused on supply chain involvement in BCM as a unique form of internal integration. Another organizational activity that is often integrated with supply chain is information technology. Future studies may consider researching the effects of internal integration between the supply chain management business unit and information technology activities of the organization in addressing supply chain disruptions. How these two integrate with BCM may also be potential for future research. Second, internal integration literature suggests that integration is less effective at the organizational rather than at the team level. A multi-level examination of how internal integration affects the firm's ability to respond could provide significant insights into how integration can most positively affect damage containment.

7. References

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Table 1. Definitions

Construct	Definition	Sources
Supply Chain Business Unit	The combination of functions directly involved in sourcing, making, storing and delivery processes of company products.	Comelli et al. (2008) Fenies et al. (2012) Mustafee et al. (2012)
Supply Chain Management	The systemic, strategic coordination of traditional business functions and tactics across these business functions within a particular company and across businesses within the supply chain, to improve the long-term performance of individual companies and the supply chain as a whole.	Mentzer et al. (2001)
Business Continuity Management (BCM)	A holistic management program for identifying risks that could impact continued operations, and providing a structure for developing capabilities in effective mitigation and response to disruptions	Engemann et al. (2011) Waters (2011) Norrman et al. (2004)
Supply chain involvement in BCM	The extent of inclusion of business functions engaged in supply chain management, such as the supply chain business unit and traditional business functions, in BCM	Kildow (2011) Mentzer et al. (2001)
Supply Chain Vulnerability	Susceptibility and exposure of the supply chain business unit to potentially damaging events.	Cardona (2004) Wagner et al. (2006) Gualandris et al. (2015)
Major Supply Chain Disruption	Disruptions that despite their relatively low probability, create ambiguous and unfamiliar situations that exert high damage on the company.	Talluri et al. (2013) Tomlin (2006)
Operational Performance	The company's ability to accomplish its objectives in terms of cost, quality, speed, and flexibility of operations.	Klassen et al. (1999) Narasimhan et al. (2001)
Corporate Reputation	Perceived image, status and popularity of the organization among its internal and external stakeholders.	Gray et al. (1998) Rindova et al. (2005) Bitektine (2011)
Operational Containment of Supply Chain Disruption	Ability of the company's response and recovery efforts to reduce the diminishing effects of major supply chain disruptions on its operational performance.	Bode et al. (2011)
Reputational Containment of Supply Chain Disruption	Ability of the company's response and recovery efforts to reduce diminishing effects of major supply chain disruption on its corporate reputation.	Gray et al. (1998) Rindova et al. (2005) Bitektine (2011)

Table 2. Descriptive statistics (Study-1)

	Construct	Min	Max	Mean (SD)	1	2	3	4	5
1	Business Continuity Management (BCM)	1.00	7.00	4.63(0.75)	1.000				
2	Supply chain involvement in BCM	1.00	7.00	4.28(0.93)	**0.180**	1.000			
3	Supply chain vulnerability	1.00	5.00	3.54(0.88)	-0.057	**0.181**	1.000		
4	Reputational containment	1.00	5.00	3.04(0.90)	0.112	**0.096**	**0.148**	1.000	
5	Operational containment	1.00	5.00	3.66(0.83)	-0.002	**0.253**	0.072	0.009	1.000
6	Small disruption frequency	1.61	3.33	2.65(0.29)	**0.176**	**-0.239**	**-0.138**	-0.032	-0.003
7	Environmental dynamism	1.00	5.00	3.66(0.83)	**-0.153**	0.000	0.027	**0.097**	0.053
8	Firm age (years)	1.00	3.00	3.52(2.39)	**-0.144**	**0.107**	**0.192**	0.041	0.009
9	Firm size (Sales)	1.00	5.00	3.61(0.72)	-0.059	**0.236**	**0.187**	0.072	**0.180**
10	Industry	0.00	1.00	0.04(0.21)	0.051	0.076	**0.147**	-0.006	0.052
11	Industry 2	0.00	1.00	0.15(0.36)	0.042	0.011	-0.079	0.024	0.002
12	Industry 3	0.00	1.00	0.10(0.30)	0.004	-0.054	0.014	-0.060	-0.028
13	Country Code 1	0.00	1.00	0.44(0.49)	-0.054	0.069	**0.195**	0.043	0.079
14	Country Code 2	0.00	1.00	0.26(0.44)	**0.184**	**-0.199**	**-0.283**	-0.038	**-0.103**

