Exploring the effect of justice, social capital, and power on supply chain disruption recovery : Buyer-supplier dyadic perspectives

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Abstract

A number of studies have brought understanding to supply chain disruption, but the recovery stage – what happens after a disruption event and how organisations can be successfully recovered – has received little attention. This thesis presents two studies that address this gap in the extant literature by incorporating theories that explain the cooperative relationship and influence mechanism in the buyer–supplier relationship.

In the first study, by bridging research on justice and social capital theory, it is presumed that these two views can explain the strong relationship that facilitates parties' interactions and the corresponding collective action effected to recover from the disruption. In the second study, the moderating role of the buyer's intention to use mediated power (coercive and reward power) during the process of disruption response and recovery in the relationship between the buyer-supplier's relational capital and their disruption response and recovery performance was investigated.

To examine the dyadic nature of the supply chain and reduce the possibility of single rater bias, 239 matched pairs data were collected to adopt a buyers and supplier dyadic perspective. This was geared towards capturing the different perceptions of the relationship and its impact on the disruption response and recovery performance. The main contribution of this research is two-fold. First, this study is one of the first to examine the relationship between the impact of the justice perception on social capital accumulation, impact of accumulation of social capital on the firm's disruption response and recovery performance as well as the moderating role of power on the link between relational capital and disruption recovery performance. The outcomes of this study allow for appropriate theoretical framing that can lead to understanding of this scantly previously investigated area. Second, having investigated the buyer–supplier's dyadic relationship in the disruption recovery context, this has led to robust findings being delivered according to both parties' individual viewpoints. More importantly, this has allowed for a dyadic perspective on the appropriate ways of dealing with such a situation to be uncovered.

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I. Introduction

1.1. Overview of the study

1.1.1. Supply chain disruption response and recovery

One of the primary objectives of supply chain management is to secure uninterrupted material flow downstream from the supply base (Kraljic, 1983). As firms outsource their materials to suppliers in a supply chain its complexity increases and this sourcing trend exposes the entities in the supply chain to uncertainty stemming from disruptions (Ellis et al., 2010). Effective supply chain management is thus becoming more challenging to achieve. In addition, rising global sourcing and the operational trend towards lower inventory levels is increasing the potential negative impact of supply chain disruptions (Blackhurst et al., 2005). Such disruption is an event that interrupts the flow of materials, logistics and operations in a supply chain (Jüttner et al., 2003; Craighead et al., 2007), thereby negatively impacting on firm performance. Additionally, its negative impact propagates through a supply chain and the involved parties (Scheibe and Blackhurst, 2018; Blackhurst et al., 2011), even damaging relationships (Sheffi and Rice 2005; Wang et al., 2014). Supply chain disruptions can come in various forms, such as product flow/transportation delay or stoppage, operational and quality issues, poor communication with partners, terrorist acts and natural disasters (Chopra and Sodhi, 2004; Chapman et al., 2002; Blackhurst et al., 2005).

The need to secure the continuity of the supply chain has motivated several streams of studies. These focus on identifying the causes that drive disruption (e.g.

Svensson, 2000; 2002; Craighead et al., 2007); the impact of disruption in terms of economic consequences (e.g. Latour, 2001; Rice and Caniato, 2003; Hendricks and Singhal, 2003, 2005); supply chain vulnerability (e.g. Wagner and Bode, 2006); and supply chain risk management (e.g. Tang, 2006). Whilst these studies have brought significant understanding about supply chain disruption, little attention has been devoted to the last phase of supply chain risk management, the disruption recovery stage, i.e. what happens after a disruptive event (Sodhi et al., 2012). As supply chain disruptions sometimes are unavoidable, then more attention needs to be given to the disruption response and recovery phase. When it comes to supply chain disruption response and recovery, timely response and recovery is essential to minimise the disruption's negative impact on performance (Bode and Macdonald, 2017). That is, firms' quick response to the disruption can lead to a quick recovery from the disruption (Blackhurst et al., 2011; Bode et al., 2011; Bode and Macdonald, 2017). This is because response and recovery time are directly related to financial loss: the longer the response and recovery time, the higher the negative impact of the disruption (Blackhurst et al., 2005). However, this disruption recovery phase has been largely overlooked among the supply chain disruption studies (Sodhi et al., 2012), in particular, how disruption response and recovery can be achieved has not been previously investigated.

The question is, how can firms in a supply chain achieve successful response and recovery from the disruption? Studies have suggested that a firm's capabilities, such as agility, resilience (Craighead et al., 2007; Chopra and Sodhi, 2004; Kleindorfer and Saad, 2005; Faisal et al., 2006; Braunscheidel and Suresh, 2009; Gligor et al., 2015; Scholten and Schilder, 2015), dynamic capability (Ambulkar et al., 2015) and use of multiple / redundant suppliers (Chopra and Sodhi, 2004; Whitney et al., 2014) are considered to be effective supply chain disruption recovery enablers. However,

achieving timely disruption response and recovery is still very challenging even when these factors are in place (Hendricks and Singhal, 2005; Tang, 2006). This is because required recovery actions for the disruption response and recovery (e.g. collective sensemaking, rapid mobilisation and coordination of supply chain resources etc.) do not simply depend on a single firm's capabilities or effort (Olcott and Oliver, 2014). That is, achieving successful recovery from a disruption depends on how well firms are able to work with their partners (Oke and Gopalakrishnan, 2009; Craighead et al., 2007). Likewise, it has been emphasised that building a close relationship with partnering firms can be an efficient disruption response initiator, as it promotes cooperative action when disruption occurs (Jüttner et al., 2003; Giunipero and Eltantawy, 2004; Faisal et al., 2006, Craighead et al., 2007).

Thus, based on the idea that buyer-supplier close relationships facilitate firms' coordination and collective action in disruption situation, the purpose of this thesis is to develop and test conceptual models that explains the role of relational factors in supply chain disruption response and recovery. Specifically, by bridging research on organisational justice, social capital theory, power, and supply chain disruption response and recovery, this thesis is aimed at understanding how firms can achieve successful disruption response and recovery by use of their relationship. To this end, two studies are undertaken.

In the first study, it is proposed that firms' successful disruption response and recovery can be achieved through the accumulation of social capital in the relationship. Moreover, it is held that prior to the disruption, this accumulation of social capital can be influenced by the level of justice perception among the parties. In the second study, it is proposed that the dominant party's (the buyer in this study) intention to use its power to gain compliance from the supplier to be involved in collective action for the

response and recovery is associated with the firm's use of relational capital in achieving this in a timely manner. The following subsections will provide a brief explanation of the key concepts and variables used in the study, and the rationale for the chosen variables given the context of the study is explained as well as how these are interrelated with each other.

1.1.2. Social capital accumulation and disruption response and recovery

Development of social capital in the relationship promotes cooperative action. It allows firms to leverage their resources and capabilities as well as sharing information (Nahapiet and Ghoshal, 1998). Social capital is defined as the "sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet and Ghoshal, 1998, p. 243). It is suggested that social capital is multifaceted concept comprising three different dimensions: cognitive capital, referring to shared goals, culture, values and understanding among the parties (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005); structural capital, pertaining to the development of formal and informal social interactions (Tsai and Ghoshal, 1998; Oh et al., 2004; Carey et al., 2011); and relational capital, referring to the development of friendship, reciprocity, respect and trust in the relationship (Nahapiet and Ghoshal, 1998; Kale et al., 2000; Carey et al., 2011).

Social capital theory offers a framework for understanding how organisations can acquire resources and information that exist outside of their boundaries by developing closer ties with partners (Koka and Prescott, 2002; Inkpen and Tsang, 2005), with such collaboration acting as a 'relational glue' underpinning effective supply chain relationships (McGrath and Sparks, 2005). Accumulation of social capital and its sub

dimensions in buyer–supplier relationships can facilitate supply chain entities' cooperation, thereby promoting collective sensemaking, situational awareness, and coordination of supply chain resources in disruption situations (Olcott and Oliver, 2014). For example, cognitive capital can facilitate collective sense-making (Weick, 1995) between the buyer and supplier, thereby aiding common situational awareness and understanding (Johnson et al., 2013). Structural capital as socialisation facilitates frequent communication (Lawson et al., 2008) and rapid information transfer (Cousins et al., 2006), thus enabling efficient and timely reactions to the occurrence of an expected event (Johnson et al., 2013). Finally, relational capital allows for privileged access to key resources (Uzzi, 1997; Kale et al., 2000) and thus, improves a firm's ability to coordinate resources and information, which is critical for firm survival and superior firm performance in high uncertainty situations (Sapienza et al., 2006; Sirmon et al., 2007; Davis et al., 2009), such as disruptions. Therefore, in considering social capital's three dimensions and their characteristics, it is apparent that they could have a profound effect on the management of supply chain disruptions. However, very few studies to date have investigated the application of social capital theory in the SCRM context (e.g., Jonson et al., 2013). Based on the above, it is suggested here that accumulation of social capital promotes firms engagement in collective action to achieve a successful response and recovery from supply chain disruption.

1.1.3. Justice perception and social capital accumulation in the relationship

Then, the question arises as to how the buyer and supplier in the supply chain can accumulate social capital in the relationship? Underlying this relationship is the recognition that for both the buyer and supplier involved in economic and social relationships (Griffith et al., 2006), supply chain relationships as social transactions

require that both parties prioritise behaving in a 'just manner' that is mutually beneficial (Narasimhan et al., 2013). One party's just manner in the exchange relationship impacts on the firms' relational state, such as the level of trust (Wang et al., 2014) and commitment (Kumar et al., 1995; Anderson and Weitz, 1992). Moreover, supply chain entities' collaborative behaviour is closely related to an input that hugely influences a firm's relationship and behaviour, namely justice (Griffith et al., 2006). Colquitt (2011, p. 1183), defined justice as 'perceptions of fairness in decision-making and resource allocation environments', based on Greenberg's (1987) study. Later, Greenberg and Colquitt (2013, p. 6) defined organisational justice as 'people's perception of fairness in an organization'

Studies discern two different dimensions of justice - distributive and procedural - and its positive effect on organisational relationship and behaviours (Kumar et al., 1995; Choi and Wu, 2009; Anderson and Jap, 2005; Rossetti and Choi, 2005; Griffith et al., 2006; Liu et al., 2012; Narasimhan et al., 2013). Distributive justice refers to the fairness of a decision's outcome (Adams, 1965), and can be determined by assessing whether the perceived ratio of outcomes to inputs is equivalent to those of a comparative other (Adams, 1965) or whether resource distributions match with appropriate norms (Leventhal, 1976). Whilst procedural justice focuses on perceived fairness of decision-making procedures (Thibaut and Walker, 1975; Leventhal, 1980), and can be evaluated by the extent of accuracy, consistency, suppression of bias, ethicality, correctability and the degree to which voice is allowed during the decision-making process (Thibaut and Walker, 1975; Leventhal, 1980).

The concept of justice has been considered as a foundation for social and economic exchanges and relationships (Adams, 1965; Greenberg, 1993; Lind and Tyler, 1988; Liu et al., 2012; Narasimhan et al., 2013), with a number of studies having

suggested that justice in dealing with partners is essential for enhancing buyer–supplier relationships (Kumar et al., 1995; Choi and Wu, 2009; Anderson and Jap, 2005; Rossetti and Choi, 2005) and developing cooperation (Kim and Mauborgne, 1991; 1998; Luo, 2007; Liu et al., 2012; Narasimhan et al., 2013). Specifically, perceived fairness in the relationship helps firms to find advantages in maintaining the relationship (Kumar et al., 1995), which can be a strong motive for each party to work cooperatively, thereby increasing the acceptance of collective goals and values (Folger and Konovsky, 1989; Brockner, 2002; Tyler and Blader, 2000; Luo, 2008). Justice perceptions among parties create a climate of fairness among them (Mahajan and Benson, 2013), which helps to remove the fear of exploitation that is often associated with interactions in buyer–supplier relationships (Anderson and Weitz, 1992; Luo, 2009) and nourishes trust in the relationship (Folger and Konovsky, 1989; Konovsky and Pugh, 1994; Konovsky and Cropanzano, 1991; Cohen-Charash and Spector, 2001).

Hence, drawing on these views, the position adopted for this thesis is that justice perception in the buyer–supplier relationship can contribute to the accumulation of social capital. Despite the relevance of justice in supply chain relationships, investigation of its role in enhancing collaboration in buyer–supplier relationships is still nascent (Griffith et al., 2006; Narasimhan et al., 2009), whilst discussion of justice theory in the SCRM context is even more scarce.

1.1.4. Buyer's intention to use coercive and reward power in disruption situation

Among the dimensions of social capital, relational capital in the relationship, in particular, permits privileged access to key resources of others (Uzzi, 1997; Kale et al., 2000), promotes firms engaging in value creation (Zaheer et al., 1998; Johnston et al., 2004; Lawson et al., 2008) and motivates the parties in the supply chain to take

additional risks and cooperate even beyond contractual provision (Villena et al., 2011). While relational capital in the relationship offers benefit towards achieving successful recovery from a disruption situation by facilitating the parties' coordination of resources for collective action (e.g. Olcott and Oliver, 2014), the ability of the relational capital can be rather limited and sometimes fails to motivate other parties to be engaged in collective action. Parties in supply chains are often uncertain whether their expectations will be fulfilled or not and whether the other party will act cooperatively in a disruption affecting situation (Li et al., 2016). Thus, the supplier may hesitate to become voluntarily involved in collective action for disruption recovery due to uncertainty in the supply chain relationship. Even if the buyer directly requests the supplier to reallocate its resources, it may not comply as the disruption is not directly affecting it at the moment, or simply, it perceives that the disruption is not its fault. Additionally, supply chain disruption can lead to increased relational conflict between the parties, involving dissatisfaction, blame and anger, based on the belief that the other party was responsible for the disruption (Primo et al., 2007; Bode et al., 2011). Hence, relational capital may not always yield the supplier's commitment for collective action in a disruption situation.

As another way to promote the appropriate response and recovery action in disruption situation, the dominant party (the buyer in this study) can use influence mechanisms based on its power to motivate the other party to become involved in the collective action aimed at achieving successful disruption response and recovery. By promising rewards when the supplier conforms to the buyer's requirements (reward power) or punishing it when failing to conform (coercive power), the buyer can produce intended changes in the supplier's behaviour leading to its engagement in collective action, thereby achieving a successful response and recovery from the disruption. In

particular, use of coercive and reward power relies on extrinsic forms of pressure to gain compliance from the power target (Handley and Benton, 2012), representing an explicit attempt by the power source to bring about some direct action (Benton and Maloni, 2005; Brown et al., 1995).

In accordance the studies that have suggested there is an association of power and relational capital (trust, reciprocity etc.) (Bachmann, 2001; Hart and Saunders, 1997; Ireland and Webb, 2007; Kumar et al., 1998; Nyaga et al., 2013; Pulles et al., 2014), in this thesis, it is proposed that the buyer's intention to use these two different response types (use of coercive / reward power) to persuade the supplier to engage in collective action has different impacts on social behaviour.

1.2. Research Objectives & Research Questions

The purpose of this thesis is to develop and test conceptual models that explains the role of relational factors in supply chain disruption response and recovery. For the first study, organisational justice and social capital theory is applied to the supply chain disruption context. It is proposed that the development of social capital helps firms to engage in collective action in a disruption situation, thereby contributing to firms achieving a successful response and recovery from it. Prior to investigating the role of social capital in a disruption situation, it is suggested that its accumulation can be influenced by justice in the exchange relationship before this. Thus, the positive impact of distributive and procedural justice on accumulation of cognitive, structural, and relational capital in the buyer-supplier relationship is hypothesised and examined. Then, following the disruption, the investigation moves on to ascertaining whether accumulated social capital can help firms in achieving disruption response and recovery. Accordingly, the research questions for the first study are: (1) Prior to the disruption,

can the justice perception of the buyer (/the supplier) from its relationship with its supplier (buyer) contribute to the buyer (/the supplier) to accumulating social capital in the relationship? and (2) In a post disruption situation, can accumulated social capital contribute to the buyer (/ supplier) achieving successful disruption response and recovery, from the perspectives of the buyer, and the supplier?

As a second study, the moderating role of the buyer's intention to use mediated power in the relationship between the buyer-supplier's relational capital and the disruption response and recovery performance is investigated from the buyer-supplier collective perspective. Specifically, it is hypothesised that the buyer's intention to use coercive power can hinder a timely disruption response and recovery by reducing relational capital's ability to facilitate coordination of resources and collective action in a disruption situation. Moreover, it is proposed that the buyer's reward power positively moderates between the impact of the relational capital on the disruption response and recovery performance. Hence, the research question for the second study is, following a disruption, does the buyer's intention to use mediated power (coercive and reward power) have an interaction effect with relational capital in the relationship, thereby reinforcing or lessening the ability of relational capital in achieving successful disruption response and recovery?

To capture the dyadic nature of supply chain, for these two studies, both perspectives of buyers and their matched supplier – who are strategic partner and are experienced the disruption together - are taken investigated. For this, 239 matched pair data were collected from manufacturers in the U.S. Most existing studies have typically involved investigating justice, social capital and supply chain disruption from a one-sided perspective, i.e. only that of the buyer or supplier. Whilst it is still important to understand a single party's perspective, due to the dyadic nature of supply chain and a

firm's exchange relationship, understanding both parties' perceptions and their impact on their relationship and performance is more salient (Palmatier et al., 2007; Liu et al., 2012). The use of a single participant in a study of supply chain relationships can result in an exception fallacy, i.e. an erroneous finding where researchers draw biased aggregate or group conclusions among stakeholders on the basis of a single rater (Roh et al., 2013).

For the first study, to reflect both the buyer and supplier perspectives, two separate models a proposed. The allows for a two-sided comparison approach that enables each party (i.e. buyer and supplier) to articulate individual perceptions relative to the shared relationship (Whipple et al., 2015).Then, to see how the dyad view the relationship, mutual perspective model by using degree-symmetry score approach was followed. For the second study, the buyer and its matched supplier's mutual perspective is the focus of the investigation. To operationalise this mutual perspective, as in the mutual perspective model in the first study, Straub et al. (2004) and Klein et al.'s (2007) suggestion of degree-symmetry score approach (considering the average value of the responses of both parties as well as the discordance between the responses) was adopted. Then, further to see the individual view, the buyer and the supplier's individual perspective were tested.

1.3. Contributions of the study

This research contributes to the body of supply chain management study in six ways. First, as the consequences of firm's action for recovery and the time it takes to get back to the normal course of business directly relate to firm performance (Blackhurst et al., 2005), supply chain disruption response and recovery is crucial. However, these phases have rarely been examined in the context supply chain risk management. Moreover,

only few studies have involved empirically examining the recovery from disruption and antecedent factors that facilitate successful response and recovery. Through the conceptual models for this thesis, this study can provide the new insight that timely disruption response and recovery can be achieved through a buyer–supplier cooperative relationship.

Second, this study is one of the first for which a framework has been developed and examined that explains the relationship between justice and social capital at the subdimensions level in the buyer-supplier relationship. Regarding the empirical test results, these show that both the buyer and supplier's level of distributive and procedural justice in the relationship contribute to social capital accumulation. By emphasising the importance of fairness in output distribution (distributive justice) and fairness in the decision making process as well as consistent use of rules and policy (procedural justice), it is believed that the findings provide important insights into the social exchange process and value creation within strategic buyer-supplier relationships.

Third, this study extends previous research by examining three dimensions of social capital and highlighting their individual impact on the buyer and supplier's disruption recovery performance. The results show that both the buyer and supplier's developed social capital contribute to achieving successful disruption recovery. This finding supports the perspective that the buyer–supplier social capital can facilitate joint action in even uncertain situation, thereby contributing to them being able to achieve timely disruption response and recovery. Thus, it is believed that these findings provides the new insight that a better-managed relationship in the supply chain can be a successful disruption recovery enabler.

Fourth, the second study outcomes have led to important implications pertaining to the use and effectiveness of the buyer's intention to use power in motivating the

supplier to engage in collective action for disruption response and recovery. The results show that only reward power can contribute to firms achieving successful response and recovery in that these provide evidence that this is positively associated with trust, respect, and friendship reciprocity (relational capital). That is, it emerges that among the dominant party's mediated power source, promising rewards can positively reinforce the ability of relational capital to achieve successful disruption response and recovery from the buyer-supplier dyadic perspective, whereas a coercive approach is found to be ineffective in this process.

Fifth, unlike most of the studies that have investigated justice, social capital, power and supply chain disruption from a one-sided perspective, a buyer-supplier dyadic perspective was adopted to examine the models to investigate both perceptions. By capturing both buyer and suppliers' perspectives on justice, social capital, power as well as disruption response and recovery performance, this has provided a more holistic view to understanding how the social capital developing role of justice in the buyer-supplier relationship can operate. Moreover, it has allowed for more comprehensive insights into how timely response and recovery can be achieved through the use of the parties' relationship than is possible with a one-sided examination. Additionally, by using matched pair data, the results not only contribute to understanding the dyadic nature of exchange relationships in the supply chain, for this approach has also reduced the possibility of single rater bias (Roh et al., 2013).

Lastly, practitioners can benefit from the results in this thesis by acknowledging the importance of social and relational factors in forming relationships between their buying firms and suppliers. The outcomes can appraise them of the importance of social capital accumulation in the relationship, which can be the basis for the development of a buyer-supplier relationship, which can contribute to firms becoming involved in

collective action in a disruption situation. Additionally, based on this study's findings, fairness in output distribution (distributive justice) as well as applying consistent rules and policy in the decision-making process (procedural justice) can help firms to develop social capital. Hence, practitioners in both parties needed to acknowledge that dealing with the other party in a just manner in the exchange relationship is a necessary condition for building social capital. Lastly, from the results of the second study that only the buyer's intention to use reward power was found to be significant, practitioners in the buying firm need to acknowledge that offering rewards to influence the other party to go along with its wishes, would appear to be a better approach than using a punitive one, for motivating the supplier in a disruption situation.

1.4. Structure of the study

This study is composed of six chapters. A summary of the contents of each chapter is as follows: The first chapter has discussed the background to the study, the purpose of the research, and the research questions to be explored.

Chapter II is devoted to a review of the literature in order to provide a diverse perspective and knowledge of the relevant research area. It consists of reviews of the literature concerning (1) supply chain disruption, (2) organisational justice theory, (3) social capital theory, and (4) power.

In chapter III, based on the extensive literature review and having identified gaps in the previous studies, models and research hypotheses for achieving the research objectives are derived for the two studies.

Chapter IV presents the adopted methodology and research design of the study. It consists of a (1) data collection section, (2) measurement item section and (3) a sample profile and descriptive analysis section. In the data collection section, the

sample framework used in the study is provided. In the measurement item section, detailed information regarding the measurement items used in the study is given. In the sample profile and descriptive analysis section, the collected data's characteristics and the detailed demographic profiles are analysed. Then, descriptive analysis of the collected data is delivered.

Chapter V provides in-depth analysis of the collected data that addresses the research hypotheses. For the first study, after assuring the reliability and validity through confirmatory factor analysis, path analysis is followed to test the postulated hypotheses for the buyer and the supplier. For the second study, reliability and validity are also ensured through confirmatory factor analysis. Then, moderated regression tests are performed to examine the second study's model and hypotheses. Lastly, simple slope analysis is undertaken to confirm the interaction effect.

Finally, Chapter VI concludes the thesis with detailed discussion of the research outcomes in relation to the extant literature. This chapter also explains the practical contributions, the limitations, and potential fruitful avenues for future research.

II. Literature review

2.1. Overview of the Chapter

In this chapter, literature is reviewed to clarify the concepts of supply chain disruption, organisational justice, social capital and power. First, the supply chain risks and disruption literatures are reviewed to provide a background to the study. Specifically, definition and sources of supply chain risks and disruption as well as the negative impact of supply chain disruption are reviewed. Then, the literature on how firms in the supply chain control disruption by used of mitigation strategies is considered along with the importance of firms' timely response and recovery. Second, justice and social capital theory are discussed according to the literature. Achieving a timely response and recovery from the impact of disruption crucially depends on how well the parties are able to coordinate their resources and the extent to which they are able to restore their collaborative arrangement. In this work, it is contended that justice in the exchange relationship helps the parties to accumulate social capital in the relationship, and following supply chain disruption, such developed social capital can facilitate firms cooperative and collective action in achieving timely response and recovery. In the section on justice, the development of justice theory is presented, followed by discussion on the sub dimensions of justice: distributive and procedural justice. In the social capital section, the theory is explained as being a multifaceted concept (cognitive, structural, and relational capital) and then, how, theoretically, accumulated social capital can be an efficient disruption response and recovery initiator is discussed. Lastly, as a second study, the prior work on power in the supply chain is reviewed. To

understand power's complementing and opposing role with relational capital, the extant work that explains its association with relational aspects in the buyer-supplier relationship is considered.

2.2. Supply Chain Risk Management

Since the early 1990s, firms have acknowledged that supply chain initiatives and supply chain management are essential for achieving competitive advantage (Blackhurst et al., 2005). It is defined as the integration of key business processes from the end user through to the original suppliers that provide products, services, and information to add value for customers and other stakeholders (Lambert et al., 1998). In the literature, it has been recognised that supply chain initiatives provide clear operational benefits, such as higher productivity (Bowersox et al., 2000; Stank et al., 2001), cost reduction (Christopher, 1997; Stank et al., 2001), product quality improvement (Langfield-Smith and Greenwood, 1998; Prahinski and Benton, 2005) and customer service improvement (Vickery et al., 2003), all of which can improve revenue (Craighead et al., 2007; Tang, 2006; Wagner and Bode, 2006; Zsidisin et al., 2005; Wagner and Neshat, 2010). These benefits motivate firms to adopt supply chain initiatives, which result in them becoming more networked, and dependent upon each other.

Whilst such initiatives have the potential to make operations leaner and more efficient in a stable situation, they also make firms more vulnerable to supply chain risks (Hauser, 2003; McGillivray, 2000; Engardio, 2001; Christopher and Lee, 2004). Their attempts to drive cost out of supply chains have left fewer buffers (e.g. low level of safety stocks…etc.) and hence, there is less margin for error and should a major disruption occur, it can come at an enormous cost (Lee, 2004). Additionally, today's supply chains are more complex than they used be. There are various reasons for

increased supply chain complexity, such as organisations' wide adoption of outsourcing and offshoring trend, relationships in supplier networks (supplier–supplier relationship), increased dependence on supplier capabilities and international markets as well as production expansion (Wagner and Neshat, 2010). Moreover, during the last few decades, disasters have increased in number and in intensity (Wagner and Neshat, 2010). That is, the number of man-made disasters, such as strikes, accidents, terrorist attacks, wars or sabotage that affect supply chains has increased (e.g. Coleman, 2006). At the same time, natural disasters, such as floods, droughts, hurricanes, earthquakes or tsunamis are happening more often, with a greater economic impact than previously (e.g. Munich, 2006).

Acknowledging that supply chains are suffering from increased levels of risk (e.g. Chopra and Sodhi, 2004; Martha and Subbakrishna, 2002; Sheffi, 2005) that can have serious negative effects on the supply chain and the entities involved (e.g. Sheffi and Rice, 2005; Wagner and Bode, 2008), supply chain risk management (SCRM) has been introduced to deal with these risks. The objectives of SCRM are identifying potential risk sources and implementing timely appropriate actions to avoid or cover supply chain vulnerability through a coordinated approach among the supply chain members, thereby ensuring its continuity and profitability (e.g. Jüttner et al., 2003; Tang, 2006).