	Construct	6	7	8	9	10	11	12	13	14
6	Small disruption frequency	1.000								
7	Environmental dynamism	0.023	1.000							
8	Firm age (years)	**-0.326**	0.069	1.000						
9	Firm size (Sales)	**-0.225**	-0.030	**0.268**	1.000					
10	Industry	0..010	**-0.142**	**0.102**	-0.011	1.000				
11	Industry 2	-0.014	0.003	-0.056	-0.031	-0.091	1.000			
12	Industry 3	0.072	0.003	**-0.098**	0.068	-0.072	**-0.140**	1.000		
13	Country Code 1	**-0.107**	0.043	**0.103**	0.039	**0.094**	-0.053	**-0.129**	1.000	
14	Country Code 2	**0.311**	-0.085	**-0.313**	**-0.184**	**-0.129**	**0.190**	**0.137**	**-0.525**	1.000

Bold values indicate significant correlation scores at $p<0.01$.

Table 3a. Study-1 Results - Effect of Business Continuity and related factors on reputational containment and operational damage containment

	Reputational containment				Operational containment			
Variables/Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Business Continuity Management (BCM)		0.150**	0.147**	0.234**				
Supply chain involvement in BCM (SCiBCM)						0.270**	0.272**	0.246**
Supply chain vulnerability (SCV)			0.145**	0.145**			-0.016	0.009
BCM x SCV				0.170**				
SCiBCM x SCV								0.135**
Controls								
Small disruption frequency	-0.041	-0.105	-0.084	-0.013	0.027	0.042	0.042	0.024
Environmental dynamism	0.181	0.180	0.179	0.178	0.069	0.068	0.068	0.077
Firm age	0.111*	0.129*	0.125*	0.119*	0.273**	0.211**	0.211**	0.229**
Firm size	0.052	0.052	0.051	0.051	-0.033	-0.029	-0.029	-0.028
Industry 1	0.003	0.004	0.001	0.003	0.279	0.208	0.207	0.165
Industry 2	0.023	0.022	0.022	0.022	0.057	0.029	0.029	0.056
Industry 3	0.097	0.100	0.077	0.082	-0.101	-0.076	-0.076	-0.086
Country 1	0.071	0.070	0.070	0.069	0.064	0.082	0.082	0.076
Country 2	0.022	-0.010	-0.094	-0.143	-0.174	-0.091	-0.091	-0.106
Constant	-0.675	-0.611	-0.551	-0.554	-1.196**	-1.061**	-1.060**	-1.107**
Observations	448	448	448	448	448	448	448	448
R-squared	0.020	0.039	0.057	0.085	0.056	0.113	0.114	0.131
Adjusted R-square	0.011	0.031	0.049	0.074	0.043	0.107	0.108	0.124

** p<0.01, * p<0.05

Table 3b. Post-hoc Analysis for Study-1

Interaction effects of Business Continuity Management and Supply chain involvement in BCM under high supply chain vulnerability settings