Despite SCRM having received attention in supply chain research, it is still at a nascent stage and hence, has rather unclear boundaries in terms of its scope and definition (Sodhi et al., 2012). As seen in <Table 1.1>, there have been attempts to define more clearly the domain and boundaries of SCRM. In particular, Sodhi et al. (2012) tried to build a consensus on the definition of SCRM and to explain how it is connected to and different from supply chain management and enterprise risk management (ERM). They suggested that, first, SCRM is mainly used for dealing with

probabilities relating to 'supply–demand matching' and exclusively with the 'risks stemming from supply chain operations'. Second, SCRM can be seen as a subset of supply chain management, which has an additional focus on risk elements. Third, the majority of studies view SCRM as a subset of ERM; however, a significant number of researchers perceive that it has more extensive boundaries or is independent from the latter, which tends to be more focused on a single firm and its immediate surroundings. Referring to Sodhi et al.'s (2012) study, SCRM is considered here as the 'identifying and controlling of supply–demand matching and operational risks for the supply chain, and through a coordinated approach amongst a wide boundary of supply chain members, to decrease supply chain vulnerability and achieve successful response and recovery to ensure profitability and continuity as a whole'. Next, the notion of supply chain risk is considered.

<Table 2.1.: Definitions of SCRM>

Author(s)	Definition
Norrman and Lindroth (2004)	"SCRM is to, collaboratively with partners in a supply chain, apply risk management process tools to deal with risks and uncertainties caused by or impacting logistics-related activities or resources"
Christopher (2002, p2)	"SCRM is the management of external risks and supply chain risks through a coordinated approach among supply chain members to reduce supply chain vulnerability as a whole"
Jüttner (2003, p201)	"SCRM aims to identify the potential sources of supply chain risk and implement appropriate actions to avoid or contain supply chain vulnerability"
Tang (2006, p453)	"SCRM is the management of supply chain risks through coordination or collaboration amongst the supply chain partners so as to ensure profitability

	and continuity"
Manuj and Mentzer, (2008, p205)	"(Global) SCRM is the identification and evaluation of risks and consequent losses in the global supply chain, and implementation of appropriate strategies through a coordinated approach among supply chain members with the objective of reducing one or more of the following – losses, probability, speed of event, speed of losses, the time for detection of the events, frequency, or exposure – for supply chain outcomes that in turn lead to close matching of actual cost savings and profitability with those desired"
Thun and Hoenig (2011, p243)	"Characterized by a cross-company orientation aiming at the identification and reduction of risks not only at the company level, but rather focusing on the entire supply chain"
Fan and Stevenson (2018, p210)	"The identification, assessment, treatment, and monitoring of supply chain risks, with the aid of the internal implementation of tools, techniques and strategies and of external coordination and collaboration with supply chain members so as to reduce vulnerability and ensure continuity coupled with profitability, leading to competitive advantage"

2.3. An Overview of Supply Chain Risk

While the terms can vary from author to author (Wagner and Bode, 2009), the process of risk management in supply chains generally comprises the stages of: 'identification', 'assessment', 'mitigation' and 'response' to risk incidents (Sodhi et al., 2012). The overall aim of this risk management process is to control, monitor, implement, and provide optimal approaches to avoid risk, decrease the relevant risks, and recover from the incident. As an initial step to handling supply chain risks, the aim is to discover potential risks (Kern et al., 2012) and acknowledge future uncertainties so as to be able to manage them proactively (Giunipero and Eltantawy, 2004): the identification stage (e.g. Chopra and Sodhi, 2004; Manuj and Mentzer, 2008; Wu and Blackhurst, 2006).

Second, comes the evaluation of the possibility and impact of risk: the risk assessment stage (e.g. Zsidisin et al., 2004; Knemeyer et al., 2009; Ellis et al., 2010). To minimise the possibility of the occurrence of risk, mitigating the risk is necessary: the mitigation stage (e.g. Chopra and Sodhi 2004; Christopher and Lee, 2004; Wagner and Bode, 2008; Braunscheidel and Suresh, 2009; Oke and Gopalakrishnan, 2009). Finally, to decrease the supply chain risks' impact and to accelerate recovery from an incident, responding to an actual risk is required: responding stage (Kleindorfer and Saad, 2005; Norrman and Jansson, 2004; Chopra and Sodhi, 2004; Tang, 2006).

When responding to a risk, these can be divided into two types: 'operational risks' and 'catastrophic risks' (Sodhi et al., 2012). Catastrophic risks caused by man-made or natural disasters are low-frequency, but high-impact (e.g. Kleindorfer and Saad, 2005; Norrman and Jansson, 2004; Knemeyer et al., 2009). Conversely, operational risks are frequent, but low-impact risk events, stemming from inherent uncertainty in supply and demand (Norrman and Jansson, 2004; Blackhurst et al., 2005, Braunscheidel and Suresh, 2009). Catastrophic risks, such as tsunamis and Kobe earthquake (Pettit et al., 2013), have severe impacts on the firm and entities in the supply chain, but such catastrophic risks occur very infrequently (e.g. Norrman and Jansson, 2004; Kleindorfer and Saad, 2005; Knemeyer et al., 2009) in comparison to operational ones (Norrman and Jansson, 2004; Blackhurst et al., 2008; Braunscheidel and Suresh, 2009). In other words, operational risks can occur more frequently and interrupt the normal course of business operations. They can be sometimes even more harmful for supply chain performance and thus, managing 'every day' demand and supply-side risks is crucial for firms (Wagner and Bode, 2008).

Supply chain studies have acknowledged three major issues in relation to risks in supply chains, that is 'the source of risks', 'impact of risks', and 'the mitigation of risks'

(Ellis et al., 2010). First, studies have identified the primary risk sources and drivers in terms of the probability or frequency of risks (e.g. Chopra and Sodhi, 2004; Stauffer, 2003; Kleindorfer and Wassenhove, 2004; Sheffi, 2005; Kleindorfer and Saad, 2005; Tang, 2006; Craighead et al., 2007), which are typically categorised into three types: demand side, supply side, and environmental (external) risks. More details regarding these sources are provided in subsection 2.2.2 on classifying supply chain disruptions.

Second, supply chain risk studies have focused on its negative impact in terms of the economic consequences (e.g. Latour, 2001; Rice and Caniato, 2003; Hendricks and Singhal, 2003, 2005), operational (e.g. temporary absence of stock) (Stauffer, 2003) and relational consequences (e.g. frustrated customers, damage to trust in the relationship) (Kramer, 1999; Stauffer, 2003; Wang et al., 2014). Recently, researchers have focused on risk propagation that negatively effects supply chains and the entities involved (Sheffi and Rice, 2005; Wagner and Bode, 2008; Blackhurst et al., 2011; Scheibe and Blackhurst, 2018). Subsection 2.3.3 (the impact of supply chain disruptions) gives more detail regarding the negative impact of supply chain risks.

Third, studies have started to investigate and discuss supply chain strategies and structures that can lower the chance of incidence occurrence and/or alleviate its negative effects (e.g. Tomlin, 2006; Lee, 2004; Sheffi, 2005; Kleindorfer and Saad, 2005; Faisal et al., 2006; Swafford et al., 2006; Tang, 2006; Craighead et al., 2007; Kim et al., 2015; Bode and Wagner, 2015). Regarding which, several capabilities, such as supply chain agility (Braunscheidel and Suresh, 2009; Gligor et al., 2015; Chan et al., 2017), resiliency (Ambulkar et al., 2015; Kim et al., 2015), dynamic capabilities (Blackhurst et al., 2005; Ambulkar et al., 2015) have been emphasised. In particular, the development of closer relationships with partnering firms has been argued as being essential to managing supply chain disruption effectively (Giunipero and Eltantawy,

2004; Craighead et al., 2007). This is because building a closer relationship with partnering firms can facilitate supply chain entities' interactions and promote cooperative action in a disruption situation (Jüttner et al., 2003; Faisal et al., 2006; Craighead et al., 2007). The following subsections provide the definitions of SCRM, supply chain risk and disruption as well as discussing the relevant studies in more detail.

2.3.1. Supply chain risks and disruptions

In the 1980s, 'risk' was said to be created by the inter-connected flow of material, information and funds in the network of organisations (Kraljic, 1983). In the supply chain literature, risk is commonly said to refer to the 'possible sources of a threat' (Natarajarathinam et al., 2009). Supply chain risks have been defined as 'the propensity of risk sources and risk drivers to outweigh risk mitigating strategies, thus causing adverse supply chain consequences' (Jüttner et al., 2003).

There is a huge variety of definitions of the term 'risk' according to the specific decision types and contexts (Ritchie and Brindley, 2007). For instance, it is said to be 'variation in the distribution of possible outcomes, their likelihoods, and their subjective values' (March and Shapira, 1987, p. 1404); or 'the extent to which there is uncertainty about whether potentially significant and/or disappointing outcomes of decisions will be realized' (Sitkin and Pablo, 1992, p. 9) in the context of individual and organisational decision-making. Three common elements are included in most definitions of risk: (1) the likelihood of occurrence; (2) the consequences of a particular event or outcome; and (3) the exposure or causal pathway leading to the event (MacCrimmon and Wehrung, 1986).

Initially, risk management was commonly aimed at covering the project or processes' potential return against the potential risk of the investment (Carter, 1972).

Later, the Enterprise Risk Management (ERM) framework was introduced, being defined as the "field of activity seeking to eliminate, reduce and generally control pure risks" (Waring and Glendon 1998, p. 3). A typical view of the ERM process depicts a continuous cycle of: (1) risk identification; (2) risk assessment; (3) analysis of controls; (4) choosing controls; (5) implementing controls; and (6) review (Pettit et al., 2010). However, as ERM is more focused on a single firm and its immediate surroundings (Sodhi et al., 2012), applying this approach to a supply chain network, which comprises complicated linkages and multi-tier relationships as well as with higher exposure to risk (Christopher et al., 2002), would be onerous.

From the perspective of supply chain management, risk is viewed as a multifaceted concept (Zsidisin, 2003; 2004). Supply chain risk contains both the inherent uncertainties in the supply chain activities' operational aspects, such as changeable supply and demand, as well as risk from disruptions to operations caused by natural and human-induced disasters, like fire, terrorism and strikes (Tang, 2006; Kleindorfer and Saad, 2005). Supply chain risk can be defined as 'variation in the distribution of possible supply chain outcomes, their likelihood, and their subjective value' (Jüttner et al., 2003, p. 200).

What is the difference between 'supply chain risk' and 'supply chain disruption'? Whilst the former can be viewed as the likelihood of the possible occurrence of a negative effect, the latter refers to a consequential situation (Wagner and Bode, 2009). Additionally, a supply chain disruption's resulting damage is generally a function of time, whereby the longer the disruption is affecting the situation, the more the negative impact. Thus, supply disruptions involve time pressure and imply the importance of swift mitigation decisions (Wagner and Bode, 2009). Craighead et al. (2007, p. 132) use the term 'supply chain disruption' to refer to 'unplanned and unanticipated events

that disrupt the normal flow of goods within a supply chain, exposing the firms within the supply chain to operational and financial risks'. In this study, it is defined as unforeseen events that interfere with the normal flow of goods and materials within a supply chain, thus drawing upon Craighead et al.'s (2007) widely adopted definition.

2.3.2. Classifying supply chain disruptions

Supply chains are exposed to different types of risk as they are connected to complex networks, and the sources of supply chain disruptions are various (e.g. Svensson, 2000; Jüttner, 2005; Wagner and Bode, 2009). For instance, Christopher et al. (2002) classified the source of disruption into two different types: supply chain risks and external risks. Whilst Tang and Tomlin (2007) categorised this into six types: demand risks, supply risks, process risks, intellectual property risks, political/social risks and behavioural risks. Jüttner (2005) proposed a simpler model, suggesting that there are three main types of disruption source: demand risks, supply risks, environmental (external) risks. In general, from the literature, the sources of disruption can be categorised into three types: demand side, supply side, and environmental (external) risks

Demand-side disruption stems downstream of the supply chain (Jüttner, 2005; Bode and Wagner, 2015). This includes not only interruptions to product delivery to the end-customer, but also uncertainty of customer demand due to poor coordination and forecasting errors (Nagurney et al., 2005) as well as demand fluctuation (Tang, 2006). This type of disruption can result in stock obsolescence and shortages along with failure to service customers due to product unavailability (Wagner and Bode, 2009).

A firm's upstream side of the supply chain can be a major supply chain disruption driver, which is known as supply-side disruption. Such disruption can be caused by

uncertainty regarding price fluctuation of raw materials and commodities, but it is most commonly due to failures in supplier(s), supplier networks and procurement activities (Wagner and Bode, 2009; Bode and Wagner, 2015). Supply-side risk includes the supply market's production capacity constraints, risks from supplier business, changes of product design and technologies, and quality related problems (Zsidisin et al., 2000). Supply-side risk can have immediate or delayed harmful impacts on the firm's performance over the short and/or long term (Sheffi and Rice, 2005). When there is a strong dependence on external sources for critical materials, a company should focus particularly on managing risks from the upstream side (Kraljic, 1983). For instance, when there is a high switching cost for the buying company, it can be exposed to a supplier's opportunistic behaviour, and this can cause supply-side risk (Wagner and Johnson, 2004; Spekman and Davis, 2004). Moreover, a supplier's failure to quality control products or services can cause a 'domino effect' on products or services delivered to the end customer (Zsidisin et al., 2000).

External risk sources comprise any external uncertainties arising that can impact on the supply chain (Jüttner, 2005; Christopher et al., 2002), such as epidemics, natural disasters, civil unrest, socio-political instability or terrorist attacks (Kleindorfer and Saad, 2005; Martha and Subbakrishna, 2002; Swaminathan, 2003). Natural disasters can present a serious threat to a firm's production and transportation system. Due to the globalisation of markets and supply chain operations, local natural disasters are increasingly having direct and indirect global consequences. In addition, environmental risks can overlap with other sources of risk (Mason-Jones and Towill, 1998), and can create supply or demand risks across the supply chain. For example, a fire in a Philips semiconductor plant caused by a lightning strike led to a supply risk downstream in the supply chain in the case of Ericsson and Nokia (Latour, 2001). The earthquake, tsunami

and the subsequent nuclear crisis that occurred in Japan in 2011 caused Toyota's production to drop by 40,000 vehicles, costing $72 million in profits per day (Pettit et al., 2013). The catastrophic Thai flooding of October 2011 affected the supply chains of computer manufacturers dependent on hard discs and also, disrupted the supply chains of Japanese automotive companies with plants in Thailand (Chopra and Sodhi, 2014).

In addition to these three risk sources, disturbance in the material and information flow within the supply chain has been suggested as another source of risk, termed process risk (Christopher and Peck, 2004; Cavinato, 2004; Zsidisin, 2003). Process refers to the sequences of value-adding and managerial activities undertaken by the firm (Christopher and Peck, 2004). These processes are directly dependent on the firm's assets, or reliability of infrastructure, communications and transportation, with process risks being the interruption of these processes (Zsidisin, 2003; Matook et al., 2009). These include the mismatch of business processes (Matook et al., 2009), quality, time, and fluctuating capacity risks associated with logistics and operations (Tang and Tomlin, 2008).

2.3.3. The impact of supply chain disruptions

As the causes of supply chain disruption are diverse, their impact can also vary greatly (e.g. Svensson, 2000; 2002; Cavinato, 2004; Chopra and Sodhi, 2004; Spekman and Davis, 2004; Kleindorfer and Saad, 2005). A supply chain disruption stops or slows the normal flow of material (Craighead et al. 2007), hampering productivity and capacity utilisation for firms (Ellis et al., 2010), thereby leading to a variety of problems, such as stock-outs, long lead-times, and inability to meet customer demand (Svensson, 2000; Chopra and Sodhi, 2004; Riddalls and Bennett, 2002). Whilst profit loss from supply

chain disruption mainly stems from the inability to meet customer demand and inventory mark-downs, such glitches can also increase the cost associated with 'expediting, premium freight, obsolete inventory, additional transactions, overtime, storage and moving, selling, and penalties paid to customers' (Hendricks and Singhal, 2003, pp. 503–504), thereby drive operating costs even higher.

Supply chain disruption can have immediate or delayed negative effects on firm performance over the short and/or long-term (Sheffi and Rice, 2005; Ellis et al., 2010). A long-lasting influence of disruption can impact particularly severely on financial performance, shareholder value and long-term stock price performance (Hendricks and Singhal, 2005; Filbeck et al., 2016). Moreover, disruption mitigation and recovery efforts can be very expensive (Filbeck et al., 2016). Regarding which, using a more than 10-year period of disruption announcements data, Hendricks and Singhal (2005) examined the effect of disruption on stock prices. They revealed that affected firms suffered negative consequences from disruption for more than three years, experiencing 33–40% lower stock returns. Filbeck et al. (2016) noted that supply chain disruptions can hamper a firm's ability to fulfil customer expectations, thereby not only affecting the short and long-term profitability of the company, but also having a negative impact on the firm's reputation, which could have implications for its financial future and ability to raise capital.

A number of studies have addressed the negative effects of supply chain risks on supply chains and the entities involved (e.g. Sheffi and Rice, 2005; Wagner and Bode, 2008; Scheibea and Blackhurst, 2018). While from a single firm's viewpoint, the adverse consequences of risks may interrupt only the firm's goal accomplishment (Svensson, 2002), when it comes to the supply chain, disruptions can not only damage the firm that incurred the failure, but can also jeopardise directly and/or indirectly

linked supply chain entities and their ability to serve effectively the end customer market (Craighead et al., 2007; Oke and Gopalakrishnan, 2009). This is because supply chain disruptions, even very small ones, can propagate through an entire system (Scheibe and Blackhurst, 2018; Blackhurst et al., 2011). For instance, a fire in the Toyota brake supplier plant resulted in the shutdown of 18 Toyota plants in Japan for two weeks and led to $195 million in lost revenues for the company (Tomlin, 2006). For Boeing, when a key supplier failed to deliver critical aircraft parts, this resulted in $2.6 billion losses for the corporation (Blackhurst et al., 2005). Hence, supply chain disruptions may spread through an entire system with serious or even devastating results (Craighead et al. 2007; Blackhurst et al., 2008; Ghadge et al., 2011). Likewise, financial and economic loss from supply chain disruption can be severe and hence, are challenging for firms recovered from. Moreover, when the relationships with partnering firms are damaged from this disruption, the relationship is especially hard to recover and the negative impact on performance can be long-lasting (e.g. Sheffi and Rice 2005; Wang et al., 2014). In 1995, for instance, an enormous earthquake struck Kobe in Japan. The shoe factories in the city, which had been producing 34 million pairs of shoes a year, lost almost 90% of their business in the wake of the earthquake as buyers shifted to other suppliers in Asia, most whom never came back (Sheffi and Rice, 2005).

To minimise a disruption's negative impact on performance, as abovementioned, a firm's speedy response and recovery is essential (Blackhurst et al., 2011). However, the disruption response and recovery stage is the least studied of all SCRM aspects (Sodhi et al., 2012). In the following sections, how entities in the supply chain can mitigate supply chain risks and be able to achieve a timely response, thereby minimising the negative effects, is discussed.

2.4. Mitigating and Controlling Supply Chain Disruptions

2.4.1. Mitigating supply chain risk

To reduce the likelihood of occurrence or prevent of supply chain disruption, mitigation strategies have been proposed (e.g. Nagel et al., 1995; Jüttner et al., 2003; Braunscheidel and Suresh, 2009). Mitigation of supply chain risk refers to the strategic moves that firms deliberately undertake to reduce the uncertainties identified from the various risk sources (Miller, 1992; Jüttner et al., 2003). A number of supply chain researchers have suggested that, to protect against risk and uncertainty, the effective use of safety stock and safety lead-time buffers can be used as a mitigation approach (Tang, 2006; Blackhurst et al., 2008). However, simply adopting such traditional approaches is considered to be less effective than they used to be in preventing supply chain disruption, due to the high complexity and uncertainty in today's business environment (Faisal et al., 2006; Craighead et al., 2007; Thun and Hoeing, 2011). Consequently, alongside buffering strategies, cultivation of the appropriate capabilities to mitigate supply chain disruption is becoming increasingly important (Zsidisin et al., 2005).

Many studies have involved investigating supply chain disruption, with strategies and capabilities that have the potential to reduce its occurrence having been proposed (Kleindorfer and Saad, 2005; Sheffi, 2005; Faisal et al., 2006; Tang, 2006; Tomlin, 2006; Swafford et al., 2006; Craighead et al., 2007; Nooraie and Parast, 2016). For example, Chopra and Sodhi (2004) identified several capabilities for risk mitigation, including cultivation of flexibility and responsiveness. Faisal et al. (2006) suggested several enablers for mitigating supply chain risks, including information sharing, supply chain agility, building trust and forging collaborative relationships. Tomlin (2006) makes the distinction between mitigation tactics (which are taken in advance of

a disruption) and contingency tactics (response tactics which are adopted only if a disruption occurs). The cultivation of flexibility, agility and responsiveness has been frequently emphasised in the disruption mitigation literature (Braunscheidel and Suresh, 2009). These enablers a commonly based on a close relationship and mutual understanding among the supply chain entities (Faisal et al., 2006).

2.4.2. Controlling (response, recovery) supply chain disruptions

While a number of SCRM studies have offered ideas for mitigating supply chain disruptions (e.g. Braunscheidel and Suresh, 2009; Oke and Gopalakrishnan, 2009; Ambulkar et al., 2015), all supply chains are inherently risky and hence, disruptions are unavoidable (Craighead et al., 2007). Consequently, when a company fails to prevent the occurrence of a disruption, being able to figure out ways to respond quickly is important so as to contain the damage (Sodhi et al., 2012). Accordingly, having a successful disruption response and recovery approach may be as important as trying to prevent it in the first place. However, this response and recovery stage has been generally overlooked by the supply chain disruption studies with only a limited number having empirically explored this final phase of SCRM (Sodhi et al., 2012).

Response to disruption is aimed at controlling the situation, shutting down affected systems and/or preventing further damage (Sheffi and Rice, 2005), thereby hastening recovery (Sodhi et al., 2012). Thus, effective response to the disruption can be seen as the ability to respond quickly to a changing situation (Hendricks and Singhal, 2003). Whilst disruption response pertains to the immediate reaction to the crisis, disruption recovery is an ongoing process regarding 'how firms can be effectively recovered from a disruption?', with the optimal aim being to bring back to a normal course of business operating situation (Blackhurst et al., 2005) which is, the state not

under the impact of disruption and supply chain in a normal and planned level of product flow.

To summarise, when it comes to supply chain disruption recovery, a firm's speedy and effective response is essential for minimising the disruption's negative impact on performance (Bode and Macdonald, 2017). That is, a firm's quick response can lead to a quick recovery from the disruption (Blackhurst et al., 2011; Bode et al., 2011; Bode and Macdonald, 2017). This is because response and recovery time are directly related to financial loss: the longer the response and recovery time, the higher the negative impact of the disruption (Blackhurst et al., 2005). This explains why a number of supply chain risk studies have emphasised cultivating the capabilities to respond and recover from disruption in a timely manner, such as supply chain agility, resilience and effective dynamics (e.g. Braunscheidel and Suresh, 2009; Christopher, 2000; Christopher and Towill, 2001; Swafford et al., 2006; Chopra and Sodhi, 2004; Kleindorfer and Saad, 2005; Zhang et al., 2002, 2003; Blackhurst et al., 2005; Ambulkar et al., 2015; Scholten and Schilder, 2015; Bode and Macdonald, 2017). A firm's capabilities in responding to a disruption and fostering recovery are discussed in the following subsections.

2.4.3. Firm's capability to respond and recovery

Firm's response and recovery action to a supply chain disruption sometimes involves their sourcing partners, that is, using temporary sourcing diversification (i.e. temporarily using alternative suppliers) or making a redundant supplier (e.g. Chopra and Sodhi 2004; Whitney et al., 2014). With effective use of safety stock and safety lead-time buffers, use of temporal/multiple supplier strategies is considered to be an effective approach to controlling supply chain disruption (Chopra and Sodhi, 2004;

Tang, 2006; Blackhurst et al., 2008). However, the availability of a sufficient amount of buffers or safety stocks is not always assured. Moreover, many recovery approaches to disruption are unable to draw upon multiple suppliers that can temporarily produce the parts, i.e. such temporary sourcing may not always possible option for the buying firms (Whitney et al., 2014).

It has been frequently stated that the cultivation of flexibility and agility are key components in controlling supply chain disruption (Braunscheidel and Suresh, 2009; Gligor et al., 2015). While both concepts denote the ability to change, supply chain agility can be seen as a capability that is externally focused, whereas supply chain flexibility is an internally focused one that is its antecedent (Braunscheidel and Suresh, 2009). Flexibility is defined as the ability to adapt to unexpected circumstances, with the focus being on an organisation's ability to encounter, resolve, and when appropriate, exploit an unexpected opportunity (Global Logistics Research Team at Michigan State University, 1995). Organisations that are characterised as having a high level of flexibility are more capable of responding to unexpected events, such as a disruption, in a more successful manner when compared to their non-flexible counterparts (Fawcett et al., 1996; Fredericks, 2005; Swafford et al., 2006).

Agility has been defined as 'the ability to efficiently change operating states in response to uncertain and changing market conditions. Agility involves many types of flexibility, and it includes the capability to do unplanned new activities in response to unforeseen shifts in market demands or unique customer request' (Narasimhan et al., 2006). Traditionally, studies have argued that agility is an aspect closely related to the efficacy of strategic supply chain management (Gligor et al., 2015). Supply chain agility is defined as 'the capability of the firm, internally, and in conjunction with its key suppliers and customers, to adapt or respond in a speedy manner to a changing

marketplace, contributing to agility of the extended supply chain' (Braunscheidel and Suresh, 2009, p. 126). Agility is an essential value for both risks mitigation and disruption response (Braunscheidel and Suresh, 2009). Developing a firm's agility is a supply chain disruption management initiative that allows firms to be capable of responding in a timely manner to market changes, as well as to anticipate actual supply chain disruption.

Extant research has also noted that cultivating supply chain resiliency is an effective approach to handling supply chain disruption (Chopra and Sodhi, 2014; Hora and Klassen, 2013; Blackhurst et al., 2011; Jüttner and Maklan, 2011; Zsidisin and Wagner, 2010; Chowdhury and Quaddus, 2016). This has been defined as the capability to anticipate and overcome supply chain disruptions (Pettit et al., 2013). Resilient firms are less vulnerable to disruption and, when supply chain disruption happens, firms are more capable of managing the incident (Sheffi and Rice, 2005; Hendricks and Singhal, 2005; Zsidisin and Wagner, 2010; Blackhurst et al., 2011; Pettit et al., 2013; Ambulkar et al., 2015; Scholten and Schilder, 2015; Chowdhury and Quaddus, 2016). Because resilience helps firms to deal with disruption, this makes them more able to deliver continuously their products and services to the customer (Ambulkar et al., 2015; Chowdhury and Quaddus, 2016). Building resilience is important in order to manage unforeseen and unquantifiable risks (Sheffi and Rice, 2005).