	Reputational containment				Operational containment			
Variables/Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Business Continuity Management (BCM)		0.453**		0.577**			0.073	0.001
Supply chain involvement in BCM (SCiBCM)			0.047	0.019		0.315**		0.444**
BCM x SCiBCM				0.102*				0.112*
Controls								
Small disruption frequency	-0.089	-0.198*	-0.096	-0.154	-0.102	-0.144	-0.119	-0.0533
Environmental Dynamism	0.244*	0.283*	0.243*	0.271*	0.390**	0.384**	0.396**	0.347**
Firm age	-0.065	-0.044	-0.063	-0.045	-0.024	-0.013	-0.020	-0.019
Firm sales	-0.031	-0.063	-0.055	-0.033	0.386*	0.226	0.381*	0.200
Industry 1	-0.320	-0.415	-0.366	-0.404	0.979*	0.668*	0.963*	0.560
Industry 2	-0.215	-0.282	-0.232	-0.258	0.395	0.279	0.384	0.284
Industry 3	-0.344	-0.177	-0.371	-0.131	0.259	0.081	0.286	-0.011
Country 1	0.544*	0.400	0.56**	0.378	-0.143	-0.005	-0.166	0.093
Country 2	0.669*	0.533*	0.688*	0.536*	-0.131	-0.001	-0.153	0.129
Constant	-0.418	0.032	-0.308	-0.221	-2.332*	-1.598	-2.259*	-1.783
R-squared	0.180	0.323	0.183	0.343	0.125	0.238	0.128	0.264
Adjusted R-square	0.169	0.316	0.177	0.338	0.113	0.231	0.119	0.257
Observations	112	112	112	112	112	112	112	112

Note: ** p<0.01, * p<0.05

Table 4. Results from Study-2 and Study-3 (Experiments)

Study-2 (a)	Reputational Damage Containment			Operational Damage Containment		
Controls	Model 2-1	Model 2-2	Model 2-3	Model 2-4	Model 2-5	Model 2-6
Experience – Professional	.009	.009	.014	.007	.007	.011
Experience – Familiarity with supply chain disruptions	.009	-.023	-.038	-.082	-.112*	-.124
Industry 1 – Food, apparel, wood manufacturing	.253	.275	.139	-.040	-.018	-.141
Industry 2 – Chemicals and petroleum manufacturing	.161	.110	.049	-.008	-.059	-.109
Industry 3 – Metals and heavy manufacturing	.223	.196	.120	-.041	-.067	-.133
Industry 4 [(a)] – Computers, auto manufacturing	.178	.094	-.027	-.050	-.132	-.233
Rank 1 - Supervisor	.297	.170	.242	.052	-.071	.003
Rank 2 - Manager	.166	.020	.129	.428	.286	.395
Rank 3 [(b)] - Director	.305	.113	.254	.278	.092	.233
Function (Operations/Supply Chain)	-.054	-.039	.026	-.299*	-.284	-.227
Predictors						
Business Continuity Management		.247***			.239***	
Supply Chain Involvement in BCM			.256***			.229***
R-Squared	.052	.172	.194	.112	.206	.207

Study-3 (b)	Operational Damage Containment		
Controls	Model 3-1	Model 3-2	Model 3-3
Experience – Professional	.025**	.026**	.028**
Experience – Familiarity with supply chain disruptions	.009	.006	.005
Industry 1 – Food, apparel, wood manufacturing	-.158	-.160	-.148
Industry 2 – Chemicals and petroleum manufacturing	.417	.309	.346
Industry 3 – Metals and heavy manufacturing	.317	.349	.400
Industry 4 [(c)] – Computers, auto manufacturing	-.038	.007	.084
Rank 1 - Supervisor	.147	.367	.324
Rank 2 - Manager	-.127	-.018	-.042
Rank 3 [(d)] - Director	-.148	-.123	-.092
Function (Operations/Supply Chain)	.097	.078	.070
Predictors			
Pre-Disruption Supply Chain Involvement in BCM		.192**	
Intra-Disruption Supply Chain Involvement in BCM			.249**
R-Squared	.163	.223	.252

Sample size for Study 2=110, Sample size for study 3=117, *(c)Fifth Industry group is medical devices manufacturing. (d) Fourth rank is vice president and CEO.*