These capabilities can help firms to prepare themselves for neutralising or reducing disruption impact and are essential, because, as aforementioned, it is impossible to eliminate completely risks from a supply chain (Craighead et al., 2007). Hence, it is necessary to identify best practices depending upon the disruption circumstances (e.g. Tang, 2006). As another enabler of disruption recovery, strengthening relationships with the partnering firm (e.g. working closely with partner

for a long time) has been suggested (Kleindorfer and Saad, 2005; Craighead et al., 2007; Scholten and Schilder, 2015). Such buyer-supplier collaborative relationships are discussed in the following subsection.

2.4.4. Buyer-supplier collaborative relationship in disruption recovery

Firm's capabilities such as agility, resilience (Craighead et al., 2007; Chopra and Sodhi, 2004; Kleindorfer and Saad, 2005; Faisal et al., 2006; Braunscheidel and Suresh, 2009; Gligor et al., 2015; Scholten and Schilder, 2015), dynamic capability (Ambulkar et al., 2015) are considered to be effective supply chain disruption recovery enablers. However, achieving quick recovery after a supply chain disruption is still very challenging (e.g. Hendricks and Singhal, 2005; Tang, 2006) even when these factors are in place. This is because it requires appropriate recovery actions (e.g. collective sensemaking, rapid mobilisation and coordination of supply chain resources etc.) that do not just depend on a single firm's effort (Olcott and Oliver, 2014). Thus, achieving successful recovery from a disruption depends on how well the firms are able to work with their partners (Oke and Gopalakrishnan, 2009; Craighead et al., 2007).

Studies have emphasised that building a close relationship with partnering firms can be an efficient disruption response initiator, as it promotes cooperative action when disruption occurs (Jüttner et al., 2003; Giunipero and Eltantawy, 2004; Faisal et al., 2006, Craighead et al., 2007). In particular, the development of social capital in the relationship allows firms to leverage their resources and capabilities as well as sharing information (Nahapiet and Ghoshal, 1998). Social capital theory offers a framework for understanding how organisations can acquire resources and information that exist outside of their boundaries by developing closer ties with partners (Koka and Prescott, 2002; Inkpen and Tsang, 2005), with such collaboration acting as a 'relational glue'

underpinning effective supply chain relationships (McGrath and Sparks, 2005). Moreover, accumulation of social capital in buyer–supplier relationships can facilitate supply chain entities' interactions, thereby promoting collective sensemaking, situational awareness, and coordination of supply chain resources in disruption situations (Olcott and Oliver, 2014). Thus, the question arises as to how the buyer and supplier in the supply chain can accumulate social capital in the relationship?

Underlying the supply chain relationship is the recognition that for both the buyer and supplier involved in economic and social interactions (Griffith et al., 2006), supply chain relationships as social transactions require that both parties prioritise behaving in a 'just manner' that is mutually beneficial (Narasimhan et al., 2013). One party's just manner in the exchange relationship impacts on the firm's relational state, such as the level of trust (Wang et al., 2014) and commitment (Kumar et al., 1995; Anderson and Weitz, 1992). Moreover, supply chain entities' collaborative behaviour is closely related to an input that hugely influences a firm's relationship and behaviour, namely justice (Griffith et al., 2006).

A number of studies have suggested that justice in dealing with partners is essential for enhancing buyer–supplier relationships (Kumar et al., 1995; Choi and Wu, 2009; Anderson and Jap, 2005; Rossetti and Choi, 2005) and developing cooperation (Kim and Mauborgne, 1991; 1998; Luo, 2007; Liu et al., 2012; Narasimhan et al., 2013). Other work has shown that low levels of justice in the relationship results in poor relationship performance due to potential opportunism (Rossetti and Choi, 2005; Anderson and Jap, 2005), which can permanently damage or even lead to the termination of the relationship (Liu et al., 2012).

Despite the relevance of justice in supply chain relationships, investigation of its role in enhancing collaboration in buyer–supplier relationships is still nascent (e.g.

Griffith et al., 2006; Narasimhan et al., 2009). In fact, very few studies have provided an explanation regarding the interactions of justice with its sub dimensions – procedural and distributional – in the context of the buyer–supplier relationships, whilst discussion of justice theory in the SCRM context is even scarcer. The following section provides a literature background to justice, and explanation its two dimensions.

2.5. Organisational Justice Theory

2.5.1. Definition of justice

Organisational justice is a concept that has long been studied in organisational research. From a theoretical point of view, it is considered as the foundation for all types of social and economic relationships and exchanges (Thibaut and Walker, 1975; Greenberg, 1993; Lind and Tyler, 1988). Justice theory has led many scholars to apply the central concepts of justice to various contexts, for instance, regarding the layoff process (Konovsky and Brockner, 1993), the selection of individuals (Gilliland, 1994), reward distribution (Dulebohn and Martocchio, 1998; Scarpello and Jones, 1996), performance evaluation (Korsgaard and Roberson, 1995), conflict resolution (Goldman et al., 2008), strategic alliance performance (Luo, 2007; 2008), contract (Katok and Pavlov, 2013; Ho et al., 2014) and exchange performance (Poppo and Zhou, 2014).

The majority of early justice studies tended to focus on the individual level (Li and Cropanzano, 2009). One explanation for this could be that the primary notions of justice (or fairness, Colquitt, 2001) were developed from equity theory (Adams, 1965), which explains an individual's judgment in terms of his/her perceived level of justice (e.g. Folger and Konovsky, 1989; McFarlin and Sweeney, 1992). Individuals are considered to be subject to their organisation's decision as to 'what is fair' (Colquitt, 2001).

However, justice can be operationalised at the group or inter-organisational levels (Li and Cropanzano et al., 2009), as a collective level of fairness, which emerges from interaction among parties (Roberson, 2006). Studies that have investigated justice issues at the inter-organisation level, have included the contexts of distribution channels (Kumar et al., 1995), supply chain relationships (Griffith et al., 2006), strategic alliances (Luo, 2005; 2007), and the supply chain disruption (Wang et al., 2014). Recent research has shown that justice perceptions in the buyer–supplier relationship are essential and that a high level can promote collaborative relationships (Luo, 2007; 2008; Liu et al., 2012; Poppo and Zhou, 2014).

Colquitt (2011, p. 1183), defined justice as 'perceptions of fairness in decision-making and resource allocation environments', based on Greenberg's (1987) study. Later, Greenberg and Colquitt (2013, p. 6) defined organisational justice as 'people's perception of fairness in an organization'. While organisational justice is widely accepted and examined as a multifaceted concept, its definition being separately established by each dimension's distinct role, there is no commonly accepted definition that can justify its multidimensional nature as a whole. Early studies focused on the result of organisational justice, termed distributive justice (Homans, 1961; Adams, 1965; Leventhal, 1976), which refers to the fairness of a decision's outcome (Adams, 1965). This can be determined by assessing whether the perceived ratio of outcomes to inputs is equivalent to those of a comparative other (Adams, 1965) or whether resource distributions match with appropriate norms (Leventhal, 1976). Later, studies started to focus on fairness in the processes that lead to decision outcomes, termed procedural justice (Leventhal, 1980; Thibaut and Walker, 1975). This was focused on perceived fairness of decision-making procedures (Thibaut and Walker, 1975; Leventhal, 1980). Procedural justice can be evaluated by the extent of accuracy, consistency, suppression

of bias, ethicality, correctability and the degree to which voice is allowed during the decision-making process (Thibaut and Walker, 1975; Leventhal, 1980).

2.5.2. Dimensions of justice

In accordance with the dominant idea that there are two justice elements, namely distributive and procedural justice, in this study, these are adopted, with their generally accepted definitions (e.g. Li and Cropanzano, 2009; Cropanzano et al., 2005; Luo, 2007; Narasimhan et al., 2013). Each term's definition with more detailed explanation is provided in the next subsections.

2.5.2.1. Distributive justice

The concept of distributive justice was suggested by Homans (1961) and extended by Adams (1965). Homans (1961) put forward the idea that individuals tend to be more worried about whether outcomes are fair rather than what the actual outcomes are (Greenberg, 1987). Equity (or equity rule) is a very important part of distributive justice since social behaviour is greatly affected by the belief that their perceived outcomes of what members in a group receive in an exchange should be proportional to their contributions (Adams, 1965). When Adams (1965) introduced his equity rule, he defined distributive justice as equity. He contended that distributive justice exists when individuals perceive that the ratio of outcomes to inputs is equivalent to those of the other(s). Equality has been considered to be distributive justice's another important aspect, which implies that member in a group should receive the same amount regardless of their inputs (Beugre, 1998; Deutsch, 1975). That is, when using the "equality" rule, distributive justice is said to occur when every member of a given social group receives the same outcomes. However, equity rule implies that parties should

receive rewards that are consistent with the inputs they contribute, relative to a referent (Colquitt, 2001; Meyer, 2001). As Williams (1999) has pointed out, the majority of distributive justice studies within justice research have been based on Adams' (1965) equity rule, inferring that rewards should be allocated equitably among exchange partners in relation to their contribution. Moreover, other researchers, such as Greenberg (1987) have adopted these views, showing that much of the fairness research of the 1960s and 1970s was dominated by equity theory based distributive justice (Cohen, 1987).

Numerous studies on distributive justice have been conducted at the individual level. Specifically, such studies link perceptions of distributive justice to various aspects, such as workers' motivations, absenteeism, turnover, organisational politics, personnel selection, stress, pay satisfaction, job satisfaction and performance (e.g. Folger and Konovsky, 1989; McFarlin and Sweeney, 1992; Colquitt et al., 2001; Cropanzano and Kacmar, 1995; Folger and Cropanzano, 1998; Folger and Greenberg, 1985; Lind and Tyler, 1988).

Later, a number of supply chain studies involved investigating the role of distributive justice in the buyer–supplier relationship (e.g. Kumar et al., 1995; Griffith et al., 2006; Narasimhan et al., 2013). Given under distributive justice it is held that the fairness of returns in a relationship should be based on the expended effort, the relationship performance outcomes in the supply chain context are believed to be fair, if one's investment in resources and effort compare favourably with outcomes, from the buyer–supplier relationship perspective (Narasimhan et al., 2013). This means that organisations will be motivated to maintain the relationship and exchange partners will be more likely commit to one another, even in high uncertainty situations (Narasimhan et al., 2013). That is, a buyer's distributive fairness perception of a supplier increases

the buyer's commitment (Anderson and Weitz, 1992) and willingness to invest in the relationship (Kumar et al., 1995). In addition, a high level of distributive justice in a buyer–supplier relationship is associated with a reduced level of opportunism (Luo, 2007). On the other hand, inequity in expended efforts and distributed reward can cause harmful results for the relationship that may include a low level of trust and an increase in conflict, thereby causing an insecure buyer–supplier relationship (Johnson et al., 2002).

2.5.2.2. Procedural justice

Procedural justice is defined as the 'extent to which the dynamics of the decision process are judged to be fair' (Kim and Mauborgne, 1998, p. 325). The central tenets of procedural justice were introduced by Thibaut and Walker (1975), who suggested that individuals often tend to be concerned about fairness in the decision-making process; when they perceive that they have 'control' over the process, they view procedures as fair.

Procedural justice is derived from the notion of instrumentality (Luo, 2007), which refers to the levels of consistency in decision-making (Loch and Wu, 2007). Under the instrumental view, it is assumed that parties do not commonly have information regarding the strategic partners' trustworthiness, or any information regarding the final gains shared. Thus, when a party perceives that it is able to participate in the decision-making procedures, perceiving the trustworthiness of a positive response is more likely than if the converse is the case (Lind, 2001). Hence, distribution of these process controls or decision-making procedures among individuals or parties is the key driver regarding the fairness of the procedures.

In buyer–supplier relationships, procedural justice is manifested through clarity

of expectations as well as involvement in and explanation of the decision-making procedures (Kim and Mauborgne, 1998; Narasimhan et al., 2013). These characteristics signify unbiasedness, as well as consistency across cooperative relationships (Luo, 2008). In addition, when both the buyer and supplier perceive procedural justice in the relationship, they are more willing to continue with and to invest in it, as they know that their benefits from the relationship will be well protected through consistent use of procedures and policies (procedural justice) (Liu et al., 2012; Kumar et al., 1995). Additionally, studies suggest that procedural justice promotes knowledge sharing (e.g. Liu et al., 2012), long-term orientation (e.g. Griffith et al., 2006) and strategic performance (e.g. Luo, 2007).

Compared to the other justice dimension, procedural justice can have a more significant role in nourishing trust in the relationship (Folger and Konovsky, 1989; Konovsky and Pugh, 1994; Konovsky and Cropanzano, 1991; Cohen-Charash and Spector, 2001). For, while distributional justice concerns reactions just towards resource allocations, procedural justice evokes cognitive reaction towards the whole organisation (Cohen-Charash and Spector, 2001; Lind and Tyler, 1988) and hence, is considered to play a more profound role in the organisational relationship (e.g. Wang et al., 2014). Additionally, research has often shown a significant relationship between procedural and distributive justice, whereby perceptions of fair procedures impact on the perceived fairness of the outcomes (e.g. Folger, 1987; Korsgaard and Roberson, 1995; Konovsky, 2000; Brashear et al., 2005). This is because voice in decision procedures (procedural justice) provides a direct/indirect way to ensure fair decision making and thus, fairness in outcome can be increased (distributive justice) (Brashear et al., 2005). Folger and Cropanzano (1998) even suggest that the evaluation of outcomes (distributive justice) as favourable or unfavourable is due in part to the

fairness of processes (procedural justice).

2.5.3. Organisational justice theory and social capital theory

The concept of justice has been considered as a foundation for social and economic exchanges and relationships (Adams, 1965; Greenberg, 1993; Lind and Tyler, 1988; Liu et al., 2012; Narasimhan et al., 2013). Buyer–supplier relationships involve both economic and social interactions (Griffith et al., 2006; Liu et al., 2012) with such relationships requiring partners to behave in a just manner for them to be beneficial (Narasimhan et al, 2013). In several studies, it has been contended that justice in dealings with partners is essential for developing collaborative relationships (Kumar et al., 1995; Choi and Wu, 2009; Anderson and Jap, 2005; Rossetti and Choi, 2005).

Studies discern two different dimensions of justice (distributive and procedural justice) and its positive effect on organizational relationship and behaviours (Kumar et al., 1995; Choi and Wu, 2009; Anderson and Jap, 2005; Rossetti and Choi, 2005; Griffith et al., 2006; Liu et al., 2012; Narasimhan et al., 2013). Justice perceptions among parties creates a climate of fairness among them (Mahajan and Benson, 2013), which helps to remove the fear of exploitation that is often associated with interactions in buyer–supplier relationships (Anderson and Weitz, 1992; Luo, 2009). Accordingly, parties in an exchange relationship are encouraged to be involved in social interaction (Oh et al., 2004; Tsai and Ghoshal, 1998) and can find benefits in continuing the relationship (Griffith et al., 2006). Additionally, as justice helps firms to find advantages in maintaining the relationship (Kumar et al., 1995), this can be a strong motive for each party to commit to it (Narasimhan et al., 2013). That is, they are more willing to work cooperatively and to nourish a party's commitment to joint efforts, thereby increasing the acceptance of collective goals and values (Folger and Konovsky,

1989; Brockner, 2002; Tyler and Blader, 2000; Luo, 2008) Hence, drawing on these views, the position adopted for this thesis is that there is a positive association between justice and organisational relationships as well as associated behaviours. That is, it is held that perceived justice in the buyer – supplier relationship can contribute to the accumulation of social capital. The following section provides more detailed explanation of the meaning of social capital and its sub-dimensions.

2.6. Social Capital Theory

2.6.1. The concept of social capital theory

Since its introduction by Coleman (1988), the concept of social capital has received considerable attention among researchers, including political economists (e.g. Granovetter, 1973), sociologists (e.g. Bourdieu, 1986; Granovetter, 1973), and organisational researchers (e.g. Nahapiet and Ghoshal, 1998; Putnam, 1993; 1995). Social capital theory's primary proposition is that the inter-connection of relationships can constitute a valuable resource for the conduct of social affairs, providing their members with 'collectively-owned capital, a "credential" which entitles them to credit, in the various senses of the word' (Bourdieu, 1986: p. 249).

Social capital is embedded within networks of mutual recognition and acquaintance (Nahapiet and Ghoshal, 1998). For instance, through 'friends of friends' (Boissevain, 1974), parties in a network can gain privileged access to opportunities and information. In addition, it has been recognised that durable obligations can be created from feelings of respect, friendship and gratitude or from the institutionally guaranteed rights derived from membership in a family, class or school (Bourdieu, 1986). While in early studies, the importance of relationships as a resource for social action was generally agreed upon, they lacked a consensus on a precise definition of social capital

(Nahapiet and Ghoshal, 1998). Nahapiet and Ghoshal (1998) adopted the view that potential or actual resources can be accessed through network ties (Putnam, 1995; Bourdieu, 1986; 1993), and defined social capital as the "sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit" (Nahapiet and Ghoshal, 1998, p. 243).

While the growing body of supply chain research that builds on social capital theory is indicative of its relevancy and value to the discipline (Krause et al., 2007; Cousins et al., 2006; Lawson et al., 2008), one of the key challenges regarding its application, is, as Adler and Kwon (2002) have cautioned, that it has become an 'umbrella concept' (Hirsch and Levin, 1999), which means many different things to many different people. Consequently, researchers (e.g., Adler and Kwon, 2002; Hirsch and Levin, 1999; Moran, 2005) have stressed the need for clearer definitions of social capital and identification of the boundaries of the theory. In alignment with previous studies that also have had an inter-organisational unit of analysis, in this work, the definition presented by Nahapiet and Ghoshal (1998) is adopted.

2.6.2. Dimensions of social capital

As a set of resources rooted in relationships, social capital has various attributes (Nahapiet and Ghoshal, 1998) and hence, the theory has to be examined as a multifaceted concept (e.g. Carey et al., 2011; Son et al., 2016). Nahapiet and Ghoshal (1998) suggested three dimensions of social capital: cognitive (shared culture, vision and values), structural (strength and number of ties between actors), and relational capital (trust, obligation and identification). In the following sections each of these dimensions is discussed in turn.

2.6.2.1. Cognitive capital

Cognitive capital is 'those resources providing shared representations, interpretations, and systems of meaning among parties' (Nahapiet and Ghoshal, 1998 p. 244). Tsai and Ghoshal (1998) noted that, from an intra-firm perspective, cognitive capital can be explained through shared vision, common goals and aspirations of the actors. Cognitive capital is present when they have shared perceptions of collective goals and how they should interact. In a knowledge transfer context, Inkpen and Tsang (2005) introduced the concept of culture to conceptualisation of cognitive capital, arguing that goal congruence and shared culture are the primary characteristics of this form of capital.

Members with shared cultures constrain their undesirable behaviour and facilitate their actions and in favour of collective interests (Coleman, 1988). The set of established norms and rules that govern appropriate behaviour by partners facilitates collective actions within a social structure (Gulati et al., 2000). Such shared norms and rules reduce the possibility of opportunistic behaviours and promote the parties' coordination of interests, thereby lowering monitoring costs and increasing commitment (Ouchi, 1980). Shared culture indicates the extent to which norms of behaviour rule the relationships, whereas shared goals refer to the extent of entities' mutual understanding of a shared approach to the achievement of common tasks and consequences (Villena et al., 2011). The development of shared goals can guide the nature, direction and magnitude of the parties' efforts (Jap and Anderson, 2003). Cognitive capital provides a referent frame for the parties' behavioural norms and common understanding of collective goals, which increases commitment to achievement of network outcomes (Gulati et al., 2000; Jap and Anderson, 2003; Rossetti and Choi, 2005).This is because, committed members have a greater

understanding of why the relationship exists and how compatible goals can be accomplished through their contribution (Jap, 1999).

Cognitive capital facilitates active resource exchange, as it helps parties to acknowledge the potential value of the combination and integration of their resources (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998), thereby reducing the occurrence of conflict (Jap and Anderson, 2003; Inkpen and Tsang, 2005). The establishment of cognitive capital within buyer–supplier relationships has been linked to greater improvement in flexibility, delivery, quality and cost (Krause et al., 2007). When values and goals are shared in the exchange relationship between buyers and their key suppliers, continued interactions should result in a self-reinforcing process of members in sense-making, whereby the members interact and collectively construct a collective understanding (Weick, 1995). In sum, cognitive capital is represented by shared congruence of goals, values and shared vision, through which the committed parties – buyer and supplier – may get a deeper understanding of their behavioural norms and common goals within the relationship.

2.6.2.2. Structural capital

Structural capital pertains to the pattern of connections between parties; 'who you know and how you reach them' (Burt, 1992). It is associated with the configuration of connections within a social structure (Nahapiet and Ghoshal, 1998) and explained by the presence and density of social ties (Inkpen and Tsang, 2005; Bolino et al., 2002) as well as the strength of such social interactions (Tsai and Ghoshal, 1998; Oh et al., 2004). These social ties between the parties are based on the existence of their configurations and connections within a relationship, which can offer access to valuable information (Coleman, 1990). Studies have shown that partnering firms need to have dense interactions to build structures within relationships; multiple connections are required

in order to access more reliable information and exchange diverse information (Koka and Prescott, 2002; Capaldo, 2007). In the case of dense interactions (i.e. more frequent interactions among parties), information is more readily interchangeable and therefore, can be made available earlier than were it otherwise (Burt, 1992).

In addition, structural capital has been defined as social interaction ties, which emphasises the parties' social interactions, both formal and informal (e.g. Tsai and Ghoshal, 1998; Oh et al., 2004; Lawson et al., 2008; Yli-Renko et al., 2001; Carey et al., 2011; Li et al., 2014; Son et al., 2016). Social interaction ties are defined as purposefully designed, specialised processes or events, implemented to coordinate and structurally embed the relationship between the buyer and supplier, which promotes cooperation (Nahapiet and Ghoshal, 1998; Cousins et al., 2006). Formal socialisation involves specific structural formats for engagement, such as regular meetings and conferences or cross-functional teams (Cousin et al., 2006), which are aimed at the transmission of knowledge and understanding (Kraimer, 1997). Informal socialisation can occur through the relationship often outside the physical setting of work (Oh et al., 2004), such as engaging in social events with each other (Oh et al., 2004; Cousin et al., 2006). Such informal interaction can create value alignment and congruence (Kraimer, 1997), thereby strengthening the reciprocity norm and increasing trust (Cousin et al., 2006). Additionally, buyer–supplier frequent interactions through formal/informal socialisation allow them to access a diversity of reliable information (Koka and Prescott, 2002; Krause et al., 2007), whilst also leading to faster resolution of problems and coordinated inter-firm processes (Heide and Miner, 1992; Uzzi, 1997; Dyer and Nobeoka, 2000). Thus, structural capital based on frequent interactions within the buyer–supplier relationship allows for special opportunities that facilitate meeting diverse competitive advantages (Lawson et al., 2008). In sum, structural capital

promotes the provision of valid, diverse information to achieve active coordination, problem resolution in a timely manner, and the formulation of common strategies.

2.6.2.3. Relational capital

Relational capital refers to the friendship, obligations, respect and trust that parties have developed with each other through a history of interactions (Nahapiet and Ghoshal, 1998; Kale et al., 2000). Through such repeated interactions, actors can develop trust in each other and cultivate reciprocity and friendship within their relationship. In this regard, relational capital can be described as the strength of the relationship built over time (Krause et al., 2007).

Trust is considered one of the essential components of relational capital (Inkpen and Tsang, 2005; Coleman, 1990; Fukuyama, 1995). Existing studies have noted that trust tends to be increased with the length of the buyers and suppliers' relationship (Helper, 1991; Sako and Helper, 1998). When there is a high level of trust, decision makers tend to have less concern about the other party's opportunistic behaviour (Blau, 1964; Jarillo, 1988) and lower their perceptions of exchange hazard (Deeds and Hill, 1998). Hence, exchange partners are more likely to engage in open communication. Through continuous communication and transactions, furthermore, the development of friendship, respect and reciprocity can be expected (Kale et al., 2000). Conversely, when there is a lack of relational capital, this causes associating organisations to withhold potentially relevant resources, which increases uncertainty within the relationship (Uzzi, 1997; Dyer and Chu, 2003; Perrone et al., 2003). Studies on buyer–supplier relationships have also shown that when trust is built between buyers and suppliers, this increases the length of time that they work together (e.g. Lawson et al., 2008; Inkpen and Tsang, 2005; Cousin et al., 2006). Moreover, as the main benefit,

trust promotes cost reductions and improves problem-solving capabilities (Stuart et al., 1998).

A number of studies show that relational capital helps improve performance within the buyer–supplier relationship (e.g. Uzzi, 1997; Dyer and Singh, 1998; Kale et al., 2000). The essential requirements for relationship development – aspects such as trust, friendship, respect and reciprocity (Kale et al., 2000) – contribute to raising the willingness to cooperate and decreasing monitoring costs even beyond contractual provision. For instance, relational capital provides privileged access to important resources (Uzzi, 1997; Kale et al., 2000), increases the willingness of those involved to take further risks and accept higher investment in achieving improved strategic and operational benefits, whilst also fostering the motivation to engage in joint value creation (Dyer and Singh, 1998). In addition, a number of studies have revealed relational capital's benefits in terms of flexibility, productivity, quality and improved cost (Dyer and Chu, 2003) as well as information sharing and innovation (Capaldo, 2007).

Some researchers examining the relationships among the dimensions of social capital and have suggested that relational capital can be influenced by cognitive and structural capital (Gittell, 2002; Inkpen and Tsang, 2005; Tsai and Ghoshal, 1998; Carey et al., 2011). Relational capital stems from the availability of shared values, common beliefs, and adherence to the associated norms of behaviour (cognitive capital) (Nahapiet and Ghoshal, 1998). Also, socialisation facilitates interactions between the buyer and supplier, with the openness of this interaction encouraging behavioural transparency and discouraging free-riding and information asymmetries in the relationship, thereby increasing trust and commitment (Carey et al., 2011). In sum, relational capital, built through a history of interactions, can be described as trust,

respect, friendship and reciprocity in the relationship, which raises the willingness to cooperate and decreases monitoring costs, thereby improves operational performance and further facilitating cooperation with partners.

2.6.3. Social capital at the individual and firm levels

The term 'social capital' initially emerged in studies of community, at the collective level (Nahapiet and Ghoshal, 1998). This stream of collective level social capital research held that interpersonal relationships developed over time provide the basis for cooperation, trust and collective action in communities (e.g. Cemea, 1993; Spence, 1993; Putnam, 1993; 1995; Jacobs, 1965; Nahapiet and Ghoshal, 1998). Many organisational researchers believe that social capital can be facilitated at the individual level as well and thus, early usage of the term also stressed the importance of social capital for individuals. However, some researchers have pointed out that the application of social capital at the individual level is sometimes problematic, because the individual's assessment of other people's value (e.g. individual's abilities and skills, job search, hiring, and promotion) is not only difficult to measure, but also can be determined by non-relational aspects, such as their own preferences and prejudices (e.g. Spence, 1974; Cooper, 1981; Rosenbaum, 1990; Burt, 1997). For instance, promotions are based on performance appraisal systems that attribute qualities to employees on the basis of contextual factors, such as race, sex and class (Cooper, 1981; Rosenbaum, 1990), which are often inconsistent with actual performance or ability. Hence, sociologists have argued that 'structural factors' may have as much of a role in determining an individual's abilities (Lin, 1990).