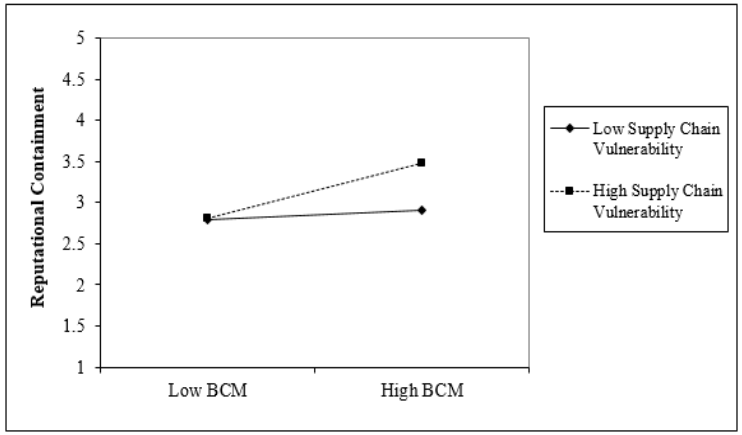

Figure 1a – Moderating effects of supply chain vulnerability on the association between BCM and reputational containment [H3a]

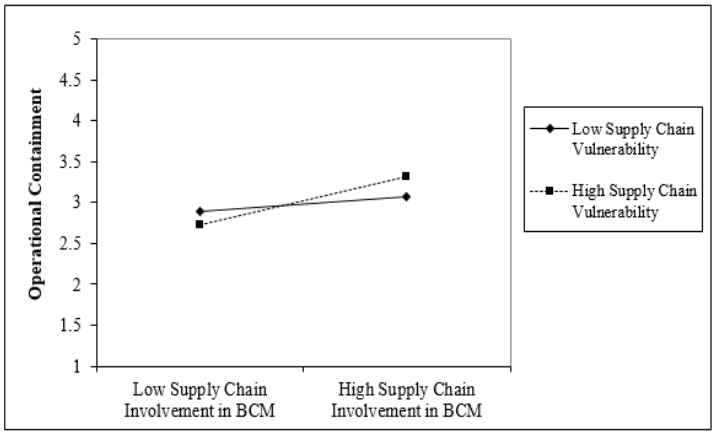

Figure 1b – Moderating effects of supply chain vulnerability on the association between supply chain involvement in BCM and operational containment [H3a]

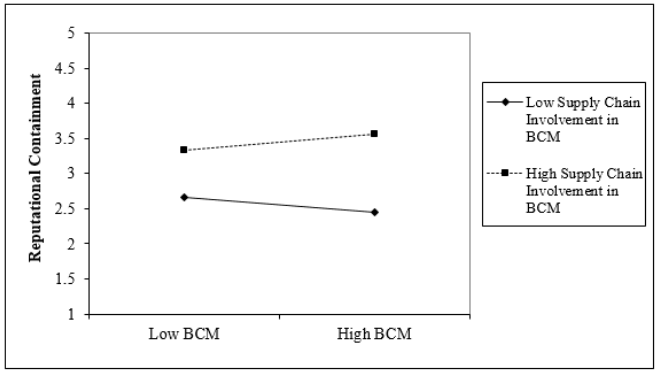

Figure 1c – Interaction effects of BCM and supply chain involvement in BCM on reputational containment in high supply chain vulnerability settings [Post-Hoc]

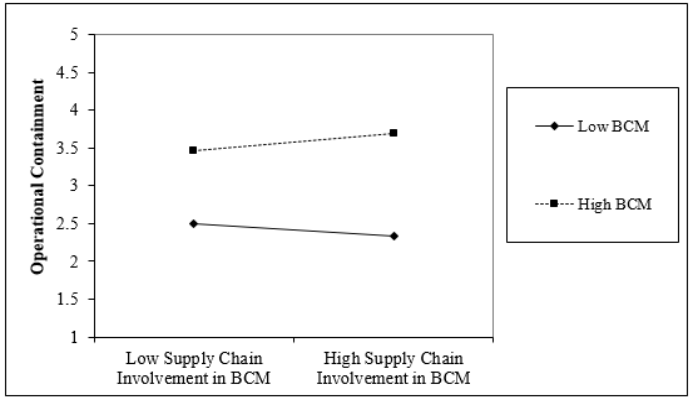

Figure 1d – Interaction effects of supply chain involvement in BCM and BCM on operational containment in high supply chain vulnerability settings [Post-Hoc]