Evidence of the importance of structural factors can be found in Granovetter's (1973) study regarding individual job search. This study showed that individuals who

had a 'network of social ties', specifically a number of weak ties in their personal network, were more likely to find a job and receive valuable information. The notion of 'social ties' provides the fundamental idea of social capital. Social ties, as channels of information, facilitate possession of key knowledge and controlling that flow of information may create entrepreneurial opportunities (Burt, 1992; 1997). Furthermore, interactions between actors establish a pattern of expectations and obligations that are based on norms of equity and reciprocity (Coleman, 1990). The basic argument underlying this stream of research is that such social ties increase access to and promote better use of resources, thud resulting in more successful individual action and outcomes (Lin, 1990). Consequently, such connections and ties establish the social capital that enables the social actor to seek further benefits (Coleman, 1988; 1990).

Based on the idea that firms can be seen as 'purposive social actors', several researchers, including Coleman (1988), Burt (1992), Walker et al. (1997) and Nahapiet and Ghoshal (1998), have sought to extend the concept of social capital to the level of groups, institutions, organisations and firms. These researchers have shown that organisations in the course of their business activities establish and maintain a variety of 'inter-firm ties'. These inter-firm ties facilitate the exchange of a variety of resources, such as knowledge, information and other forms of capital (Coleman, 1988). Hence, ties represent valuable social capital. This can incorporate buyer–supplier relationships, joint memberships and strategic alliances in industry associations, among other things (e.g., Nahapiet and Ghoshal, 1998; Krause et al., 2007; McFadyen and Cannella Jr., 2004; Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005).

2.6.4. Social capital in buyer-supplier relationships

The central tenet of supply chain management is the extension of the value creation process beyond the firms' boundaries. Proponents recognise the necessity to integrate

the business process with other actors in the supply chain, such as manufacturers, suppliers and customers (Tan et al., 1998). Cooperation with these different actors helps develop synergies and has been shown to lead to superior performance. To achieve this cooperation, organisations must, therefore, invest in these supply chain relationships, focusing on collaboration, integration and coordination of processes (Sanders, 2008). In particular, the development of social capital in the relationship has been deployed to explain how firms acquire the necessary resources through collaborative relationship, thereby achieving superior performance (e.g. Koka and Prescott, 2002; McGrath and Sparks, 2005; Carey et al., 2011).

To provide evidence that social capital leads to superior performance, many researchers have examined its impact on performance in various fields, and with a range of different measures (Lawson et al., 2008). Former studies that have involved investigating the buyer–supplier relationship effects on buyer–supplier performance have primarily focused on the role of relational capital (e.g. Johnston et al., 2004; Cousins et al., 2006). Researchers have also begun to analyse the cognitive and structural dimensions in terms of their effects on several aspects of performance, including lead time, quality, delivery, flexibility and cost (e.g. Lawson et al., 2008). Specifically, there has been examination of relational capital's effect on buyer firm performance (e.g. Cousins et al., 2006); structural and relational capital on buyer performance (e.g. Lawson et al., 2008); as well as cognitive and structural capital in explaining firm performance in terms of quality, flexibility and delivery (e.g. Krause et al., 2007).

The three dimensions of social capital are interconnected, but the vast majority of studies in a supply chain context have focused on the effects of only single or dual facets, with the notable exceptions of Krause et al. (2007), Carey et al. (2011) and

Johnson et al. (2013). In particular, Carey et al. (2011) adopted a holistic view to examine the relationships between all three dimensions, testing their differential effect on cost and innovation performance improvement for buying firms. They found that the relational dimension can mediate the relationship between both the cognitive and structural dimensions, and the buying firm's innovation and cost improvement. Johnson et al. (2013) also took this holistic approach to gain an understanding of how social capital can be used for building supply chain resilience. They examined how Nahapiet and Ghoshal's (1998) three dimensions of social capital can facilitate the four formative capabilities for supply chain resilience, as identified by Jüttner and Maklan (2011): flexibility, velocity, visibility and collaboration.

However, some researchers have considered the 'dark side' of social capital, with the aim of providing a more balanced view of social capital (e.g. Villena et al., 2011). Regarding which, whilst social capital can create value for partnering buyers and suppliers, scholars have warned about the over embeddedness in the relationship (Yli Renko et al., 2001; Adler and Kwon, 2002; Cousin, 2006; Inkpen and Tsang, 2005; Ireland and Webb, 2007; Villena et al., 2011). In fact, social capital's benefits can backfire for firms in various ways (Cousin, 2006). High solidarity, which means the degree of closure in a group (akin to high levels of structural capital), can hinder the flow of new ideas into the group, thereby fostering inertia and thus, resulting in the creation of fewer or no novel ideas (Adler and Kwon, 2002). The firm may lose flexibility in its decision making (Gargiulo and Benassi, 2000), or discriminate against new, potentially better partners, due to obligations and reciprocity in established relationships (Kern, 1998; Villena et al., 2011). This may restrict firms from effectively adapting or responding to changes in the market and environment, which can eventually jeopardise performance (Uzzi, 1997; Kern, 2000; Villena et al., 2011). Strong social

capital in young firms has been associated with both a relational and cognitive 'lock-in' relationship with partners, which restrains adaptability to changing requirements (Maurer and Ebers, 2006). In a similar vein, in a study of supply chain complexity and supply chain disruption frequency, Bode and Wagner (2015) found that having relationships with multiple suppliers for each tier (horizontal complexity), the number of tiers (vertical complexity), and the extent of the dispersion within the network (spatial complexity), can all be sources of supply chain disruption.

2.6.5. Social capital and supply chain disruption

A great deal of attention has been paid in the literature to understanding the differential effects of social capital dimensions on different aspects of buyer–supplier performance (e.g. Krause et al., 2007; Lawson et al., 2008; Carey et al., 2011). Buyer-supplier relationships do not exist in a vacuum, for they are influenced by the environment that surrounds them. Much of this literature, however, has considered the buyer-supplier relationship as an entity independent of its external environment.

In considering social capital's three dimensions and their specific characteristics, it is apparent that they could have a profound effect on the management of supply chain disruptions. For example, cognitive capital can facilitate collective sense-making (Weick, 1995) between buyer and supplier, thereby aiding reciprocal awareness and common understanding of the situation (Johnson et al., 2013). Relational capital allows for privileged access to key resources (Uzzi, 1997; Kale et al., 2000), and thus, improves a firm's ability to reconfigure resources, which is critical for firm survival and superior firm performance in high uncertainty situations (Sapienza et al., 2006; Sirmon et al., 2007; Davis et al., 2009), such as disruptions. Finally, structural capital may facilitate frequent communication (Lawson et al., 2008) and rapid information

transfer (Cousins et al., 2006), thus enabling efficient and timely reactions to the occurrence of an expected event (Johnson et al., 2013).

Accumulation of social capital and its sub dimensions facilitate the coordination and development of a close relationship among the buyer-supplier, thereby promoting firms engagement in collective action to achieve a timely response and recovery from supply chain disruption. However, very few studies, to date, have investigated the application of social capital theory in the SCRM context with a notable exception being that of Johnson et al. (2013). Jonson et al. (2013) adopted Nahapiet and Ghoshal's (1998) three dimensions of social capital and examined how social capital can facilitate the formative capabilities - flexibility, velocity, visibility and collaboration - for supply chain resilience.

Likewise, accumulation of social capital in the relationship helps parties to achieve successful disruption response and recovery by facilitating collective action. In addition to social capital, use of power - forcing others to gain compliance – can also be an initiator for motivating parties to engage in action for response and recovery. Alongside social capital, power is considered to be another important supply chain attribute that influences the parties involved in developing their relationship and in managing supply chain practice (Bachmann, 2001; Yeung et al., 2009). Power in the buyer-supplier relationship is believed to be interrelated with components of social behaviour (Nyaga et al., 2013). In particular, among the dimensions of social capital, relational capital (and its sub factors such as trust, reciprocity etc.), have been suggested as being positively or negatively associated with power (Bachmann, 2001; Hart and Saunders, 1997; Ireland and Webb, 2007; Kumar et al., 1998; Nyaga et al., 2013; Pulles et al., 2014). In the following section, the literature regarding power in the buyer-supplier relationship is reviewed and then, there is a focus on its association with

relational capital.

2.7. Power in supply chains

Power, the capability to influence or constrain the behaviour of another (Hunt and Nevin 1974), is a central concept in understanding the supply chain relationship and behaviour (Handley and Benton, 2012; Huo et al., 2017; Reimann and Ketchen, 2017; Morgan et al., 2018). Supply chain power contains both a structural and a behavioural choice attribute (Chen et al., 2016). The structural one pertains to the level of dependence between exchange partners (e.g. a supplier dependent on a buyer for a large percentage of sales affords that buyer a degree of power) (Carr et al., 2008; Emerson, 1962), whilst the behavioural choice refers to the use or non-use of power to influence the other partner's behaviour (e.g. a buyer offers incentives, such as increased business or shared cost reductions, to drive supplier performance improvement) (Maloni and Benton 2000, Benton and Maloni 2005).

Power refers to "the ability of one individual or group to control or influence the behaviour of another" (Hunt and Nevin, 1974, p. 186). The concept of power is based on French and Raven's (1959) seminal work in which they classified power into five sources: expert, referent, legitimate, coercive, and reward power. Expert power is present when one firm has specific expertise and knowledge that the other firm desires. Referent power exists when one firm admires the way another conducts its operations and thus, values being identified with it. Legitimate power is present when the supplier believes the buyer retains natural right to influence it. Coercive power exists when one firm has the ability to exert punishment to influence another firm. Reward power exists when one firm has the ability to offer rewards intended to influence the target firm (French and Raven 1959; Brown et al., 1995; Zhao et al., 2008).

A number of studies have adopted this framework to classify power sources in supply chain research (e.g. Maloni and Benton, 2000; Benton and Maloni, 2005; Handley and Benton, 2012). These power sources are grouped into mediated and non-mediated power (Zhao et al., 2008; Nyaga et al., 2013). The term mediated refers to explicit attempts to "bring about some direct action" (Benton and Maloni, 2005), in contrast, non-mediated power bases are not explicit actions (Frazier and Summers, 1984; Maloni and Benton, 2000) and the target (recipient) firm decides whether and if so, how it will be influenced by the firm wielding the power (Zhao et al., 2008). Non-mediated power sources are more relational and positive and consist of expert, referent and legitimate power (Benton and Maloni, 2005; Nyaga et al., 2013).

Mediated power sources include coercive and reward power (Zhao et al., 2008). They involve "influence strategies that the source specifically administers to the target", with an "intention to bring about some direct action" (Benton and Maloni, 2005). Unlike non-mediated power, use of mediated power is deliberately controlled by the power dominant firm, that is, the firm offering punishment / reward decides whether, when and how to use their power to influence the other's behaviour (Zhao et al., 2008). While coercive power sources often reflect explicit forms of coercion, reward power may be viewed as an implicit form of coercion, for withholding reward is an act of punishment for non-compliance or failure to achieve set performance goals (Nyaga et al., 2013).

Firms in supply chains are conditioned by the power to make substantial investments to maintain their relationships (Cox, 2001). Dominant firms can use their power to gain a greater share of relationship benefits, favourable exchange terms, or to coerce other parties into doing what they would otherwise not do (Nyaga et al., 2013). Regarding the dominant and recipient party in supply chain relationships, the majority

of supply chain studies indicate that the buyer (focal company) is usually in a position of power over the supplier (manufacturer) (e.g. Benton and Maloni, 2005; Ireland and Webb, 2007; Zhao et al., 2008). This is because supply chains generally consist of a number of suppliers and relatively few buyers who purchase components from suppliers. Such an oligopolistic procurement structure has created an unbalanced power environment in which buyers tend to be more powerful (Benton and Maloni, 2005).

A buyer uses mediated power (coercive and reward power) to produce intended changes in the supplier's behaviour by deliberately controlling the reinforcements guiding the supplier's response (e.g. Ramsay, 1996; Maloni and Benton, 2000). Thus, the successful application of buyer power results in the intended changes in the behaviour of the supplier (Ramsay, 1996). However, a buyer's failed attempts in this regard will result in no change in the supplier's behaviour or even lead to undesirable behaviour. For example, if a buyer decides to punish a supplier by reducing its business with this supplier, the supplier may become reluctant to make investment in processes that could have benefited the buyer (Pulles et al., 2014).

Studies have warned that the use of power, especially coercive power, can gain short-term compliance at the expense of damaging longer-term intrinsic commitment to the relationship (e.g. Handley and Benton, 2012; Kumar, 2005). However, a buyer's appropriate use of power - successful application of exerted punishment (coercive power) and offer of reward (reward power) to gain compliance from the supplier - can improve supply chain coordination (e.g. Zhao et al., 2008). Regarding which, Belaya et al. (2009) posit that power can be used as an "effective tool in coordinating and promoting harmonious relationships, resolving conflicts, and therefore, enhancing performance of the whole supply chain network." That is, while some researchers have suggested that use of power, especially coercive power can result in instability and

conflict (e.g. Lawler and Yoon, 1996; Ireland and Webb, 2007; Pulles et al., 2014), others have argued reward based power also can contribute to promoting stability, as is the case in supply chain networks where a powerful focal firm plays a major role in coordinating other parties (Nyaga et al., 2013). Hence, application of power can have a positive or negative effect on supplier coordination and resource allocation (Pulles et al., 2014). Accordingly, a buyer needs insight into how coercive and reward power relate to supplier resource allocation (Pulles et al., 2014). In the disruption response and recovery context, a powerful buyer firms' appropriate use of coercive and reward power can gain immediate compliance from the supplier for coordination and resource allocation by directly controlling or influencing behaviour (e.g. Pulles et al., 2014), thereby ensuring a successful recovery of the supply chain from the disruption.

2.7.1. Power and relational capital

Following supply chain disruption, firms are expected to have appropriate disruption recovery action, such as rapid mobilisation and coordination of supply chain resources to minimize negative impact from the disruption and a return to a back to normal operational situation, which is, the state not under the impact of disruption and supply chain in a normal and planned level of product flow. (e.g. Craighead et al., 2007; Braunscheidel and Suresh, 2009; Olcott and Oliver, 2014; Ambulkar et al., 2015). As such actions for recovery hugely rely on sourcing partners and cannot be achieved through a single firm's effort, building a close relationship with partnering firms as a recovery enabler has been emphasised (Jüttner et al., 2003; Giunipero and Eltantawy, 2004; Faisal et al., 2006, Craighead et al., 2007). Such a relationship facilitates supply chain entities' interactions, promotes collective sensemaking between parties (Olcott and Oliver, 2014), and can foster coordination of supply chain resources in a disruption

situation (Craighead et al., 2007).

In particular, relational capital in the relationship can offer benefits that can lead to successful recovery from a disruption situation (e.g. Olcott and Oliver, 2014).The development of relational capital allows privileged access to key resources of others (Uzzi, 1997; Kale et al., 2000), and thus, improves a firm's ability to reconfigure resources, which is critical to firm survival and superior performance even in high uncertainty situations (Sapienza et al., 2006; Sirmon et al., 2007; Davis et al., 2009). Relational capital can reduce opportunism in the relationship (Dyer and Singh, 1998) and encourage resource commitment of the counterpart by reducing its fear of opportunism (Coleman, 1990; Zaheer et al., 1998; Kale et al., 2000). Hence, the development of relational capital in the relationship has been suggested as a key mechanism for explaining access to the other party's resources and information (Krause et al., 2007; Johnson and Elliott, 2011).

Alongside relational capital (and its key factors, such as trust), power is considered to be another important relational attribute that influences parties in the supply chain to develop their relationships and manage supply chain practice (Bachmann, 2001; Yeung et al., 2009). Studies have been undertaken to address the association of power and key aspects of relational capital (such as trust, reciprocity and commitment) in the supply chain relationship. Regarding which, for instance, it has been elicited that both trust and power play vital roles in developing interorganisational relationships (Bachmann, 2001) and suggested that the use of coercive power determines the level of trust (Hart and Saunders, 1997). Firms will be more likely to be fully committed to supply chain relationships when trust and coercive and reward power are simultaneously managed between the parties (Ireland and Webb, 2007). In addition, the presence of trust and power in the supply chain increases the probability

of a firms' investment in a supply chain alliance (McCarter and Northcraft, 2007). The norm of reciprocity and commitment in the relationship can be enhanced when the buyer uses reward based power (Kumar et al., 1998; Nyaga et al., 2013), whereas the deployment of coercive power can decrease commitment in the relationship (Nyaga et al., 2013).

As the different types of power are believed to be positively or negatively interrelated components of social behaviour (Nyaga et al., 2013), thus, power can be a complementary or oppositional component of relational capital (e.g. Ireland and Webb, 2007; Yeung et al., 2009). Coercive power and relational capital are opposing components of social behaviour, with use of the coercive power potentially increasing the amount of economic and psychological costs, thereby ultimately undermining trust (Kumar, 2005; Yeung et al., 2009; Ireland and Webb, 2007; Leonidou et al., 2008), which lies at the heart of relational capital (Coleman, 1990; Johnson et al., 2013). One central role of relational capital in the buyer-supplier relationship is reducing the expectation of opportunistic behaviour and decreasing transaction costs, thus lowering the safeguards and facilitating a closer relationship (e.g. Dyer and Singh, 1998; Ring and Van de Ven, 1994; Gulati, 1995). However, the buyer's use of coercive power makes the supplier realise that the buyer manages to succeed by taking advantage of their dependence on it (Ke et al., 2009), which is viewed as buyer opportunism, where it expects to gain at the expense of the supplier (Nyaga et al., 2013). This makes the supplier more likely to seeking greater safeguard, which hinders having a closer relationship, ultimately weakening the relationship and deteriorating the relational benefit (e.g. Bucklin and Sengupta, 1993; Yeung et al., 2009; Nyaga et al., 2013).

In contrast, when power is not used exploitatively or coercively, there is an overall improvement in relationships (e.g. Cox, 2001; Maloni and Benton, 2000;

Ireland and Webb, 2007), for non-coercive forms of power (reward power) and relational capital are complementary components (e.g. Ireland and Webb, 2007; Pulles et al., 2014). The buyer's use of reward power represents their ability to contribute resources to a relationship, and it increase a supplier's trust by providing the perception that the powerful party has the capability of fulfilling the necessary obligations of a transaction (Ireland and Webb, 2007). Additionally, as reward power is based on the idea that parties cooperate in relationships with the expectation of giving and receiving rewards, this supports a norm of reciprocity (Pulled et al., 2014), as embodied in relational capital.

While a number of researchers have suggested the association of power and relational capital in the supply chain, they have rarely paid attention to the potential interaction effect on supply chain disruption recovery. Moreover, despite supply chain scholars having expressed great interest in relational capital and power, an in-depth examination of prior studies indicates that most research has been focused on the effects of the sole relationship in supply chain management, with little attention being paid to the interaction effect of power and relational capital. In particular, the interaction effects between the two have not been empirically tested.

III. Conceptual Model and Hypothesis

3.1. Overview of the chapter

The aim of this chapter is to develop a conceptual framework based on the literatures and the proposal of hypotheses to examine the relationships between the identified constructs. To develop this conceptual framework, the previous chapter has involved reviewing literature in the areas of justice, social capital, supply chain disruption and power. First, the relationship between justice perception and social capital accumulation is hypothesised. Second, the proposed model can consider the effect of social capital on supply chain disruption recovery performance. For this study, it is held having a high level of perceived justice between buyers and suppliers can contribute to the accumulation of social capital between them, prior to the disruption. Once a disruption occurs, during the process of response and recovery, this social capital can facilitate the coordination of parties in responding more effectively and thus, response and recovery from the disruption can be achieved.

To pay attention to dyadic nature of supply chain, this study adopt both buyer and their matched supplier's perspective. Most of existing studies have typically involved investigating justice, social capital and supply chain disruption from a one-sided perspective, i.e. only that of the buyer or supplier. Whilst it is still important to understand a single party's perspective, due to the dyadic nature of supply chain and a firm's exchange relationship, understanding both parties' perceptions and their impact on their relationship and performance is more salient (Palmatier et al., 2007; Liu et al., 2012). Unfortunately, the use of a single participant in a study of supply chain relationships can result in an exception fallacy, i.e. an erroneous finding where researchers draw biased aggregate or group conclusions among stakeholders on the

basis of a single rater (Roh et al., 2013). Operations management researchers should be aware of such "exception fallacies that can occur when wrong inferences are drawn from the unit of analysis" (Roth, 2007, pp. 359).

Collecting data from a single side of a multi-stakeholder construct poses a problem, if it creates a major source of measurement error between an observed variable and the construct it is intended to represent (Roh et al., 2013). In addition, these types of errors are insidious, as they are not generally detected through conventional quantitative assessment techniques (Hair et al., 2016). Furthermore, single rater bias threatens the validity of a study's conclusions, as such errors provide a credible alternative explanation for the phenomena of interest (Boyer and Verma 2000, Rosenthal and Rosnow 2008). Accordingly, numerous researchers over the past several decades have called for studies that examine perspectives from each side of multi-stakeholder constructs (e.g. Boyer and Verma, 2000, Carter, 2000; Ellram and Hendrick, 1995; John and Reve, 1982; Klein et al., 2007; Malhotra and Grover, 1998; Roh et al., 2013; Son et al., 2016).

Additionally, social capital is considered to be to be the sum of the potential and actual resources embedded within the relationships (Nahapiet and Ghoshal, 1998). Hence, capturing a single side of a supply chain relationship is not the best way to assess the social capital accumulation in the relationship. Thus, focusing on both parties of the dyad and understanding to what extent both parties agree that they share social capital is important (Son et al., 2016). Capturing both sides of the supply chain relationship is also important for understanding supply chain disruption. The negative impact of such disruption permeates through a supply chain and the involved parties (Scheibe and Blackhurst, 2018; Blackhurst et al., 2011), and hence, disruption recovery action (e.g. rapid mobilisation and coordination of supply chain resources etc.) cannot be down to

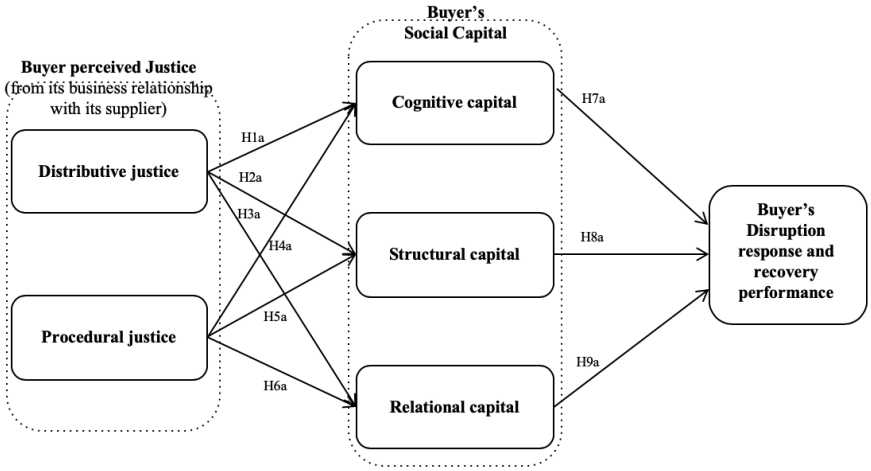
a single firm's effort (Olcott and Oliver, 2014). In sum, using both parties' perspective is a more appropriate way to investigate supply chain disruption and disruption recovery. Accordingly, in this study, a buyer-supplier dyadic perspective – buyer and its matched supplier who experience the same supply chain disruption – is adopted to investigate how the buyer's perceived justice from interaction with the supplier in the relationship impacts on the buyer's social capital accumulation and the same matter is probed for the supplier. Then, this impact on the buyer's disruption recovery performance is examined and so too, is the supplier's. By capturing both the buyer's and its supplier's perspective, this can contribute to understanding the dyadic nature of the supply chain and supply chain risk management.

This study comprises two different time phases: 'before the supply chain disruption' and 'after the supply chain disruption occurred'. The establishment of buyer-supplier justice and social capital perception is through a history of exchange in a continuous relationship. Hence, the relationship between justice perception and accumulation of social capital is captured in the time phase 'before the supply chain disruption'. Subsequently, to identify the coordination and collective action promoting role of social capital in the relationship in achieving successful response and recovery from the disruption, the time phase of the disruption situation is examined as well. Thus, the relationship between accumulated social capital in the relationship and disruption response and recovery performance is captured in the 'after the supply chain disruption occurred: in the disruption situation' time phase.

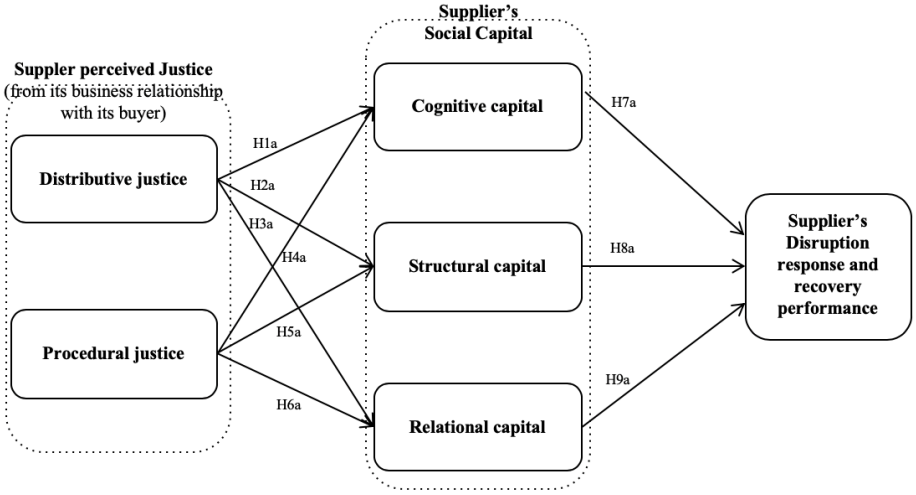
The proposed model is set to investigate the relationship among the two dimensions of organisational justice (distributive and procedural justice) and three dimensions of social capital (cognitive, structural, and relational capital). It also examines the relationship between the three dimensions of social capital and the firm's

disruption recovery performance. Figure 3.1 and 3.2 illustrate these relationships from the buyer and supplier perspective, respectively.

<Figure 3. 1: Conceptual Model for the study 1: Buyer>



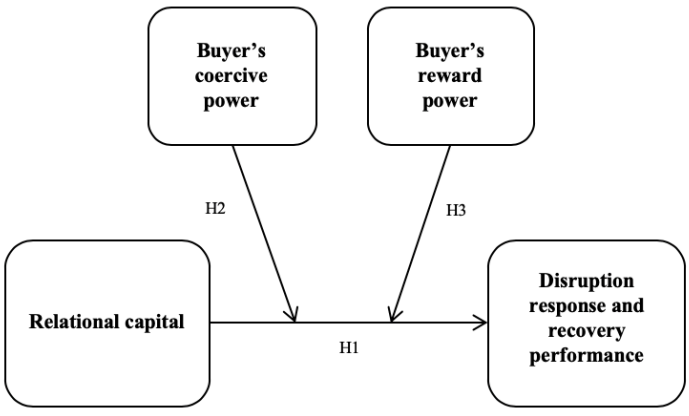
<Figure 3. 2: Conceptual Model for the study 1: Supplier>



Finally, second study is to examine the moderating role of different types of buyer power exhibited in the relationship between relational capital and disruption response and recovery performance. Relational capital between the parties permits privileged

access to key resources of others (Uzzi, 1997; Kale et al., 2000) as well as motivating the parties in the supply chain to take additional risks and cooperate, even beyond contractual provisions (Villena et al., 2011). In a disruption situation, thus, the buyer firm can use its relational capital as a supply chain disruption response and recovery initiator, with the expectation of the supplier's cooperation in achieving a successful recovery. In order to accelerate the supplier's action regarding disruption response and recovery, the buyer can also use its power (coercive and reward) to influence the supplier to engage in collective action. Coercive and reward power, as two different responses by the buyer that can be differentially associated with their social behaviour. That is, they can both produce an interaction effect with relational capital on the buyer and supplier that can impact on the disruption response and recovery. In the second study, the moderating role of the buyer's intention to use coercive and reward power in the relationship between relational capital and disruption response and recovery performance is investigated, Figure 3.3 illustrating these relationships.

<Figure 3. 3: Conceptual Model for the study 2: Mutual perspective>



In the following sections, the development of hypotheses linking justice and social capital, and social capital and disruption response and recovery performance

from the buyer, and the supplier (Figure 3.1 and 3.2) is presented. Then, for the second study, hypotheses regarding the moderating role of the buyer's mediated power in the relationship between relational capital and disruption recovery performance are put forward (Figure 3.3).

Hypotheses for the 1st study

3.2. Organisational Justice and Social Capital Theory

3.2.1. Distributive Justice and Social Capital

The primary notion of distributive justice, developed from equity theory (Adams, 1965), pertains to assessment of the level of justice, specifically, deciding upon 'what is fair' regarding the extent of allocation of an output (Colquitt, 2001). Distributive justice refers to the fairness of a decision's results. It can be determined by assessing whether the perceived ratio of outcomes to inputs is equivalent to those of a comparative other (Adams, 1965) or whether resource distributions match appropriate norms (Leventhal, 1976), such as equity or equality (Colquitt, 2001). Among the distributive justice's equity and equality rule, this study adopt equity rule. This is because purpose of distributive justice in exchange relationship is not for socioemotional reward (e.g., friendliness) but for output maximisation through fair allocation of economic reward (e.g., profit sharing) (Kabanoff, 1991), thus distributive justice in buyer-supplier relationship is about to receive reward that proportionate their input, not about receive equal amount of reward regardless of contribution.

When the distribution of rewards/return is equivalent to the efforts, parties in the exchange relationship are willing to commit to one another, even in a high uncertainty

situation (Narasimhan et al., 2013). As a result, they can find benefits in continuing the relationship, and thus, possibly promote a closer relationship. For instance, a high level of the supplier's justice may lead to the buyer's commitment and willingness to invest in the relationship (Kumar et al., 1995). Likewise, a supplier's distributive justice raises the buyer's commitment to the relationship (Anderson and Weitz, 1992). Extending the positive association between distributive justice and collaborative intention and behaviour, it is posited here that a buyer and supplier's perception of distributive justice fosters the accumulation of different types of social capital between them.

3.2.1.1. Distributive Justice and Cognitive Capital

The definition of cognitive capital used in this study is 'those resources providing shared representations, interpretations, and systems of meaning among parties' (Nahapiet and Ghoshal, 1998, p. 244). This dimension of social capital encompasses the shared cultures, values and goals between the parties in a relationship (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005). Parties who perceive fairness in outcome distribution are more likely to bring their goals and values close together (e.g., aligning their differences in interpretation and assumptions in information sharing).

Perceived fairness in the allocation of the outcome (distributive justice) can motivate parties to conform to a norm of equity or fairness that has the power to affect their attitudes and behaviour (e.g. MacKenzie et al., 1993; Netemeyer et al., 1997). This suggests that parties who are rewarded fairly might be more positive in their attitude and more willing to act in ways that support the relationship, which in turn, increases commitment to its mutual goals and values (Coote et al., 2004). Additionally, distributive justice has been positively associated with higher levels of

mutual behaviour (Bosse et al. 2009). In other words, distributive justice is consistent with the development of mutually supportive behaviours, which result in stronger agreements on expectations (Rouziès and Hulland, 2014). That is, to meet the expectations in the relationship, the parties may make an effort to align their priorities and differences to one another, and thereby prioritise mutual goals and value for further cooperation.

Additionally, distributive justice in the relationship can give the promise that the distribution of rewards to each party is equivalent to the effort they expend, which can be a strong motive for each party to maintain the relationship (Walker and Pettigrew, 1984; Narasimhan et al., 2013). This is because parties who receive a fair distribution of outcomes can see their own benefits as being interdependent with the performance in the relationship (Jap, 1999), which will make them willingly adjust and sacrifice self-interests for mutual benefit (Bosse et al., 2009). In this process, mutual goals and values in the relationship can be promoted. Moreover, fair allocation of output encourages transparency of communication between parties (Luo, 2009), which leads to less ambiguity and possibility of misunderstanding in the communication. It consequently encourages the participants to develop common understandings (e.g. common situational awareness etc.).

In this sense, distributive justice in the relationship fosters co-values and congruent goals in the relationship, helping both parties to have a common understanding (cognitive capital). Hence, when there is high level of distributive justice in the relationship, it helps those involved to accumulate cognitive capital.

Hypothesis 1a. The buyer's perception of distributive justice in its relationship with the supplier is positively related to the level of the buyer's cognitive capital in

the buyer-supplier relationship.

Hypothesis 1b. The supplier's perception of distributive justice in its relationship with the buyer is positively related to the level of the supplier's cognitive capital in the buyer-supplier relationship.

3.2.1.2. Distributive Justice and Structural Capital

In the literature, structural capital has been operationalised as the presence and density of social ties (Inkpen and Tsang, 2005; Bolino et al., 2002), as well as through the development of formal and informal social interactions (Tsai and Ghoshal, 1998; Oh et al., 2004; Carey et al., 2011). For this study aligns, the latter approach of operationalising structural capital through social interaction ties is adopted. Specifically, structural capital is positioned as purposefully designed, specialised processes or events, implemented to coordinate and structurally embed the relationship between the buyer and supplier, and thus, promoting cooperation in the dyadic buyer–supplier relationship (Nahapiet and Ghoshal, 1998; Yli-Renko et al., 2001; Cousins et al., 2006; Carey et al., 2011).

Organisations with a strong emphasis on distributive justice are likely to facilitate social interaction between parties. This is because they are satisfied with what they earn from the relationship, which stimulates the parties into making the effort to be more connected with each other (Leana and Van Buren, 1999; Luo, 2009). Kumar et al. (1995) suggested that when the distribution of rewards is equivalent to the efforts, firms can find benefits in maintaining the relationship, and hence actively seek further connection with their partner. That is, high levels of distributive justice perceptions among parties create a climate of fairness among them, which, in turn, helps each to interact with the

other (e.g. Mahajan and Benson, 2013), thereby, formal/informal socialisation is facilitated in the exchange relationship.

Fair allocation of reward/return also reduces hazards, such as withholding information and shirking obligations by another party (Luo, 2009). Fairness in outcome distribution helps firms to lessen the worry of such exploitation (Skarlicki and Folger, 1997; Tyler and Bies, 1990), thereby encouraging parties in an exchange relationship to contact each other more frequently and initiate social interaction. Hence, when there is high level of distributive justice in the buyer-supplier relationship, this helps both parties to obtain structural capital.

Hypothesis 2a. The buyer's perception of distributive justice in its relationship with the supplier is positively related to the level of the buyer's structural capital in the buyer-supplier relationship.

Hypothesis 2b. The supplier's perception of distributive justice in its relationship with the buyer is positively related to the level of the supplier's structural capital in the buyer-supplier relationship.

3.2.1.3. Distributive Justice and Relational Capital

The definition of relational capital in this study pertains to the friendship, obligations, respect and trust that parties have developed with each other through a history of interactions (Nahapiet and Ghoshal, 1998; Kale et al., 2000; Carey et al., 2011). Relational capital can be described as the strength of the relationship built over time (Krause et al., 2007; Carey et al., 2011).

Distributive justice can lead to the parties' cooperative efforts and motivate them

to work towards joint gains (Luo, 2009). Bosse et al. (2009) suggested that the parties in the exchange relationship conform to the norms of reciprocity by adjusting their contribution to the relationship so as to match the perceived level of distributive justice. That is, when a firm believes that its contributions to the relationship are fairly rewarded, it reciprocates by developing a stronger bond with the partner (Cropanzano et al., 2002; Griffith et al., 2006). Additionally, the parties will be more committed to the relationship when they perceive that it will be compensated commensurately (Walker and Pettigrew, 1984). Furthermore, high levels of perceived distributive justice encourage confidence in, and commitment to the relationship (Liu, 2012). Through repeated interactions, parties can develop trust in each other and norms of reciprocity and friendship within the relationship. Hofer et al. (2012) suggested that when a party perceives fairness in distribution of the outcomes, it will believe that the other party is reliable and can be trusted.

In contrast, if the reward is perceived as unfair, this could be considered a violation of the psychological contract (Hill et al., 2009), resulting in a sense of inequality and maltreatment (Davis and Todd, 1985). This can have harmful consequences for the relationship, such as a negative impact on the level of trust (Hill et al., 2009; Leonidou et al., 2013; Kaynak et al., 2015) and an increase in conflict, thus resulting in an unstable partnership (Johnson et al., 2002; Narasimhan et al., 2013). It has been suggested that when reward is not equivalently allocated, this can cause a sense of equity distress to the members in the relationship. That is, the members may feel anger resulting from underpayment inequity or guilt resulting from overpayment inequity (Colquitt et al., 2012). Those negative perceptions are often associated with tendencies of action, such as withdrawal or retaliation, both of which could weaken the development of reciprocity and trust in the relationship (Colquitt et al., 2012). Put

differently, fairness in reward distribution in the relationship fosters the establishment of stronger bonds, norms of friendship, reciprocity and trust. It follows that:

Hypothesis 3a. The buyer's perception of distributive justice in its relationship with the supplier is positively related to the level of the buyer's relational capital in the buyer-supplier relationship.

Hypothesis 3b. The supplier's perception of distributive justice in its relationship with the buyer is positively related to the level of the supplier's relational capital in the buyer-supplier relationship.

3.2.2. Procedural Justice and Social Capital

The definition of procedural justice adopted for this study is the extent to which the acquirer makes an effort to assure fairness of processes in decision making in the form of allowing involvement or even providing for an ability to control procedures (Thibaut and Walker, 1975). When both parties, buyer and supplier, perceive there to be procedural justice in the relationship, they are more willing to continue and to invest in it, as they know that their benefits from it will be well protected through consistent standards and policies (Liu et al., 2012; Kumar et al., 1995).

3.2.2.1. Procedural Justice and Cognitive Capital

Procedural justice in the relationship contributes to the establishment of norms and standards of expected behaviour that promote cooperation (Tyler, 1989). A just process encourages an organisation's willingness to serve in the larger interest of a relationship (Cropanzano et al., 2007; Narasimhan et al., 2013), and also helps to minimise

interparty incongruities in the strategic orientation, corporate culture, and managerial style (Shenkar and Zeira, 1992). It is agreed that with a high level of procedural justice in the relationship, parties can identify the needs, desires, and expectations of the partnering firm, thus making it more willing to work cooperatively (Hofer et al., 2012). This nourishes a party's commitment to joint effort, thereby increasing acceptance of collective goals and values (Folger and Konovsky, 1989; Brockner, 2002; Tyler and Blader, 2000; Luo, 2008).

Liu et al. (2012) used the example of Walmart China to show that a high level of procedural justice perception in the relationship signifies consistency of the exchange process. When parties perceive there to be fairness in procedures surrounding the exchange, they are more likely to commit to the relationship's shared values and goals that promote cooperative outcomes (Luo, 2008). A number of studies have suggested that procedural fairness perception fosters the acceptance of collective values (Folger and Konovsky, 1989; Kim and Mauborgne, 1998) as well as establishing a mutual understanding of the process (Larson, 1992; Liu, 2012), common policy, norms and standards in the relationship (Tyler, 1989). In sum, a high level of procedural justice perception makes it possible for the buyer and the supplier to establish a common understanding and expectation of goals, and norms between the two parties (Larson, 1992), that is, cognitive capital can be accumulated.

Hypothesis 4a. The buyer's perception of procedural justice in its relationship with the supplier is positively related to the level of the buyer's cognitive capital in the buyer-supplier relationship.

Hypothesis 4b. The supplier's perception of procedural justice in its

relationship with the buyer is positively related to the level of the supplier's cognitive capital in the buyer-supplier relationship.

3.2.2.2. Procedural Justice and Structural Capital

Fairness of processes (procedural justice) signals to the parties in exchange relationship that the other one will not act in self-interest, which minimises or even removes the fear of exploitation and conflict (Shapiro and Brett, 2005; Luo, 2005; Arin˜o and Ring, 2010), with the involved parties considering the relationship to be "fair play" (Luo et al., 2012). As this relationship continues, the confidence levels increase (Luo, 2007), which is often associated with improved openness and communication in buyer–supplier relationships (Luo, 2005). Procedural justice, in sum, provides the basis for interaction with the other party (Tyler and Blader, 2001; Narasimhan et al., 2013).

A number of researchers have acknowledged the role of procedural justice in facilitating communication and interaction among buyers and suppliers (e.g. Tyler and Blader, 2001; Hofer et al., 2012; Narasimhan et al., 2013). Kumar et al. (1995) suggested that procedural justice in the relationship motivates the parties willingly to interact with each other. Hofer et al. (2012) noted that when a party perceives the processes utilised by the other party to manage its account to be fair, it engages actively in communication and information sharing. Hence, when a party establishes procedurally just policies, its partner reciprocates by raising its interactive behaviour, though such as more active connection and social interaction (Griffith et al., 2006). As a result of procedural justice in the relationship, parties may more willing to be connected and initiate coordination for further connection, including the organisation of and participate in formal/informal social interaction. In this sense, when a high level of procedural justice is perceived in the relationship, it can strengthen the buyer and

supplier's structural capital in the relationship.

Hypothesis 5a. The buyer's perception of procedural justice in its relationship with the supplier is positively related to the level of the buyer's structural capital in the buyer-supplier relationship.

Hypothesis 5b. The supplier's perception of procedural justice in its relationship with the buyer is positively related to the level of the supplier's structural capital in the buyer-supplier relationship.

3.2.2.3. Procedural Justice and Relational Capital

Relational capital is represented by the reciprocity, trust, friendship and respect that parties have established with each other through a history of interactions (Nahapiet and Ghoshal, 1998; Kale et al., 2000). When a party perceives that the other's policies and procedures in dealing and managing its relationship are fair (procedural justice), this implies that the other party understands and agrees with the policies and procedures involved in the relationship. It signals that the parties' benefits are well protected through the policies (Liu, 2012). This, in turn, will make the participants in the exchange relationship more willing to engage with and invest in the relationship (Liu, 2012). Hence, fair procedures are associated with positive attitudes toward the relationship (Lind and Tyler, 1988). As a result, it increases the overall relationship quality (Kumar et al. 1995) and the development of trust in it (Korsgaard et al., 1995; Liu, 2012). A number of studies have emphasised the trust-fostering role of procedural justice (Korsgaard et al. 1995; Folger and Konovsky, 1989; Alexander and Ruderman, 1987; Kumar et al., 1995; Hofer et al., 2012; Konovsky and Pugh, 1994; Masterson et

al., 2000). By contrast, when the processes are seen as unfair, the parties may well not believe the promises that the opponent makes with regard to relationship (Luo, 2007) and also exhibit self-interest, because of the lack of trust (Narasimhan et al., 2013).

Procedural justice in the relationship signifies to the parties that they are respected members of a group (Lind and Tyler, 1988). When there is high level of procedural justice in the relationship, the parties acknowledge a clear level of engagement, explanation and expectations in the relationship, which contributes to members feeling that they are valued and respected (Korsgaard et al., 1995; Kim and Mauborgne, 1998). Additionally, having input into a decision makes members feel the other party values them and affirms their status in the relationship (Korsgaard et al., 1995). In contrast, if one party's input is solicited but ignored, or they have no right to have an input in the process, it will not think it is a respected member in the relationship (Korsgaard et al., 1995). Accordingly, when a party perceives that the other party is treating it with a high level of procedural justice, the buyer/supplier's relational capital can be enhanced.

Hypothesis 6a. The buyer's perception of procedural justice in its relationship with the supplier is positively related to the level of the buyer's relational capital in the buyer-supplier relationship.

Hypothesis 6b. The supplier's perception of procedural justice in its relationship with the buyer is positively related to the level of the supplier's relational capital in the buyer-supplier relationship.

In this section, links between justice (distributive and procedural justice) and social capital (cognitive, structural, and relational) have been proposed from the buyer and

supplier dyadic perspective to see how fairness in the relationship can contribute to the accumulation of social capital between them. In the following sections, there is the development of hypotheses linking social capital and disruption recovery performance subsequent to supply chain disruption.

3.3. Social Capital and Disruption Recovery performance

A supply chain disruption can have a severe negative impact on the financial and operational performance of a firm (Hendricks and Singhal, 2003, 2005; Wagner and Bode, 2008; Narasimhan and Talluri, 2009). It can also negatively influence the capacity and productivity utilisation for the buying firm and consequently, interfere with its ability to satisfy its customers (Ellis et al., 2010).

Response is aimed at controlling an actual disruption so as to lower the potential damage and to hasten recovery (Sodhi et al., 2012). Studies have shown that quick response from disruption is essential, as recovery time is directly related to financial loss: the greater the response time, the higher the negative impact of the disruption (Blackhurst et al., 2005). This explains why a number of supply chain risk studies have emphasised the importance of responding to disruption in a timely manner (e.g. Braunscheidel and Suresh, 2009; Christopher, 2000; Christopher and Towill, 2001; Swafford et al., 2006; Chopra and Sodhi, 2004; Kleindorfer and Saad, 2005; Zhang et al., 2002, 2003). Furthermore, since supply chain disruptions not only has an immediate negative effect but also, delayed, long-term negative effects on supply chain performance (Sheffi and Rice, 2005), quick recovery needs to be achieved to minimise the impact of the disruption.

However, achieving speedy response and recovery from supply chain disruption is challenging (e.g. Hendricks and Singhal, 2005; Tang, 2006). In order to ensure this, appropriate actions needs to be taken by both firms, such as rapid mobilisation and

coordination of resources (Ambulkar et al., 2015), which cannot be achieved by a single firm's effort (Olcott and Oliver, 2014). In this sense, developing closer relationships with key partners in the supply chain is considered as being essential for managing supply chain disruption effectively (Giunipero and Eltantawy, 2004). This is because a closer relationship with partnering firms promotes cooperative action in a disruption situation and this can be an efficient mitigation initiator (Jüttner et al., 2003; Faisal et al., 2006, Craighead et al., 2007).

Social capital has been considered as 'relational glue' that underpins successful supply chain relationships and collaboration (McGrath and Sparks, 2005). In addition, it provides theoretical framing that helps in the understanding of how firms acquire resources and information from outside their boundaries by developing closer ties with others (Koka and Prescott, 2002). In this study, the framework of social capital is utilised to understand how supply chain entities' use of their relationships for the promotion collective action can offer benefits for achieving successful recovery from a disruption situation (Olcott and Oliver, 2014). In the following three sections, how these three different dimensions of social capital (cognitive, structural, and relational capital) can contribute to parties' coordination and collective action in a disruption affecting situation, thereby achieving timely response and recovery, is presented.

3.3.1. Cognitive capital and disruption recovery performance

To deal with supply chain disruptions, parties need to put mutual effort into the coordination of capabilities, realignment of their existing resources and processes (Ambulkar et al., 2015) as well as restructure their resource base (Sirmon et al., 2007; Eddleston et al., 2008), to overcome the slowing or stoppage of planned production. Since these actions cannot be achieved by a single firm's effort, the parties need to

share a common goal and have mutual understanding as this makes coordination and mobilisation of resources easier (Olcott and Oliver, 2014). Despite intensive use of such coordination with partnering firms (e.g. dual/multi-sourcing) having several potential drawbacks, such as increased complexity and frequency of disruptions in supply chain, coordination contributes to their being capable of mitigating supply chain disruption (Bode and Wagner, 2015).

Cognitive capital, with the mutual values, rules and/or goals it embodies, promotes interaction and the development of common understandings, whilst also supporting collaborative efforts towards accomplishing goals and tasks (Inkpen and Tsang, 2005). When goals and values are shared among the exchange relationship, continued interactions result in an ongoing and self-reinforcing process of participation in sense making as the parties interact and socially construct a shared understanding (Weick, 1995). In the context of supply chain disruption response and recovery, this self-reinforcing process of sense making can be expected to improve its speed and effectiveness. Shared goals and values in the relationship facilitates the participants to have common situational awareness that supports collaborative efforts towards achieving tasks and goals (Krause et al., 2007; Johnson et al., 2013). This can lead to greater improvement in coordination and collective action when faced with disruption response and recovery. Conversely, when goals and values are incongruent, misunderstandings and misinterpretations may arise, thus resulting in conflict (Johnson et al., 2013), which can have a harmful effect on firms' collective action for recovery.

Such mutual values, goal congruence and shared understanding (cognitive capital) can help firms to have common situational awareness and contribute to their having coordination with partnering firms, thereby being able to take collective action in terms of problem resolution. Furthermore, this helps to prevent incongruence and

misinterpretations that can arise during the disruption recovery process (e.g. Ro et al., 2016), and is therefore, expected to deliver a speedy and effective response and recovery. Extending this view, established cognitive capital in the relationship may help firms to achieve successful disruption recovery.

Hypothesis 7a. The buyer's cognitive capital in its relationship with a supplier is positively related to the buyer's supply chain disruption response and recovery performance.

Hypothesis 7b. The supplier's cognitive capital in its relationship with a buyer is positively related to the supplier's supply chain disruption response and recovery performance.

3.3.2. Structural capital and disruption recovery performance

Structural capital influences access to other members, timing, referral to those with resources as well as information (Burt, 1992), and knowledge sharing (Koka and Prescott, 2002; Lawson et al., 2008; Carey et al., 2011). Established structural capital in the buyer-supplier relationship helps firms to engage in formal/informal socialisation and interactions, thereby helping parties to share information. This shared information can contribute to them achieving successful response and recovery. In a disruption situation, before parties in the supply chain can take action for response and recovery, they need to have appropriate information regarding their situation, such as each firm's damage from the disruption, what is the first priority, and what resources and what options are available for implementing a contingency plan. Otherwise, incongruence in collective action for recovery may result due to each party's different situation and

viewpoint (e.g. Corsten and Kumar, 2005; Nyaga et al., 2010). Without information sharing, identifying the disruption and its negative effect will prove difficult and thus hinder any-agreement regarding the recovery process.

While information sharing is essential for disruption recovery, this can be interrupted, as supply chain disruptions can have a negative affect not only on materials or product flows, but also, on those of information across organisation borders (LaLonde, 1997; Jüttner et al., 2003). Given strong socialisation promotes information sharing (Dyer and Nobeoka, 2000), established structural capital can help firms to do so even in a disruption situation. This is because structural capital - organised social events and team building between the buyer and supplier - facilitates social interaction, which encourages parties to have behavioural transparency. That is, firms actively share information without worrying about the other party's free-riding and information asymmetries in the relationship (Carey et al., 2011). In the context of making successful response to supply chain disruption, both parties can exchange necessary information to implement a contingency plan more efficiently, such as the first priority of the situation for the supply chain, alternative delivery options, and availability of resources. Additionally, structural capital (social interaction ties) have also been positively related to value creation and improvement of performance in buyer–supplier relationships (Kale et al., 2000; Cousins et al., 2006), because developed social capital provides a forum where parties can share information and identify gaps that may exist in the current situation (Carey et al., 2011).

When it comes to supply chain disruption response, sharing of appropriate information has to be prompt. This is because, as previously explained, the longer the response, the greater the negative impact of the disruption (Blackhurst et al., 2005). Structural capital influences the information transfer speed concerning resource

alternatives and opportunities between the parties of a supply chain, thereby impacting upon how quickly a supply chain can respond to a disruption (Johnson et al., 2013). Hence, established structural capital promotes firms engaging in information sharing for disruption recovery through frequent communication, social interactions and rapid information transfer (Cousins et al., 2006; Lawson et al., 2008), thus enabling efficient and timely reactions to the occurrence of an unexpected event (Johnson et al., 2013).

Hypothesis 8a. The buyer's structural capital in its relationship with a supplier is positively related to the buyer's supply chain disruption response and recovery performance.

Hypothesis 8b. The supplier's structural capital in its relationship with a buyer is positively related to the supplier's supply chain disruption response and recovery performance.

3.3.3. Relational capital and disruption recovery performance

While the supply chain disruption requires firms to have collective action for successful recovery, those facing it may be reluctant to make an effort to coordinate their resources and capabilities due to concerns surrounding the other party's opportunism in the situation. For instance, one party can put a great deal of effort into lessening the disruptive effect, but the other party may not generate reciprocal investment for the circumstance, or one party's extensive effort made may not appropriately rewarded by the counterpart after the disruption situation. Also, one party may not respond adequately to the other's request for recovery due to the burden of additional cost, or it is simply not specified in its contract. In some cases, the supplier can even increase its

price in response to the buyer's request for the disruption response and recovery, in particular, when there is no alternative supplier.

One of the central roles of relational capital in the buyer-supplier relationship is reducing the expectation of opportunistic behaviour and transaction costs (Dyer and Singh, 1998). Relational capital developed through an ongoing history of interactions lessens the occurrence of exchange hazards (Deeds and Hill, 1998) and reduces fear of the other party's opportunism (Parkhe, 1993), thereby decreasing the expected cost of dealing with the other party (Ring and Van de Ven, 1994; Gulati, 1995; Dyer and Singh, 1998). Additionally, a continuous exchange relationship contributes to firms exchanging their resources without relying on formal contracts, whilst also leading to lower the transaction costs (e.g. Zaheer and Venkatraman, 1995). Relational capital can not only allow buyers and suppliers privileged access to the other party's valuable resources (Uzzi, 1997; Kale et al., 2000) but also, to combine knowledge (Collins and Hitt, 2006; Dyer and Chu, 2003; Wu, 2008). In this sense, established relational capital helps firms to facilitate the coordination and exchange of their resources for disruption recovery.

In particular, trust that lies at the heart of the relational capital (Coleman, 1990; Johnson et al., 2013) can reduce opportunism in the relationship (Dyer and Singh, 1998), whilst also fostering a sense of openness and reciprocity (Coleman, 1990; Zaheer et al., 1998; Kale et al., 2000). Accordingly, it has been suggested as being a key mechanism that explains access to the other party's resources and information (Krause et al., 2007; Johnson and Elliott, 2011). In the disruption recovery process, the role of trust in the relationship may well be essential for the parties achieving speedy and effective disruption recovery. Building trust in the relationship facilitates the sharing of information and resources and flexibility in the networks can be achieved (Chan et al.,

2009). High levels of trust in the relationship raise confidence in sharing valuable information relating to the operating assets (Pettit et al., 2010), thus helping the parties to prevent unnecessary interventions, ineffective decisions and overreactions during a disruption situation (Christopher and Lee, 2004).

Finally, trust enables rapid access to resources and information even in an insecure situation (Krause et al., 2007; Johnson et al., 2013), without the necessity for formal or contractual requisitions (Johnson and Elliott, 2011). Development of trust in the relationship positively influences a firm's willingness to cooperate with parties even in a disruption situation, thereby increasing the likelihood of the parties making an effort to address the situation (Dyer, 1996; Joshi and Stump, 1999). Hence, the development of relational capital and trust embodied in it may improve a firm's ability to exchange resources (Sapienza et al., 2006; Sirmon et al., 2007; Davis et al., 2009), thereby helping the parties involved to achieve speedy and effective disruption response and recovery.

Hypothesis 9a. The buyer's relational capital in its relationship with a supplier is positively related to the buyer's supply chain disruption response and recovery performance.

Hypothesis 9b. The supplier's relational capital in its relationship with a buyer is positively related to the supplier's supply chain disruption response and recovery performance.

In this section, positive relationships between accumulated social capital (cognitive, structural and relational capital) and disruption recovery performance from a buyer

and supplier dyadic perspective have been postulated. In what follows, the focus is on the coordination promoting role of relational capital and the buyer's intention to use coercive and reward power to motivate its supplier to engage in collective action for disruption recovery. Hypotheses that the moderating role of the buyer's coercive and reward power in the relationship between relational capital and disruption recovery performance will be developed.

Hypotheses for the 2nd study

3.4. The moderating role of buyer power on the relationship between relational capital and supply chain disruption response and recovery performance

In a disruption situation, there is a necessity for appropriate recovery actions, such as rapid mobilisation and coordination of supply chain resources (e.g. Craighead et al., 2007; Braunscheidel and Suresh, 2009; Olcott and Oliver, 2014; Ambulkar et al., 2015). As these actions cannot be successful through a single firm's effort, building a closer relationship with partnering firms as a recovery enabler has been emphasised (Jüttner et al., 2003; Giunipero and Eltantawy, 2004; Faisal et al., 2006, Craighead et al., 2007).

Relational capital in the relationship permits privileged access to key resources of others (Uzzi, 1997; Kale et al., 2000), promotes firms engaging in value creation (Zaheer et al., 1998; Johnston et al., 2004; Lawson et al., 2008) and motivates the parties in the supply chain to take additional risks and cooperate even beyond contractual provision (Villena et al., 2011). Thus, relational capital in the relationship helps foster the achievement successful recovery from a disruption situation (e.g. Olcott and Oliver, 2014). In addition to using relational capital, the buyer can use the influence mechanism based on their power–force compliance to motivate the supplier into going along with

their wishes. By offering rewards when the supplier conforms to the buyer's influence attempt (reward power) or punishing the supplier when failing to conform (coercive power), the buyer can produce intended changes in the supplier's behaviour to engage in collective action, thereby achieving a successful response and recovery from the disruption.

In this study, the contingent effect of two different behaviour responses (use of coercive and reward power) following a disruption is probed. In a disruption situation, as abovementioned, the buyer firm can use power (coercive and reward) to influence the supplier to go along with their wishes. These two different response types of a buyer can be differently associated with their social behaviour, i.e. power and relational capital can produce an interaction effect. Specifically, the buyer's use of coercive power can damage trust and relational benefit, thus being negatively associated with relational capital. In contrast, the use of reward power complements relational capital by reinforcing trust and reciprocity in the relationship, which can contribute to firms obtaining a successful response and recovery from the disruption. The proposed model investigates the moderating role of the buyer's power (coercive and reward power) in the relationship, with (Figure 3.3 on page 73) illustrating these relationships.

3.4.1. Interaction effect of power (coercive / reward power) and relational capital, and impact on the disruption response and recovery performance

While relational capital in the relationship offers benefit towards achieving successful recovery from a disruption situation by facilitating the parties' coordination of resources for collective action (e.g. Olcott and Oliver, 2014), this capital can be rather limited and sometimes fails to motivate other parties to be engaged in collective action. Parties in supply chains are often uncertain whether their expectations will be fulfilled

or not and whether the other party will act cooperatively in a disruption affecting situation (e.g. Li et al., 2016). Thus, the supplier may hesitate voluntarily to become involved in collective action for disruption recovery due to uncertainty in supply chain relationship. Even if the buyer directly requests the supplier to reallocate their resources, it may not comply as the disruption is not directly affecting its firm at the moment, or simply, it perceives that the disruption is not its fault. Additionally, supply chain disruption can lead to increased relational conflicts between the parties, such as dissatisfaction, blame, anger, and conflict, based on the belief that the other party was responsible for the disruption (Primo et al., 2007; Bode et al., 2011). Hence, relational capital may not always yield the supplier's commitment for collective action in a disruption situation.

The buyer can additionally use the influence mechanism based on their power; forcing compliance on the supplier to go along with its wishes. In particular, use of coercive and reward power relies on extrinsic forms of pressure to gain compliance from the power target (Handley and Benton, 2012), representing an explicit attempt by the power source to bring about some direct action (Benton and Maloni, 2005; Brown et al., 1995). Many researchers have suggested an association of power and relational capital (trust, reciprocity etc.) (Bachmann, 2001; Hart and Saunders, 1997; Ireland and Webb, 2007; Kumar et al., 1998; Nyaga et al., 2013; Pulles et al., 2014) and is argued here, that following the disruption, the buyer's use of these two different response types (use of coercive / reward power) to persuade the supplier to engage in collective action have different impacts on social behaviour, thereby producing an interaction effect with relational capital.

One of the central roles of relational capital in the buyer-supplier relationship is reducing the expectation of opportunistic behaviour and transaction costs (Dyer and

Singh, 1998; Ring and Van de Ven, 1994; Gulati, 1995; Dyer and Singh, 1998). It permits privileged access to key resources of others (Uzzi, 1997; Kale et al., 2000), without the necessity for formal or contractual requisitions (Johnson and Elliott, 2011), being accompanied increasing willingness to cooperate and take additional risks for the relationship (Villena et al., 2011). In this regard, relational capital facilitates buyer-supplier coordination of resources and collective action, thereby contributing to firms achieving timely response and recovery. However, when the buyer uses coercive power to accelerate the supplier's coordination, such relational benefit can be lessened. Coercive power stems from a firm's ability to punish the partner, if it fails to conform to the firm's attempted influence (French and Raven, 1959), and the aim of the buyer that uses such power is to pressure a supplier into complying with its requirements (Pulles et al., 2014). By forcing compliance on the supplier, the buyer may be succeeded in motivating it to coordinate its resources and engage in collective action. However, as many studies have indicated, there is a negative association of coercive power with a cooperative relationship (e.g. Brown et al., 1995; Maloni and Benton, 2000). In particular, trust that lies at the heart of relational capital (Coleman, 1990; Johnson et al., 2013) and coercive power do not exist simultaneously in the relationships as they are opposing components of social behaviour (Ireland and Webb, 2007).

A buyer's use of coercive power usually has a detrimental effect on trust (Kumar, 2005; Yeung et al., 2009). Due to a possible conflict of interest among parties in the supply chain, trust under these circumstances between the parties is subject to high risk, for it can very easily be withdrawn by the parties (Lane and Bachmann, 1997; Ireland and Webb, 2007). When the dominant party uses coercive power, it decreases the ability of trust in the relationship (Yeung et al., 2009). This is because it signals that this party is not likely to maintain the relationship for the long term (Morgan and Hunt, 1994),

and the target firm is also likely to take greater safeguards and seek mechanisms to reduce its vulnerability, which ultimately weakens the relationship with accompanying deterioration in relational benefit (e.g. Bucklin and Sengupta, 1993; Yeung et al., 2009; Nyaga et al., 2013).

Use of coercive power also lessens the ability of relational capital which can reduce the fear of the other party's opportunism in the exchange relationship. Use of coercive power makes the target firm realise that the coercing party is succeeding by taking advantage of its dependence (Ke et al., 2009), which is viewed as opportunism, with the buyer being seen as expect to gain at the expense of the supplier (Nyaga et al., 2013). Hence, it reflects the dominant firm's incompetence and thus, reduces the target firm's trust (Leonidou et al., 2008). Additionally, the buyer's reliance on coercive power implies that its supplier's performance is not satisfactory (Zhao et al., 2008), It damages the supplier's sense of competence and autonomy, which ultimately lowers motivation to continue the relationship with buyer (Chae et al., 2017). Thus, it is believed that the use of coercive power can damage trust, relational norms, intention to continuing the relationship, and cooperation, thereby even increasing conflict, and consequently, decreasing a firm's commitment and willingness to cooperate (e.g. Kumar, 2005; Benton and Maloni, 2005; Yeung et al., 2009; Nyaga et al., 2013; Chae et al., 2017).

Therefore, in the disruption response and recovery context, the buyer firm's use of coercive power to influence the partnering firm to go along with their wishes can be seen as being effective in that it directly influences the supplier firm's behaviour. The supplier may react immediately for the buyer's coercive power, such as complying with its request and becoming involved in collective action. However, coercive power's overall impact on disruption response and recovery can be dramatically reduced as it

ultimately deteriorates the relational benefits from relational capital, with the partnering firm being less likely to be willing to be fully devoted in collective action for recovery. Based on these arguments, it is posited that the buyer firm's intention to use coercive power has a negative interaction effect with relational capital in terms of achieving a timely recovery from a disruption.

Hypotheses 10a. The buyer's intention to use coercive power towards a supplier (following a disruption) negatively moderates the relationship between relational capital and disruption response and recovery performance.

As discussed earlier, relational capital's ability can be rather limited in disruption affecting situation, thus the supplier's commitment to collective action for response and recovery may not always be guaranteed. To influence its supplier to engage in collective action for response and recovery, a buyer can also use reward-based power that motivates the supplier to go along with their wishes by offering rewards and benefits. Reward power exists where one firm has the ability to offer rewards intended to influence the target firm (French and Raven, 1959). Unlike coercive power, which increases the amount of economic and psychological costs (Leonidou et al., 2008), the use of reward power helps to increase social and financial benefits (e.g. offering financial rewards etc.). While coercive power and relational capital are opposing components of social behaviour, non-coercive forms of power (reward power) are complementary (e.g. Ireland and Webb, 2007; Pulles et al., 2014). When power is not used exploitatively or coercively, there is an overall improvement in relationships (e.g. Cox, 2001; Maloni and Benton, 2000; Ireland and Webb, 2007). That is, reward-based power provides numerous relational advantages (Cox, 2001) and promotes closer

supply chain relationships (Nyaga et al., 2013). Consistent with these findings, it is held here that a buyer's reward power complements the effect of relational capital in achieving successful response and recovery.

The use of reward power can lead to two parties to be bound to each other and it raises costs for negligence or opportunism, thus fostering a relational contract and trust between the two (Ireland and Webb, 2007). Its usage is based on a firm's ability to contribute resources to a relationship, which can also increase a target firm's trust by providing the perception that the powerful party has the capability to fulfil the necessary obligations of a transaction (Ireland and Webb, 2007). Additionally, reward power helps to promote common interests and collective goals within the relationship, as well as engendering a constructive and friendly atmosphere (Leonidou et al., 2008). These positive aspects will subsequently lead to high levels of trust in the relationship. While the power source's use of coercion and punitive action will most likely decrease relationship commitment, in contrast, when the customer uses reward power to meet the manufacturer's expectation of reciprocity, commitment could well be further enhanced (Nyaga et al., 2013).

Additionally, use of reward power is based on the idea that parties cooperate in relationships with the expectation of giving and receiving rewards, which supports the norm of reciprocity (Pulled et al., 2014). The notion of reciprocity embodied in relational capital suggests that firms feel obligated to reciprocate certain actions by the other party (e.g. Uzzi, 1997; Adler and Kwon, 2002). When reward power is used to influence the other party, both parties adjust their behaviour and actions toward their partner (e.g. Ireland and Webb, 2007). When this reciprocal action in a supply chain exchange is rewarded or produces benefits, both parties do so. The reward giver gets better results and the receiving party gets the reward promised (Nyaga et al., 2013;

Pulles et al., 2014). Hence, by positively associating with reciprocity and trust in the buyer-supplier relationship, use of reward power will complement relational capital and its ability to coordinate resources and capabilities between the parties. This will contribute to them achieving a timely disruption response and recovery performance.

Hypotheses 10b. The buyer's intention to use reward power towards a supplier (following a disruption) positively moderates the relationship between relational capital and disruption response and recovery performance.

3.5. Summary

This chapter has provided theoretical foundations for the research model and hypotheses development. First, a relationship between justice and social capital was suggested based on the literatures. This relationship is developed through histories of exchange and continuous relationship, being established prior to supply chain disruption arising. Second, a positive association between social capital and disruption recovery performance was proposed. From this relationship, establishing a closer relationship with the partnering firm in a supply chain is critical in a disruption situation, for a closer relationship initiates creative problem solving and promotes cooperative action in a disruption situation. Third, when introducing the second study, it was posited that there is a moderating role of the buyer's power in the relationship between relational capital and disruption response and recovery performance. It was postulated that the buyer's intention to use coercive or reward power can, negatively or positively, be associated with the relational capital in achieving timely disruption recovery.

IV. Research Methods

4.1. Structure of the Chapter

This chapter provides the details of the methods used to achieve research objectives and to address the research questions. Specifically, the chapter describes the data collection methods, constructs, measurement scales and data analysis technique used in the research study for empirically test the hypotheses. For this research, a dyadic survey was conducted on manufacturers in the U.S. in order to collect data. This chapter consists of three sections, including: (1) data collection and sampling (2) measurement and (3) sample profile and descriptive analysis. In the data collection (survey methods) section, detailed information regarding the sample frame and targeted sample's characteristics is provided. It is also shown how several steps were taken to detect bias that could have existed in the data. Following this, the development and adaptation of the measurement items in the survey is discussed. Then, the collected data's characteristics and detailed demographic profile are presented along with the descriptive analysis.

4.2. Use of dyadic data in this study

There are several ways to use a matched pair dataset. One of the most frequently used approaches is side-by-side comparisons (Whipple et al., 2015). This pertains to using a matched pair dataset as two independent groups (e.g. a buyer and its paired supplier) and comparing them. While the dataset is paired, two different (e.g. a buyer and its supplier) analyses are performed, and the results can be compared to ascertain the differences between the parties. This approach is normally by using separate regression

or SEM for each dyad individually and then comparing their coefficients. For example, Um and Oh (2020) compared the path coefficients of Amos models for the buyer and supplier and revealed that, while governance mechanisms assist collaboration and affect operational and innovation outcomes, the significance and relative strength of the proposed relationships are perceived differently by the two parties. Ro et al. (2016) performed separate regression analysis and compared the path coefficients, revealing that when suppliers perceive the buyer's opportunism is higher than it actually is, then the former will also have greater expectation that the latter will continue the relationship. Whipple et al (2015) compared the path coefficients of Stata for the buyer and supplier, showing that investment in internal collaboration process competence without external social capital does not contribute the improvement in operational performance. Roh et al. (2013) performed separate regression analysis and found that both the buyer and supplier's social capital impact on their relationship satisfaction. Cheung et al. (2010) compared the path coefficients of PLS models for the buyer versus supplier samples and found that relationship learning leads to the relationship being valued by both the buyer and supplier.

Another approach to handling dyadic data is, matched dyads analysed as dyadic units. Rather than comparing two different perspectives, focusing on that the data was actually matched and more direct use the fact that the data is faired. Traditionally, in this approach, the dataset was tested through correlations or paired t-test on the responses of each side to ascertain the differences. Oosterhuis et al. (2013) deployed a paired t-test and showed that suppliers perceive greater technology uncertainty than their customers, and suppliers perceive greater buyer dependence than the buyers themselves do. Krause et al. (2007) used correlation coefficients to conclude that both buyers and suppliers had a similar view on managing their relationship in the long-term.

Ellram and Hendrick (1995) adopted t-tests and showed that, both the buyer and the supplier view their relationship similarly in terms of relationship attributes, however, there are differences between the parties in regard to risk-sharing.

Additionally, another approach to handling matched dyads as dyadic units is using the degree-symmetry score. This was Straub et al. (2004) and Klein et al.'s (2007) method, which involved using a composite measure of the average value of the responses of both parties as well as the discordance between these responses. Whipple et al. (2010) used a degree-symmetry approach and analysis by using PLS, showing that social capital elements (e.g. trust and shared vision) positively influence information sharing and cooperative effort between buyers and suppliers. Liu et al. (2012) created a buyer and supplier's mutual measure by this approach. Their analysis using AMOS revealed that among justice dimensions, procedural justice has the strongest effects on coupling behaviours and buyer–supplier relationship performance. Grawe et al. (2015) also used this approach and mutual perception for the service provider and customer. By using PLS, they found that external organisational support and affective commitment can promote knowledge exchange and logistics innovation. Bhattacharya et al. (2015) adopted this approach and regression analysis results showed that frequent exchanges can lead to buyer opportunism in the relationship, whilst investments made by the suppliers and uncertainty were not found to be significant.

Some studies have involved using just the degree (average). Liu et al. (2009) adopted this mean approach to average dyadic scores and their regression analysis results revealed that transactional mechanisms are more effective in restraining opportunism than relational mechanisms, while relational mechanisms are more powerful in improving relationship performance. Dong et al (2016) used this approach and regression models as well, finding that both role ambiguity and role conflict can

result from sub-national institutional distance, which can jeopardise supply chain performance.

Lastly, matched dyads can be analysed as dyadic units by representing the direction and magnitude of dissonance in the constructs (Gulati and Sytch, 2007). To create composite measure among the dyads, the one with the lower response is subtracted from that with higher response. Regarding which, Son et al. (2016) created one of the first dissonance of social capital variables, representing both parties (retailer and supplier) in the three dimensions of social capital. After empirically testing these impacts on retailer-supplier relationship performance, they found that both parties' performance can differ based on the magnitude and direction of the dissonance. Specifically, the study revealed that relational capital asymmetry can be a negative performance implication and when the supplier's cognitive capital is higher than that of the retailer, this dissonance pertains negatively to the retailer's operational performance. Villena and Craighead (2017) also adopted this spline method and revealed that relational capital imbalance leads to counterparts perceiving high levels of opportunistic behaviour in the relationship. They also showed that a buyer observes lower benefits in the presence of size asymmetry, whereas the supplier's perception of benefits is unaffected.

In this study, to deal with the dyadic dataset, side-by-side comparisons (Whipple et al., 2015) and a degree-symmetry scores approach (Straub et al., 2004; Klein et al., 2007) has been adopted. The main aims are to see how each party (the buyer and the supplier) in a dyad view the relationship between justice perception and its impact on their social capital accumulation from this relationship. The interest also lies in how each party views the impact of accumulated social capital on disruption recovery performance and to compare their perceptions. Hence, the study's main aim pertains to

investigating each group in a dyad to articulate their individual perceptions regarding the shared relationship. To this end, side-by-side comparisons approach has been adopted, which allows for uncovering whether and if so, how the buyer and the supplier in a dyad view their relationship differently.

Additionally, aggregating data from both sides allows for capturing mutual perception. However, this potentially makes it difficult for researchers to see the difference in the buyer and supplier's perspectives (Roh et al., 2013). Buyers and suppliers have different interpretations of attitudinal or behavioural constructs (Whipple et al., 2015; Yang et al., 2017), especially social capital (Whipple et al., 2015; Villena and Craighead, 2017) and justice (Corsten and Kumar, 2005; Luo, 2008) is the area with significant perception of asymmetry, where aggregating may dilute the difference. The side-by-side comparisons approach help in minimising single rater bias related issues, such as exception fallacy. This refers to "an erroneous finding, where researchers draw biased aggregate or group conclusions among stakeholders on the basis of a single rater" (Roh et al., 2013, p712) and it potentially can threat the validity and reliability of the research (Roh et al., 2013). Accordingly, a number of recent dyadic studies have been adopting the side-by-side comparisons approach and examining perspectives from each side of multi-stakeholder constructs (e.g. Um and Oh, 2020; Ro et al. 2016; Whipple et al., 2015; Roh et al., 2013). Thus, how the buyer and the supplier in a dyad view their relationship differently, and comparing each perspective will contribute to understanding justice and social capital in supply chain (for instance, which dimension of justice or social capital matters more for the buyer, or for the matched supplier).

However, while side-by-side comparisons approach would be more appropriate to capture each group in a dyad to articulate their individual perceptions relative to the

shared relationship, the approach cannot directly use the fact that the data is paired and thus, is unable to capture traits as a dyadic unit. Hence, for the study, a 'degree-symmetry' scores approach is adopted (Straub et al., 2004; Klein et al., 2007) that averages the buyer and the supplier scores as well as the discordance between the responses.

Specifically, for the first study, side-by-side comparisons approach was adopted to compare how the buyer and the supplier in a dyad view their relationship and then, a pooled model (mutual perspective) using the degree-symmetry approach was also examined to see how the dyad (mutual) view these relationships in terms of the association between justice and social capital as well as social capital and disruption recovery performance. For the second study, conversely, the mutual perspective of how the buyer's use of coercive and reward power in a disruption situation can moderate the relationship between relational capital and disruption recovery performance was probed. However, this cannot capture how each party in a dyad view their relationship. Hence, separate tests were implemented capture the individual view and to compare the buyer and supplier's perspectives.

4.3. Data collection and sample

To test the proposed hypotheses, dyadic data (survey), from both the manufacturer (buyer / focal company) and its matched supplier, who are a strategic partner and had experienced the disruption together, were utilised. That is, matched pair questionnaires for the buyer and supplier were designed. Each version of the survey questionnaires was pilot tested with a panel of five academicians familiar with the supply chain and supply chain disruption literatures. They pointed out some issues in the survey, such as the use of indirect expressions, which can cause misunderstanding and vague words

that are unhelpful for business people. Based on the comments, a few minor changes were made for clarity and readability, being updated to the survey. This was then validated through semi-structured interviews with seven mid-level and senior procurement practitioners to identify any deficiencies in its design, administration or the wording of the questions (Remenyi et al., 1998), as well as to assess how the survey instrument would work under realistic conditions (Fowler, 1993). Through the field pilot test, some of the wording of the questionnaire was modified after a number of participants pointed out certain ambiguities. The final questionnaire is provided in appendices I (buyer version) and II (supplier version).

For this study, a cross-sectional survey of a sample of US manufacturing companies drawn from the ISM (Institute for Supply Management) membership directory (e.g., Chen et al., 2004; Braunscheidel and Suresh, 2009; Craighead et al., 2009; Krause et al., 2007; Paulaj et al., 2008) was utilised. Members of the ISM mainly comprise purchasing / procurement professionals and directors and managers of purchasing, with more than 70% of them having nine or more years of supply management experience (Institute for Supply Management, 2006; Schoenherr, 2008). This sampling frame could facilitate the study of the perceptions of buyers who manage supplier relationships on a daily basis (Ellis et al., 2010). In addition, an initial sample was randomly drawn across US manufacturing industries having two-digit Standard Industrial Classification (SIC) between 20 and 39, which means classified as a manufacturer in U.S. (e.g. Chen et al., 2004; Ellis et al., 2010; Mantel et al., 2006). These randomly selected companies were mainly from the automotive and the electronic industries because the companies in these industries rely heavily on relationships with the partnering firm (Krause et al., 2007).

Hence, purchasing professionals who manage the procurement of direct materials

across US manufacturing industries were first targeted. In addition, the sample frame of the study consists of Title 2 and Title 3 purchasing professionals, who were randomly selected from a list of ISM members. Generally, these members are mid-level or above purchasing professionals, with titles, such as buyer, senior buyer, and purchasing/supply chain manager (Ellis et al., 2010). In completing the survey, respondents were asked to recall a recently (within three years) experienced supply chain disruptive situation that negatively impacted on their normal routine business or performance. To collect supplier data in matched pair data, this first set of surveys for buyers included questions asking them to provide information about the disruption experienced and the contact details of the supplier involved. Subsequently, the named suppliers described in the main buyer survey were contacted.

In July 2017, 701 buyer firms were initially contacted with the help of a research company to see if they wanted to be involved in the survey and could provide matched supplier information. Those buyer firms that agreed to participate amounted to 433 and they were sent a cover letter explaining the study's purpose. They were also provided with the criteria for selecting the supply chain disruption experienced (i.e. critical impact to the company's operations), and for selecting a supplier who are a strategic supplier - who supply key product/parts for the buyer - and had experienced this disruption (i.e. the supplier who also had damage from the disruption) with them.

Specifically, it was requested that the respondents chose a supplier as a reference point for completing the survey and named a contact at the supplier firm. A reminder e-mail was sent one week later and 397 usable responses were received from buyers, representing a response rate of 56.63%. Upon receiving the buyer survey responses, a customised survey was sent to the designated supplier. Data collection was completed in September 2017, with 256 supplier surveys having been received, representing a

response rate of 64.48%. In total, 256 matched pair completed their questionnaires. However, 17 surveys were excluded due to the quality problem and missing data, thus the survey ended with 239 dyads.

4.4. Bias Control

To ensure that the sample of responses was representative of the population, non-response bias was followed through a comparison of early and late waves of returned surveys (Armstrong and Overton, 1977). Responses between early and late respondents were compared using two-tailed t-statistics across all the variables of the buyer side (distributive justice: $p = 0.653$; procedural justice: $p = 0.756$; cognitive capital: $p = 0.053$; structural capital: $p = 0.557$; relational capital: $p = 0.427$; recovery performance: $p = 0.482$) and supplier side (distributive justice: $p = 0.286$; procedural justice: $p = 0.388$; cognitive capital: $p = 0.206$; structural capital: $p = 0.339$; relational capital: $p = 0.307$; recovery performance: $p = 0.357$) included in the survey. No statistically significant differences among the variables were identified ($p < 0.05$), indicating that non-response should not be a concern in this study.

To avoid information bias, first, only senior buyers and purchasing/supply chain managers or above, according to the ISM (title 2 and title 3 ISM members), who were knowledgeable about the supply chain and phenomena of interest in the study (Kumar et al., 1993), were contacted. The respondents were asked to recall their experience of a supply chain disruption, which could have incurred a recall bias. This refers to systematic error due to differences in accuracy or completeness of recall to the memory of past events or experiences. To minimise this potential bias, the asked respondents were asked to report on a recent supply chain disruption they had experienced (e.g. Robinson and Clore, 2002), and asked for the exact month of the disruption (Bode et

al., 2011). By asking them about recent and specific information, this improved the accuracy of introspective reports by reducing retrospective recall (Robinson and Clore, 2002; Scott et al., 2014). Lastly, the respondents were asked to forward the survey, if they considered another executive/manager would be more knowledgeable about the questionnaire subjects (Finkelstein and Haleblian, 2002; Ellis et al., 2011).

In order to focus on the dyadic nature of the supply chain, the perspective of both the buyer and its matched supplier was adopted. Compared to single dyad studies, it is believed that the use of a paired data set offers better understanding of the buyer-supplier relationship and also, reduces the possibility of single rater bias, such as an exception fallacy. This refers to an erroneous finding where researchers draw biased aggregate or group conclusions among stakeholders on the basis of a single rater (Roh et al., 2013).

Given that self-reported data was used and that the same respondents answered the questions on both performance (response and recovery performance) and its determinants, the common method bias was a possibility (Podsakoff *et al*., 2003). In this study, several steps were taken in the research process to avoid this bias. First, the researcher provided detailed information about the necessary qualifications of key informants in the questionnaires to ensure that they were mid- to senior-level managers carrying out procurement activities (title 2 and title 3 ISM members). Second, the respondents were assured that their identities would be kept anonymous (Podsakoff *et al*., 2003). Third, through a CFA process, the research models showed good / acceptable fit indices as they surpassed the cut off criteria. Fourth, Harman's one-factor test was conducted to assess the existence of the common method bias. Lastly, potential common method bias was assessed using the marker variable technique (Lindell and Whitney, 2001). More details regarding the assessment for common method bias are

presented in the statistical analysis section.

4.5. Measurement

The variables in the study were operationalised using previously tested and validated constructs. The face validity of these constructs was examined at the pilot testing stage and modified where required. To collect matched pair data and capture both the perspectives of the buyer and its paired supplier, two different versions of questionnaires were developed. For all the measurement items, a seven-point Likert scale was used.

4.5.1. Organisational justice: Distributive and procedural

4.5.1.1. Distributive justice

Distributive justice refers to the fairness of a decision's results. This is determined by assessing whether the perceived ratio of outcomes to inputs is equivalent to those of a comparative other (Adams, 1965) or whether resource distributions match appropriate norms (Leventhal, 1976), such as equity (Colquitt, 2001).

In this study, distributive justice is measured via a five-item, seven-point scale, ranging from 1, 'strongly disagree', to 7, 'strongly agree'. These are based on ideas presented in Luo (2007), Liu et al. (2012), and Poppo and Zhou (2014), with the aim being to capture the fairness perception of inputs and outputs (relative participation and reward) prior to disruption. Specifically, Luo (2007) measured distributive justice as the fairness of reward and return sharing in view of each party's contributed resources, continued commitment, amount of effort, and level of responsibility. Poppo and Zhou (2014) adapted the measure of distributive justice from Blader (2007) and Luo (2007), which captures the party's fairness perceptions of outcome distribution from the

relationship in terms of the duties, responsibilities, contributions, knowledge, and gain compared to that of others in similar kinds of deals.

Liu et al. (2012) captured it as the fairness of gain (reward and return) in light of contributed effort, investment, role, responsibility, and gain compared to the other party. In particular, they captured both buyer and supplier perspective of regarding justice and related other factors. By doing so, they not only demonstrated that mutual perceptions of justice was a driver for buyer–supplier relationship performance, but also lowered the possibility of single rater bias, such as an exception fallacy (e.g. Roh et al., 2013).

Based on Luo (2007), Liu et al. (2012), and Poppo and Zhou's (2014) perspectives, both the buyer and supplier were asked to indicate 'DJ1: Our gain from this relationship was consistent with the amount of effort and investment we had put into it (Luo, 2007; Liu et al., 2012)'; 'DJ2: Our gain from this relationship was commensurate with the roles and responsibilities we have taken in it (Liu et al., 2012)'; 'DJ3: Our gain relative to our contribution to this relationship was about the same as that of this supplier (/ buyer) (Liu et al., 2012)'; 'DJ4: Our gain relative to our contribution to this relationship was about the same as that of other firms in similar business relationships (Poppo and Zhou, 2014)'; and 'DJ5: We received a just share of the outcomes given the knowledge/expertise contributions that we each made (Poppo and Zhou, 2014)'.

4.5.1.2. Procedural justice

Procedural justice refers to the fairness perception of the methods or processes used to derive the distribution of outcomes (Korsaard and Roberson, 1995). In buyer–supplier relationships, it manifests itself through clarity of expectations and the extent of involvement and explanation of the procedures (Kim and Mauborgne, 1998;

Narasimhan et al., 2013). In this study, procedural justice captures whether each party had a voice in the decision-making process, used consistent procedures, was not discriminated against, was provided feedback, prior to supply chain disruption (e.g. Luo, 2007; Griffith et al., 2006; Liu et al., 2012; Narasimhan et al., 2013; Poppo and Zhou, 2014).

The specific items were adapted from Luo (2007), Liu et al. (2012), and Poppo and Zhou's (2014) studies, being modified to fit the context of the study. Procedural justice is operationalised through a five-item, seven-point Likert scale, ranging from 1, 'strongly disagree', to 7, 'strongly agree'. Both the buyer and supplier were asked to indicate to what extent they 'PJ1: When negotiating and stipulating agreements or changes, this supplier (/buyer) consistently applied the same procedures and policies (Luo, 2007; Liu et al., 2012; Poppo and Zhou, 2014)'; 'PJ2: When implementing decisions, this supplier (/buyer) conformed to agreed-upon standards and formats (Poppo and Zhou, 2014)'; 'PJ3: The procedures for implementing changes to the contract were consistently used by this supplier (/buyer) (Poppo and Zhou, 2014)'; 'PJ4: This supplier (/buyer) asked our opinion when they made decisions (or changes) with respect to their product(s) (Poppo and Zhou, 2014)'; and 'PJ5: This supplier (/buyer) treated us impartially and in a non-discriminatory way (Liu et al., 2012)'.

4.5.2. Social capital

Social capital theory is one theoretical framing that helps in the understanding of how firms acquire resources and information that exist outside their boundaries and develop closer ties with others (Koka and Prescott, 2002). As a set of resources rooted in relationships (Nahapiet and Ghoshal, 1998), social capital has various attributes and is considered to be multifaceted concept. In this study, social capital is defined as 'the

sum of the potential and actual resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit' (Nahapiet and Ghoshal, 1998). Nahapiet and Ghoshal (1998) suggested three dimensions of social capital: cognitive (shared culture, vision and values), structural (strength and number of ties between actors), and relational capital (trust, obligation and identification) (e.g. Krause et al., 2007; Carey et al., 2011; Johnson et al.,2013).

The following subsections provide each of these dimensions' measurement items in use in this study. Regarding social capital and its three subdimensions, both the buyer and supplier were asked the level of social capital that accumulated in the relationship prior to the disruption over time.

4.5.2.1. Cognitive capital

Cognitive capital refers to those resources providing shared representations, interpretations, and systems of meaning among parties (Nahapiet and Ghoshal, 1998 p. 244). This dimension encompasses the shared cultures and values between the parties in a relationship. Cognitive capital is represented by shared congruence of goals, values and shared vision, through which committed parties – buyer and supplier – may get a deeper understanding of their behavioural norms and common goals within the relationship.

Carey et al. (2011) assessed cognitive capital using scales developed for intra-firm networks (Tsai and Ghoshal, 1998; Weick, 1995) and modified these to an inter-organisational context. They captured the extent of shared business values, ambitions and vision, goals for the business, and levels of agreement on what was in the best interest for the relationship. Villena et al. (2011) adopted the measurement of cognitive capital from the Jap (1999), Kale et al. (2000), and Sarkar et al. (2001), which is

concerned with congruence in organisational culture, business philosophies, goals, and a shared vision between the parties. Roh et al. (2013) adopted the measure from Leana and Pil's (2006) work, modifying it to fit the buyer and supplier dyadic relationship context, which pertained to capturing the extent of shared vision, goal and commonality of purpose,

Cognitive capital was measured via a five-item, seven-point scale, ranging from 1, 'not at all', to 7, 'to a very large extent'. These items are based on suggestions presented in Villena et al. (2011), Carey et al. (2011), and Roh et al.'s (2013) work, being modified to the context of the study, i.e. capturing both parties' perspectives. Respondents were asked the extent to which their buyer–supplier relationship was characterised by 'CC1: We shared a similar corporate culture and values with this supplier (/buyer) (Villena et al., 2011; Carey et al., 2011)'; 'CC2: We often agreed with this supplier (/buyer) on what was in the best interest of the relationship (Carey et al., 2011)'; 'CC3: We shared similar philosophies/approaches to business dealings (Villena et al., 2011)'; 'CC4: We shared compatible goals and objectives with this supplier (/buyer) (Villena et al., 2011; Carey et al., 2011)'; and 'CC5: We shared the same ambition and vision for our relationship (Villena et al., 2011; Carey et al., 2011; Roh et al., 2013)'.

4.5.2.2. Structural capital

Structural capital represents the pattern of connections between parties; 'who you know and how you reach them' (Burt, 1992). Traditionally, it can be explained by the presence and density of social ties (Inkpen and Tsang, 2005; Bolino et al., 2002). However, structural capital in the supply chain / operational management context is considered to be more about social interaction (e.g. Villena et al., 2011; Carey et al.,

2011). Thus, structural capital can also be defined as social interaction ties, which emphasises the actors' social interactions, both formal and informal (Tsai and Ghoshal, 1998; Oh et al., 2004). Study on the configuration of network ties has acknowledged that an actor is included in a social structure as a member. Socialisation involves specific structural formats for engagement, such as regular meetings and conferences or cross-functional teams (Cousin et al., 2006).

Carey et al. (2011) assessed structural capital as social interaction ties, as a proxy following Tsai and Ghoshal (1998) and adopted measures of social interaction from Cousins et al. (2006) and Cousins and Menguc (2006). They captured the extent to which the buyer and supplier engage in social events, joint workshops, cross functional teams, team building exercises, and co-location. Villena et al. (2011) adopted the measurement of structural capital from Inkpen and Tsang (2005), Levin and Cross (2004), and Tsai and Ghoshal (1998), captured the extent of interaction between personnel across different levels and functions.

For this study, structural capital is measured by six items, ranging from 1, 'not at all', to 7, 'to a very large extent', adapted from Villena et al. (2011) and Carey et al. (2011). Respondents were asked the extent to which their buyer–supplier relationship was characterised by 'SC1: We organised social events with this supplier (/buyer) (Carey et al., 2011)'; 'SC2: We organised joint workshops with this supplier (/buyer) to improve understanding of each other's business (Carey et al., 2011)'; and 'SC3: Frequent and intensive interactions took place between our respective personnel (Villena et al., 2011)'.

4.5.2.3. Relational capital

Relational capital pertains to the aspect of relationships of partnering firms mutually

developed through a history of interactions (Nahapiet and Ghoshal, 1998; Kale et al., 2000). Through such repeated interactions, actors can establish and cultivate trust, reciprocity and friendship within their relationship. In this regard, relational capital can be described as the strength of the relationship built over time (Krause et al., 2007). That is, it is represented by the friendship, obligations, respect and trust that parties have developed with each other through a history of interactions (Nahapiet and Ghoshal, 1998; Kale et al., 2000).

Carey et al. (2011) adopted relational capital measures from Kale et al. (2000), building on the earlier work of Dyer and Singh (1998) and Madhok (1995). They measured to what extent the supplier relationship was characterised by close interaction, mutual trust, mutual respect, friendship, and high levels of reciprocity. Similarly, Villena et al. (2011) adopted the measurement of structural capital from Kale et al. (2000), to examine close interpersonal interactions, trust, friendship, respect, and reciprocity.

Relational capital, in this study, is operationalised through a five-item, seven-point Likert scale, ranging from 1, 'not at all', to 7, 'to a very large extent', adapted from Villena et al. (2011), Carey et al. (2011), Roh et al. (2013), and Li et al. (2014). Both the buyer and supplier were asked to indicate to what extent 'RC1: This supplier (/buyer) was concerned about our welfare or interests when they made important decisions (Roh et al., 2013; Li et al., 2014)'; 'RC2: We respected this supplier (/buyer) (Villena et al., 2011, Carey et al., 2011)'; 'RC3: We trusted this supplier (/buyer) (Villena et al., 2011, Carey et al., 2011)'; 'RC4: The relationship with this supplier (/buyer) was characterised by high levels of reciprocity (Carey et al., 2011)'; 'RC5: We had a good friendship with this supplier (/buyer) (Carey et al., 2011)'; 'RC6: This supplier (/buyer) was understanding when we had difficulties in meeting their demands

(Li et al., 2014)'; and 'RC7: This supplier (/buyer) was willing to offer us assistance and support even if circumstances changed (Li et al., 2014)'.

4.5.3. Disruption response and recovery performance

Studies have emphasised that quick response and recovery from disruption is essential, as recovery time directly relates to financial loss: the greater the response time, the higher the negative impact of the disruption (Blackhurst et al., 2005). Furthermore, since supply chain disruptions not only have an immediate negative effect, but also have delayed, long-term, negative effects on supply chain performance (Sheffi and Rice, 2005), quick response and recovery need to be achieved to minimise the impact of disruption. The disruption response and recovery stage can critically influence supply chain performance. However, response is the least studied of all supply chain disruption elements (Sodhi et al., 2012), with there having been even less focus on recovery.

The extant literature provides little guidance on operationalising disruption response and recovery. Moreover, only a limited number of studies have been focused on the importance of a firm's quick reaction and timely recovery from disruption. In a study presenting an optimisation model for resolving disruptions to an operating schedule in the rail industry, Walker et al. (2005) emphasised the ability to shift the schedules regarding drivers and train for timely disruption recovery. In the supply chain context, Ambulkar et al. (2015) stressed the importance of supply chain resilience in achieving successful disruption response and recovery. They emphasised firm's ability to respond quickly responding and can cope with changes brought by the supply chain disruption. Macdonald and Corsi (2013) noted that to recover quickly from disruption, a firm's experience, training and a risk plan regarding this situation are required. These will allow for appropriate recovery structure and behaviour, through which firms will

be able to discover the disruption quickly and contribute to successful recovery. They suggested speed of recovery, financial cost of recovery, customer impacts, and production time impacts as performance indicators of successful disruption recovery. Chowdhury and Quaddus (2016) measured disruption recovery performance in terms of the recovery time, ability to absorb a big loss, ability to handle the crisis and loss, and as well as the reduction in the recovery cost. From these studies, the commonly addressed factors for the effective disruption response and recovery were extracted for the current work. Seven items were adopted and adjusted fit with the study context, which primarily are focused on effective and timely recovery from the disruption – how quickly and well a firm can resume the normal course of business.

In this study, for the disruption recovery performance construct, both the buyer and supplier were asked to what extent they had recovered from supply chain disruption. Capturing both sides of the supply chain relationship is important for understanding supply chain disruption recovery, as its negative impact permeates into the whole supply chain (Scheibe and Blackhurst, 2018; Blackhurst et al., 2011) and hence, disruption recovery action cannot be down to a single firm's effort (Olcott and Oliver, 2014). That is, capturing a single member's perspective of the dyadic relationship will only provide limited understanding of supply chain disruption as well as response and recovery behaviour. By using dyadic paired data, thereby to assess both parties' views, this will provide better understanding of these processes, whilst also lowering the possibility of single rater bias, such as an exception fallacy (e.g. Roh et al., 2013).

Adopted items for the construct were: 'RS1: Material flow was restored more quickly (Macdonald and Corsi, 2013)', 'RS2: Normal operating performance was more quickly restored (Chowdhury and Quaddus, 2016; Macdonald and Corsi, 2013)' 'RS3: The supply chain more easily recovered to its original state (Chowdhury and Quaddus,

2016; Ambulkar et al., 2015)', 'RS4: The disruption was dealt with more efficiently (Ambulkar et al., 2015)', 'RS5: Satisfied with the outcomes of the recovery effort for this disruption overall (Chowdhury and Quaddus, 2016)', 'RS6: The financial distress due to the disruption was more successfully dealt with when compared with similar disruptions (Chowdhury and Quaddus, 2016)', and 'RS7: Production costs were better controlled when compared with similar disruptions (Chowdhury and Quaddus, 2016; Macdonald and Corsi, 2013)'.

4.5.4. Buyer's mediated power (coercive and reward)

Power refers to the ability of one individual or group to control or influence the behaviour of another (Hunt and Nevin, 1974). For this study, mediated power - coercive and reward power - are considered, which are the most widely recognised sources (Pulles et al., 2014). Use of mediated power is deliberately controlled by the dominant firm exercising the power. That is, the firm offering punishment / reward decides whether, when and how to use its power to influence the other's behaviour (Zhao et al., 2008). As previously discussed, coercive power stems from a firm's ability to punish the partner, if it fails to conform to the firm's attempted influence, whilst reward power pertains to where one firm has the ability to offer rewards intended to influence the target firm (French and Raven, 1959). The presence of mediated power by a buyer in a disruption situation could need to be measured from both the buyer and supplier's perspective. This is because power presenting party and the influenced party may be perceiving the use of it differently. That is, they could have different views on the level of the power presenting in the situation and the consequences of buyers usage. In other words, there can be a perceptual gap regarding the buyer's use of power between the parties (e.g. Nyaga et al., 2013). Capturing both these views, thus gaining a mutual

perspective on the buyer's mediated power, will allow for more precise measurement of the presence of power in the relationship, whilst also lowering the possibility of single rater bias. Accordingly, both buyers and matched suppliers were questioned about the former's use of mediated power.

The questionnaire items of the coercive power construct measure the extent to which the buying firm punishes the supplier, if it does not conform to the buyer's attempted influence in a disruption affecting situation (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al., 2014). In this study, coercive power is measured by four items ranging from 1, "strongly disagree," to 7, "strongly agree," that were adopted from Maloni and Benton, (2000), Zhao et al. (2008), and Pulles et al. (2014). Measurement items for coercive power are 'CP1: We often implied that our firm's personnel would somehow get back at this supplier, if they did not do as we asked and we found out (/ This customer often implied that they would somehow get back at us, if we did not do as they had asked and they found out) (Zhao et al., 2008),'; 'CP2: We often hinted that we would take action that would reduce this supplier's profits. if they did not go along with our requests (/ This customer often hinted that they would take actions that would reduce our profits, if we did not go along with their requests) (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al., 2014)'; 'CP3: We often implied that we might have withdrawn certain needed services from this supplier, if they did not go along with us (/ This customer often implied that they might have withdrawn certain needed services from us, if we did not go along with them) (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al., 2014)'; and 'CP4: We often implied that we could made things more difficult for this supplier, if they did not agree to our suggestions (/ This customer often implied that they could made things more difficult for us, if our organisation did not agree to their suggestions) (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al.,

2014)'.

The measurement items of reward power emphasised the extent to which the buying firm aims to influence the supplier's firm by offering benefits (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al., 2014) during the disruption recovery process. In this study, reward power is measured by three items ranging from 1, "strongly disagree," to 7, "strongly agree,", which were adopted from Maloni and Benton (2000), Zhao et al. (2008), and Pulles et al. (2014). The measurement items for this type of power are 'RP1: We offered incentives to this supplier for their cooperation (/ This customer offered incentives to us for our cooperation) (Maloni and Benton, 2000; Zhao et al., 2008)'; 'RP2: We implied that we would favour this supplier in the future, if they went along with our requests (/This customer implied that they would favour us in the future, if we went along with their requests) (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al., 2014)'; and 'RP3: We offered this supplier rewards, if they went along with our wishes (/ This customer offered us rewards, if we went along with their wishes) (Maloni and Benton, 2000; Zhao et al., 2008; Pulles et al., 2014)'.

4.6. Control Variables

To ensure the robustness of results, for this study, several control variables were included: size of the firm (measured by number of employees and firm sales), industry, the severity (impact size) of the disruption (measured by financial loss), dependency on the exchange partner (measured by dependency on the other firm) and frequency of disruption (measured by the frequency disruption occurred).

Large firms tend to have access to a greater number of resources (Tsai, 2001). However, smaller firms, while not as rich in resources, may have the ability to be nimble in the face of adversity, due to the shorter chain of command (D'Amboise and Muldowney, 1988; Ramaswami et al., 2009). Thus, difference in firm size could mean

that there is a difference in the amount of resource or speed in adapting to the situation, i.e. impacting in varying ways on achieving timely disruption recovery. For the current research, the size of the firm was measured by asking about the number of employees and sales figures of the firm in 2016.

Dependence on an exchange partner indicates that a firm needs to maintain the relationship with it to achieve its desired goal (Emerson, 1962). Thus, when there is a high level of dependency, occurrence of disruption in the partnering firm may have a significant negative impact on it. So, where high dependency is the case, this encourages a firm to be more actively engaged in coordination and collective action (e.g. Bode et al., 2011). Hence recovery performance may be influenced by such dependency on the partnering firm. Dependency on the exchange partner was captured by asking the respondents about importance of the partner in achieving their goals, difficulties in replacing the partner, dependency on the partner, and availability of an alternative one.

The likelihood of disruption occurring (frequency) and its impact (size) are the main factors that firms consider when developing plans to protect against it. For instance, disruptions such as natural disasters and terrorist attack do not occur frequently, but their impact is huge once they have happened. In contrast, disruptions such as delivery failure can happen on a daily basis and hence, there is a high likelihood disruption, but its impact is relatively low. These two factors regarding supply chain disruption influence a firm's response and recovery time. When the firm has experienced relatively frequent, or many supply chain disruptions, it will have a better understanding of these and response to it, thus being likely to have more complete information regarding the available options to restore operations than when this rarely occurs or happens for the first time (Bode et al., 2011). Additionally, a firm that has

been experiencing frequent supply chain disruption considers that no partner is perfectly reliable (Bode and Wagner, 2015), thus frequency of disruptions will lead to an increase in the number of direct suppliers or redundant capacity (e.g. Babich, 2006; Chaturvedi and Martínez-de-Albéniz, 2011; Bode and Wagner, 2015). In this sense, the frequency of disruption experienced can affect a firm's disruption response and recovery performance. For this study, frequency of disruption was measured by asking 'how often has a similar type of a disruption occurred?', with a Likert scale of 1 (occurred rarely) to 7 (occurred very frequently) based on Bode et al.'s (2011) study.

The impact size (severity) of a disruption can be one significant determinant of firm's motivation to act (Bode et al., 2011; Ambulkar et al., 2015). In a high impact disruption situation, firms in the supply chain a likely to invest in disruption response and recovery action, such as coordinating and reconfiguring their resources (Ambulkar et al., 2015). In contrast, in a low impact disruption situation, firms may not need to invest in such recovery actions. but rather, are able to absorb its impact (Melnyk et al., 2014; Ambulkar et al., 2015). For this study, disruption impact size was measured by asking about financial loss from the disruption.

4.7. Sample Profile and Preliminary Analysis

4.7.1. Sample profiles

<Table 4. 1: Demographic profile – Buyer>

	Frequency	Percentage (%)
Size (No. of personnel employed)		
Small-sized (<250 employees)	182	76.15%
Medium-sized (between 250 and 500 employees)	28	11.72%
Large-sized (>500 employees)	29	12.13%
Total	239	100%
Total annual sales (US Dollars in Millions)		

<2	3	1.26%
2-3.99	52	21.76%
4-4.99	31	12.97%
5-9.99	57	23.85%
10-19.99	40	16.74%
>20	56	23.43%
Total	239	100%
Industrial sector		
Automotive[1]	75	31.38%
Electronics[2]	71	29.71%
Food & beverage[3]	34	14.23%
Fabricated metal products[4]	26	10.88%
Machinery[5]	2	0.84%
Etc[6].	31	12.97%
Total	239	100%
Respondent profile		
Supply chain director	7	2.93%
Senior procurement manager	80	33.47%
procurement manager	152	63.60%
Total	239	100%

[1](SIC 37: Transportation Equipment); [2](SIC 36: Electronics & other Electronic Equipment); [3](SIC 20: Food & Kindred Product); [4](SIC 34: Fabricated metal products); [5](SIC 35: Industrial Machinery & Equipment); [6](SIC 23: Apparel/textile; SIC 39: Miscellaneous Manufacturing Industries; SIC 27: Printing, Publishing and Allied Industries; SIC 28: Chemicals and Allied Products)

<Table 4. 2: Demographic profile – Supplier>

	Frequency	Percentage (%)
Size (No. of personnel employed)		
Small-sized (<250 employees)	173	72.39%
Medium-sized (between 250 and 500 employees)	60	25.10%
Large-sized (>500 employees)	6	2.51%
Total	239	100%
Total annual sales (US Dollars in Millions)		
<2	36	15.10%
2-3.99	67	28.10%
4-4.99	9	3.80%
5-9.99	31	13.10%
10-19.99	50	21.00%
>20	45	18.90%
Total	239	100%
Respondent profile		
CEO/general director / Senior Vice President	2	0.84%
Supply chain director	41	17.15%
Senior sales manager	55	23.01%
Sales manager	141	59.00%
Total	239	100%

4.7.1.1. Respondents' profile (designation)

The designation refers to the experience and role of the respondent in the specific company. In the buyer sample, among the 239 respondents, 63.60% were procurement managers, whilst 33.47% were senior procurement managers and just 2.93% were supply chain directors. The supplier sample's respondent profile shows similar constitution to buyer's sample. 59.00% were sales managers, who corresponded to procurement ones in the buyer's sample. 23.01% were senior sales managers and 17.15% were supply chain directors. Lastly, 0.84% of supplier sample respondents' roles were CEO / general director / senior vice president. The sample framework of this study followed the ISM directory and only title 2 and title 3 ISM members were contacted, all of the respondents being at mid or above mid-level professionals in the manufacturing firms.

4.7.1.2. Industry

The sample framework of this study is based on the two-digit Standard Industrial Classification (SIC), with SIC numbers 20 to 39 being included in the sample, as these are classified as manufacturers in the U.S. (e.g. Chen et al., 2004; Ellis et al., 2010; Mantel et al., 2006). The automotive industry (SIC37: Transportation Equipment) is the largest in the collected data, with 31.38%, and 29.71% of the sample being from Electronics (SIC 36: Electronics & other Electronic equipment). 14.23% of the sample are from the Food & beverage industry (SIC 20: Food & Kindred product), 10.88% from metal products (SIC 34: Fabricated Metal Products) and 0.84% from Machinery (SIC 35: Industrial & Commercial Machinery).

4.7.1.3. Number of employees

The tables also contains the number of employees in each respondent's firms in 2016. In the buyer's sample (Table 4.1), 76.15% of the respondents were working in a firm with no more than 250 employees; medium and large sized firm portions were 11.72% and 12.13%, respectively. Supplier data's (Table 4.2) number of employees were relatively smaller than the buyer sample. 72.38% of the respondents were working in small-sized firms, whilst 25.10% were with medium sized and only 2.51% of respondents were from large sized firms. Overall, there were higher number of large sized firms in the buyer samples than in the supplier samples.

4.7.1.4. Total annual sales

In this study, total annual sales refers to the amount of sales of the firm (US dollars in millions) in 2016. In the buyer's sample, the biggest portion of the respondents were from firms with 5-9.99 million US dollars sales (23.85%), and second biggest portion had over 20 million US dollars sales (23.43%). In supplier's sample, 28.03% of the respondents were working in firms with 2-3.99 million US dollars sales and 18.83% were with firms with over 20 million US dollars sales. Of the sample, the buyer firms have a higher sales amount than the suppliers. Overall, there are higher total annual sales in the buyer samples than in the supplier samples.

4.7.1.5. Source of the disruption / Types of disruption

In this study, among 239 paired sample, 90% of respondents (n=215) replied that the disruption actually started from the supplier, and 7.9% said that from the buyer side (n=19), 1.7% respondents said it is from 3rd party (n=4), and only 0.4%respondent said it is unclear (n=1). This indicates that suppliers are directly / indirectly related to the

disruption and likely to had damage from the disruption.

There were 5 types of disruptions, (1) delay disruption (n=25), (2) delivery failure (n=73), (3) quality problem (n=61), (4) inventory shortage (n=77), and (5) other type of disruption (n=3). From the types of disruptions, the disruption the buyer and the supplier experienced would be operational risks which can occur more frequently and interrupt the normal course of business operations rather than catastrophic high impact risks (low risk – high frequency risk). Further to see if these types of disruption have differentiated the disruption recovery performance, ANOVA tests were performed. ANOVA test results (Table 4.3) showed that there is no statistical differences in both buyer (F=1.162, p=0.328) and supplier (F=1.546, p=0.190). That is, both buyer and supplier model were not impacted by the type of disruptions. One possible reason for this could be that the type of disruption that the buyer and the supplier experienced was mostly 'high frequency – low impact disruption' and thus, catastrophic disruption was rare. Thus, the respondents mostly experienced high frequency – low impact disruption and these similar disruption types would be the reason for there being no statistical differences in disruption recovery performance.

<Table 4. 3: ANOVA test results - types of disruption on disruption recovery>

Types of disruptions		Mean of Recovery performance	Std. Deviation
Delay disruption (n = 25)	Buyer	5.069	0.969
	Supplier	5.288	0.751
Delivery failure (n = 73)	Buyer	5.101	0.460
	Supplier	5.238	0.656
Quality problem (n = 61)	Buyer	5.214	0.771
	Supplier	5.338	0.896
Inventory shortage (n = 77)	Buyer	5.007	0.593
	Supplier	5.281	0.640
Others (n = 3)	Buyer	5.600	2.425
	Supplier	4.267	1.474

ANOVA results: Buyer (F=1.162, p=0.328); Supplier (F=1.546, p=0.190)

4.7.2. Descriptive analysis

After describing the demographic information of the survey respondents, the next issue dealt with is the descriptive statistics. Before testing any relationship among constructs, descriptive analysis was performed on each construct and its relevant items (Table 4.4: buyer's model, 4.5: supplier's model and 4.6: dyadic model), which included mean, standard deviation and variance. Table 4.7 and Table 4.8 showed the correlation of the structures for the buyer's model, supplier's model, respectively (for the study 1) and Table 4.9 showed the buyer-supplier mutual perspective model (for the study 2).

<Table 4. 4: Descriptive analysis - Buyer's model>

	Min	Max	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
BDJ	1.000	7.000	5.002	0.054	0.829	0.687
BPJ	1.000	7.000	5.037	0.052	0.811	0.657
BCC	1.000	7.000	5.090	0.044	0.680	0.463
BSC	1.000	7.000	4.966	0.051	0.785	0.617
BRC	1.000	7.000	5.196	0.049	0.758	0.574
BRS	1.000	7.000	5.103	0.045	0.692	0.479
BCP	1.000	7.000	5.095	0.034	0.531	0.282
BRP	1.000	7.000	5.037	0.038	0.586	0.343
BDep	2.000	7.000	5.073	0.036	0.563	0.317

- BDJ: Buyer's Distributive Justice
- BPJ: Buyer's Procedural Justice
- BCC: Buyer's Cognitive Capital
- BSC: Buyer's Structural Capital
- BRC: Buyer's Relational Capital
- BRS: Buyer's evaluation of Disruption Recovery Performance
- BCC: Buyer's use of Coercive Power
- BRC: Buyer's use of Reward Power
- BDep: Buyer's dependence on the relationship with the supplier

<Table 4. 5: Descriptive analysis - Supplier's model>

	Min	Max	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
SDJ	1.000	7.000	5.219	0.051	0.783	0.613
SPJ	1.000	7.000	5.193	0.050	0.766	0.586
SCC	1.000	7.000	5.196	0.042	0.645	0.416
SSC	1.000	7.000	5.168	0.052	0.811	0.658
SRC	1.000	7.000	5.359	0.047	0.724	0.524

SRS	1.000	7.000	5.270	0.048	0.744	0.553
SCP	1.000	7.000	5.241	0.041	0.635	0.403
SRP	1.000	7.000	5.256	0.046	0.712	0.507
SDep	2.000	7.000	5.244	0.044	0.687	0.471

- SDJ: Supplier's Distributive Justice
- SPJ: Supplier's Procedural Justice
- SCC: Supplier's Cognitive Capital
- SSC: Supplier's Structural Capital
- SRC: Supplier's Relational Capital
- SRS: Supplier's Disruption Recovery Performance
- SCP: Supplier perceived the buyer's use of Coercive Power
- SCP: Supplier perceived the buyer's use of Reward Power
- SDep: Supplier's dependence on the relationship with the buyer

From the descriptive statics of the buyer (Table 4.4) and the supplier sample (Table 4.5), all responses for the constructs were over 5.00 (mean values), except buyer's structural capital (4.966). All of the responses from the suppliers indicating higher responses in dimensions of justice, social capital, and power, and as well as disruption recovery performance. Furthermore, to see the dyadic relationship between the buyer and supplier that representing the direction and magnitude of dissonance in the constructs, based on Gulati and Sytch (2007), buyer's responses were subtracted from the supplier's as supplier's response were higher than the buyer's in the all constructs. Table 4.6 showed descriptive analysis on the dyad.

<Table 4. 6: Descriptive analysis - Buyer-supplier's dyadic relationship>

	Min	Max	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
ADJ	-6.000	5.000	0.217	0.070	1.080	1.166
APJ	-4.000	5.000	0.155	0.055	0.848	0.719
ACC	-3.000	4.000	0.105	0.055	0.849	0.721
ASC	-4.000	2.000	0.202	0.057	0.886	0.785
ARC	-4.000	5.000	0.163	0.059	0.915	0.837
ARS	-4.400	4.000	0.168	0.054	0.836	0.700
ACP	-3.000	3.000	0.147	0.050	0.777	0.604
ARP	-3.000	4.000	0.219	0.056	0.861	0.741
ADep	-3.000	4.000	0.172	0.054	0.828	0.685

- ADJ: Asymmetry in Distributive Justice
- APJ: Asymmetry in Procedural Justice
- ACC: Asymmetry in Cognitive Capital
- ASC: Asymmetry in Structural Capital
- ARC: Asymmetry in Relational Capital

- ARS: Asymmetry in Disruption Recovery Performance
- ACP: Asymmetry in the perception on the buyer's use of Coercive Power
- ACP: Asymmetry in the perception on the buyer's use of Reward Power
- ADep: Asymmetry in dependence on the relationship

The possible reason for supplier side's higher responses would be, buyer firms are in more dominant position in the relationship, to maintain this relationship, supplier would put more effort to act fairly when it comes to relationship with the buyer, and more committed the relationship building. The mean values of firms dependence on the other party would support this argument, dependence of the supplier on the buyer (5.244) was higher than the buyer's (5.073). Also, in the demographic data (Table 4.4 and 4.5), overall, showed that the buyer are bigger sized (higher number of employees: 12.13% of buyer samples have over 250 employees, only 2.51% for the supplier) and have higher total annual sales (76.99% of buyers have sales of higher than 4 million US dollars, and supplier are 56.49%) than in the supplier side, that is, the buyer firm would be bigger player and more dominant party in the relationship. Regarding the dominant and recipient party in supply chain relationships, the majority of supply chain studies indicate that the buyer is usually in a dominant position over the supplier (e.g. Benton and Maloni, 2005; Ireland and Webb, 2007; Zhao et al., 2008). This is because supply chains generally consist of a number of suppliers and relatively few buyers who purchase components from suppliers. Such an oligopolistic procurement structure has created an unbalanced power environment in which buyers tend to be more powerful (Benton and Maloni, 2005).

<Table 4. 7: Correlation of the constructs – Buyer's model>

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	BDJ	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	BPJ	.879**	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	BCC	.622**	.626**	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	BSC	.629**	.609**	.563**	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	BRC	.779**	.778**	.607**	.641**	1	-	-	-	-	-	-	-	-	-	-	-	-	-
6	BRS	.702**	.708**	.650**	.602**	.720**	1	-	-	-	-	-	-	-	-	-	-	-	-
7	BCP	.365**	.378**	.521**	.376**	.384**	.399**	1	-	-	-	-	-	-	-	-	-	-	-

8	BRP	.536**	.521**	.516**	.457**	.461**	.486**	.629**	1	-	-	-	-	-	-	-	-	-	-	-
9	SRP†	.088	.103	.043	.124	.080	.027	.003	.131	1	-	-	-	-	-	-	-	-	-	-
10	SReRe††	.022	.075	.065	.070	.063	.045	.108	.118	.371**	1	-								
11	Financialloss	-.111	-.117	-.053	-.124	-.064	-.050	.016	-.067	-.059	-.117	1	-	-	-	-	-	-	-	-
12	Frequency	.093	.155*	.124	.137*	.115	.199**	.060	.170**	-.010	.09	-.020	1	-	-	-	-	-	-	-
13	BuSize	-.129*	-.093	-.121	-.05	-.112	-.044	-.160*	-.232**	-.234**	-.101	.103	-.081	1	-	-	-	-	-	-
14	SuSize	.066	.103	.118	.087	.091	.101	.087	.124	.072	-.002	.418**	.084	0.03	1	-	-	-	-	-
15	BuRiskMgt	.093	.121	.146*	.108	.127*	.190**	.219**	.232**	-.134*	-.064	.015	.150*	.201**	.099	1	-	-	-	-
16	SuRiskMgt	.068	.103	.132*	.144*	.090	.128*	.084	.166*	.035	.328**	-.244**	.059	.117	-.101	.095	1	-	-	-
17	BuDep	.495**	.490**	.487**	.516**	.472**	.498**	.601**	.821**	.066	.149*	-.137*	.198**	-.216**	.133*	.231**	.111	1	-	-
18	SuDep	.126	.138*	.110	.167**	.168**	.108	.099	.134*	.049	.451**	-.399**	.024	-.113	-.039	-.093	.265**	.134*	1	-

**. Correlation is significant at the 0.01 level (2-tailed); N = 239

† SRP: supplier's perception on the buyer's reward power is used as a marker variable for the 1st study

†† SReRe: supplier's resource reconfiguring capability is used as a marker variable for the 2nd study

- BDJ: Buyer's Distributive Justice
- BPJ: Buyer's Procedural Justice
- BCC: Buyer's Cognitive Capital
- BSC: Buyer's Structural Capital
- BRC: Buyer's Relational Capital
- BRS: Buyer's evaluation of Disruption Recovery Performance
- BCC: Buyer's use of Coercive Power
- BRC: Buyer's use of Reward Power
- Finacialloss: The buyer and the supplier's financial loss from the disruption (size of the disruption)
- Frequency: Frequency of the disruption experienced
- BuSize (SuSize): Buyer (supplier) firm's number of the employee
- BuRiskMgt (SuRiskMgt): Buyer (supplier) firm's risk management level (basic-advanced)
- BuDep (SuDep): Dependence on the relationship with the supplier (Buyer)
- Bindustry: Buyer firm's industry

<Table 4. 8: Correlation of the constructs – Supplier's model>

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	SDJ	1	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-
2	SPJ	.612**	1	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-
3	SCC	.587**	.508**	1	-	-	-	-	-	-		-	-	-	-	-	-	-	-
4	SSC	.308**	.426**	.463**	1	-	-	-	-	-		-	-	-	-	-	-	-	-
5	SRC	.669**	.655**	.606**	.493**	1	-	-	-	-		-	-	-	-	-	-	-	-
6	SRS	.630**	.595**	.457**	.429**	.720**	1	-	-	-		-	-	-	-	-	-	-	-
7	SCP	.307**	.303**	.435**	.482**	.399**	.326**	1	-	-		-	-	-	-	-	-	-	-
8	SRP	.169**	.196**	.297**	.521**	.318**	.222**	.661**	1	-		-	-	-	-	-	-	-	-
9	BCP†	.051	-.014	.043	.017	-.018	-.032	.120	.003	1		-	-	-	-	-	-	-	-
10	BReRe††	.036	-.014	.015	.015	-.040	-.002	.103	.626**	.016	1								
11	Financialloss	-.230**	-.187**	-.209**	-.343**	-.264**	-.152*	-.373**	-.437**	-.224**	-.059	1	-	-	-	-	-	-	-
12	Frequency	.106	.083	-.013	.142*	.130*	.144*	.117	.035	.035	-.010	-.020	1	-	-	-	-	-	-
13	BuSize	-.154*	-.089	-.151*	-.116	-.211**	-.066	-.091	-.162*	-.162*	-.234**	.103	-.081	1	-	-	-	-	-
14	SuSize	-.302**	-.188**	-.064	-.003	-.248**	-.234**	.018	-.107	.11	.072	.418**	.084	.030	1	-	-	-	-
15	BuRiskMgt	-.133*	-.160*	-.201**	-.078	-.219**	-.057	-.062	-.080	-.08	-.134*	.015	.150*	.201**	.099	1	-	-	-
16	SuRiskMgt	.124	.134*	.215**	.212**	.122	.075	.339**	.325**	.325**	.035	-.244**	.059	.117	-.101	.095	1	-	-
17	BuDep	.053	.048	.021	.118	-.052	-.001	.150*	.120	.12	.066	-.137*	.198**	-.216**	.133*	.231**	.111	1	-
18	SuDep	.211**	.271**	.390**	.559**	.327**	.256**	.684**	.689**	.689**	.049	-.399**	.024	-.113	-.039	-.093	.265**	.134*	1

**. Correlation is significant at the 0.01 level (2-tailed); N = 239

† BCP: buyer's perception on their coercive power is used as a marker variable for the 1st study

†† BReRe: buyer's resource reconfiguring capability is used as a marker variable for the 2nd study

- SDJ: Supplier's Distributive Justice
- SPJ: Supplier's Procedural Justice
- SCC: Supplier's Cognitive Capital
- SSC: Supplier's Structural Capital
- SRC: Supplier's Relational Capital
- SRS: Supplier's evaluation of Disruption Recovery Performance
- SCC: Supplier's use of Coercive Power
- SRC: Supplier's use of Reward Power

<Table 4. 9: Correlation of the constructs – Mutual perspective model[1]>

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	MDJ	1															
2	MPJ	.801**	1														
3	MCC	.625**	.586**	1													
4	MSC††	.578**	.591**	.572**	1												
5	MRC	.764**	.755**	.687**	.67**	1											
6	MRS	.724**	.703**	.635**	.58**	.781**	1										
7	MCP[1]	.363**	.32**	.485**	.442**	.38**	.346**	1									
8	MRP[1]	.37**	.342**	.373**	.48**	.344**	.281**	.644**	1								
9	Financialloss	-.228**	-.179**	-.168**	-.283**	-.206**	-.127	-.261**	-.358**	1							
10	Frequency	.134*	.142*	.074	.168**	.156*	.209**	.121	.127*	-.02	1						
11	BuSize	-.19**	-.108	-.176**	-.1	-.204**	-.068	-.163*	-.256**	.103	-.081	1					
12	SuSize	-.056	.037	.067	.126	-.048	-.076	.119	.098	.24**	.013	.322**	1				
13	BuRiskMgt†	-.022	-.018	-.03	.016	-.054	.076	.088	.081	.015	.15*	.201**	.066	1			
14	SuRiskMgt	.128*	.14*	.225**	.214**	.134*	.124	.297**	.336**	-.244**	.059	.117	.182**	.095	1		
15	BuDep	.377**	.326**	.339**	.377**	.275**	.295**	.473**	.578**	-.137*	.198**	-.216**	.041	.231**	.111	1	
16	SuDep	.225**	.24**	.32**	.44**	.312**	.227**	.556**	.581**	-.399**	.024	-.113	.121	-.093	.265**	.134*	1

[1] Used in the second study only
**. Correlation is significant at the 0.01 level (2-tailed); N = 239
† BuRiskMgt: Buyer's risk management approach level - marker variable for the first study (mutual model)
†† MSC: mutual level of structural capital - marker variable for the second study
- MRC: Mutual level of relational capital
- MCP: Mutual level of coercive response
- MRP: Mutual level of cooperative response
- MRS: Mutual level of disruption response and recovery performance

Further to see whether the dyad had perceptual differences between the buyer and the supplier, t-tests have been conducted (Um and Oh, 2020; Liu et al., 2009). The t-test results (Table 4.10) show the significant differences in the perceptions of relationship dimensions between the two groups. In the t-tests, where equal variances are not applied, the results imply that the perceptions of buyers and suppliers significantly differ in the eight dyadic constructs. These results are in line with previous studies, which elicited that the buyers and suppliers have different interpretations of attitudinal or behavioural constructs (Whipple et al., 2015; Yang et al., 2017). In particular, social capital (Whipple et al., 2015; Villena and Craighead, 2017) and justice (Corsten and Kumar, 2005; Luo, 2008) are aspects where significant perception of asymmetry has been found.

<Table 4. 10: t-test comparison of constructs>

	Buyer / Supplier	Mean	Std. Deviation	Std. Error Mean	Sig.	t
DJ	Buyer	5.002	0.829	0.054	0.003	-2.941
	Supplier	5.219	0.783	0.051		-2.941
PJ	Buyer	5.037	0.811	0.052	0.033	-2.137
	Supplier	5.192	0.766	0.050		-2.137
CC	Buyer	5.090	0.680	0.044	0.083	-1.737
	Supplier	5.196	0.645	0.042		-1.737
SC	Buyer	4.966	0.785	0.051	0.006	-2.745
	Supplier	5.167	0.811	0.052		-2.745
RC	Buyer	5.196	0.758	0.049	0.017	-2.388
	Supplier	5.358	0.724	0.047		-2.388
RS	Buyer	5.103	0.692	0.045	0.011	-2.551
	Supplier	5.270	0.744	0.048		-2.551
CP	Buyer	5.095	0.531	0.034	0.006	-2.736
	Supplier	5.241	0.635	0.041		-2.736
RP	Buyer	5.037	0.586	0.038	0.000	-3.673
	Supplier	5.256	0.712	0.046		-3.673

4.7.3. Multicollinearity

Testing for multicollinearity of the adopted constructs was carried out. A linear regression with another variable, MOM (Mutual Operational Modification), which was not included in the analysis, was performed to obtain 1) the tolerance value and 2) the Variance of Inflation Factor (VIF). Tolerance refers to the amount of variability of the selected independent variable not explained by the other independent variables (Hair et al., 2016). Hair et al. (2016) suggested that independent variables with tolerance values below 0.10 and over 10 can be suspected as having multicollinearity with other such variables. The test results for the buyer (Table 4.11), supplier (Table 4.12) and mutual model (Table 4.13) suggested that there was no obvious multicollinearity among the constructs utilised in the analysis.

<Table 4. 11: Buyer model – Test for multicollinearity for the constructs>

Constructs	Collinearity Statistics	
	Tolerance	VIF
BDJ	.191	5.239
BPJ	.196	5.095
BCC	.441	2.266
BSC	.504	1.983
BRC	.299	3.344
BRS	.373	2.684
BCP	.540	1.851
BRP	.487	2.054

- Dependent Variable: Mutual Operational Modification (Not included in the analysis)

<Table 4. 12: Supplier model – Test for multicollinearity for the constructs>

Constructs	Collinearity Statistics	
	Tolerance	VIF
SDJ	.421	2.374
SPJ	.485	2.063
SCC	.507	1.972
SSC	.549	1.820
SRC	.323	3.097
SRS	.418	2.390
SCP	.489	2.044
SRP	.496	2.018

- Dependent Variable: Mutual Operational Modification (Not included in the analysis)

<Table 4. 13: Mutual model – Test for multicollinearity for the constructs>

Constructs	Collinearity Statistics	
	Tolerance	VIF
MDJ	.278	3.598
MPJ	.299	3.349
MCC	.438	2.285
MSC	.460	2.174
MRC	.243	4.110
MRS	.332	3.014
MCP	.511	1.957
MRP	.524	1.910

- Dependent Variable: Mutual Operational Modification (Not included in the analysis)

In buyer's model, the value of the tolerance lies between 0.191 and 0.540, whilst

the value of the VIF assessment is between 1.851 to 5.239. In supplier's model, the value of the tolerance lies between 0.323 and 0.549, whilst the value of the VIF assessment is between 1.820 and 3.097. In mutual model, the value of the tolerance lies between 0.243 and 0.523, whilst the value of the VIF assessment is between 1.910 and 4.110. All support the conceptualisation of a lack of multi-collinearity in the data, as none of the constructs have a value greater than 10.0 (Hair et al., 2016).

4.8. Summary

This chapter has introduced the sample, data collection methods and the measurement items for the dyadic survey. The survey instrument was targeted at only an SCM managers (buyer: procurement / supplier: sales) or above profile of manufacturers in the U.S, and the firms were randomly selected from the ISM membership directory. After the relevant literature review and pilot study, the measurement items were adopted and developed. The research model has six constructs based on the literature. Both the buyer and supplier respondents detailed demographic profiles have been described. Then, descriptive analysis and testing for multicollinearity of the adopted constructs was carried out.-Further to see whether the dyad had perceptual differences between the buyer and the supplier, t-tests have been conducted.

V. Statistical Results

5.1. Structure of the Chapter

This chapter discusses the statistical results from the first study, and the second study. For the first study, before examining the postulated hypotheses, Confirmatory Factory Analysis (CFA) were performed to examine if proposed models for the buyer and the supplier assure the convergent and discriminant validity and reliability. Then, path analysis was followed to test the model and hypotheses. As the proposed conceptual models are SEM, AMOS 14.0 was employed to test the hypotheses. For the second study, after assuring the reliability and validity through CFA, moderation tests were performed to assess the interaction effect by using SPSS 21. Then, simple slope analysis were performed to confirm the interaction effect.

Statistical Results for the 1st study

5.2. Test of Confirmatory Factory Analysis (CFA)

The purpose of CFA is to test the unidimensionality of the constructs and to assure reliability (Fornell and Larcker, 1981; Bagozzi and Yi, 1988). Scales having both convergent and discriminant validity are considered to be unidimensional (Anderson and Gerbing, 1988).

5.2.1. Buyer's model

CFA is used to assess the internal and external consistency of all the constructs measured with multi-item reflective indicators. Table 5.1 presents the factor loadings, demonstrating significant relationships with their underlying theoretical constructs and

the average variance extracted (AVE) values are all well above the criterion of 0.50 (Fornell and Larcker 1981), i.e. they range from 0.591 - 0.996. Regarding the cut off criteria for the factor loadings, Hair et al. (2016) noted that if the factor loadings exceed 0.70, then this a well-defined structure, which is the goal of any factor analysis. However, loadings over 0.50 are considered to be practically significant, whilst those ranging from 0.30 to 0.40 are considered to meet the minimum level for interpretation of the structure. In particular, the authors noted that the factor loading cut off can differ in accordance with the sample size, such that when it is over 200, loadings of over 0.40 are considered to be acceptable. In this study, the criterion of 0.40 was adopted to enable the use of as many items as possible. This ensured that there were a higher number of matching items than if the threshold was set at 0.7 for the buyer and the supplier models to allow for the investigation into the dyadic relationship perspective. The result of process of CFA was that, DJ5 (just sharing of the outcomes given the knowledge/expertise contributions), DPJ4 (asking their opinion regarding when they made decisions that could affect the relationship), DRC1 (concern about welfare or interests), DRC6 (understanding the difficulty to meet demands), DRS4 (efficiency to deal with the disruption) and DRS6 (financial distress due to the disruption was successfully dealt with) were deleted due to low loadings. These results collectively provide evidence of convergent validity. In addition, reliability by Cronbach's coefficient alpha and composite reliabilities (CR) were assessed. Taken together, these results indicate that the theoretical constructs exhibit good psychometric properties.

Additionally, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.2). Hence, it can be concluded that there is discriminant validity among the theoretical constructs.

<Table 5. 1: Construct analysis – Buyer>

Construct			Factor Loadings	Average Variance Extracted	Composite Reliability	Cronbach alpha
BDJ	Buyer's perception of Distributive Justice in its relationship with the supplier	BDJ1	0.986	0.683	0.825	0.706
		BDJ2	0.726			
		BDJ3	0.779			
		BDJ4	0.793			
BPJ	Buyer's perception of Procedural Justice in its relationship with the supplier	BPJ1	0.974	0.635	0.803	0.703
		BPJ2	0.755			
		BPJ3	0.714			
		BPJ5	0.714			
BCC	Buyer's Cognitive Capital	BCC1	0.996	0.556	0.806	0.717
		BCC3	0.591			
		BCC4	0.715			
		BCC5	0.609			
BSC	Buyer's Structural Capital	BSC1	0.901	0.546	0.754	0.724
		BSC4	0.602			
		BSC6	0.680			
BRC	Buyer's Relational Capital	BRC2	0.949	0.690	0.818	0.710
		BRC3	0.921			
		BRC4	0.694			
		BRC5	0.729			
BRS	Buyer's Disruption Recovery Performance	BRS1	0.952	0.550	0.807	0.709
		BRS2	0.655			
		BRS3	0.683			
		BRS5	0.644			
		BRS7	0.729			

* BDJ5, BPJ4, BRC1&6, BRS4&6 are deleted due to the low loadings

<Table 5. 2: Construct level correlation analysis -Buyer>

Constructs	(BDJ)	(BPJ)	(BCC)	(BSC)	(BRC)	(BRS)
(BDJ)	0.826	-	-	-	-	-
(BPJ)	0.722	0.797	-	-	-	-
(BCC)	0.572	0.605	0.746	-	-	-
(BSC)	0.598	0.622	0.652	0.739	-	-
(BRC)	0.605	0.619	0.519	0.581	0.831	-
(BRS)	0.601	0.603	0.600	0.601	0.569	0.742

Note: n = 239; all correlations are significant at $p < .01$.

For the buyer's model, the goodness of fit was evaluated by multiple criteria to ascertain how well the specified one reproduces the covariance matrix among the indicator variables. Specifically, the buyer's model represents that of Chi-square: 294.5

(df= 204); CFI = 0.972; TLI = 0.962, GFI = 0.908; AGFI = 0.865; and RMSEA = 0.043. The model fit results show good / acceptable fit.

We further examined discriminant validity using the heterotrait-monotrait (HTMT) method (Henseler et al., 2015). HTMT represents the ratio of within construct correlations to the between construct correlation. Although the exact HTMT ratio that would trigger a discriminant validity violation is open to some interpretation, Henseler et al. (2015) suggest that HTMT being below 1.0, preferably 0.85 and 0.90, satisfies the discriminatory criterion. However, even if two constructs are highly correlated (values close to 1.0 or over), the criterion is unlikely to indicate a lack of discriminant validity, particularly when the loadings are homogeneous and high or the sample size is large (Henseler et al., 2015). To satisfy discriminant validity, as the second option for HTMT, confidence interval should not include the value of one (Henseler et al., 2015).

<Table 5. 3: Discriminant validity (HTMT criterion) -Buyer>

Constructs	BDJ	BPJ	BCC	BSC	BRC	BRS
BDJ	-					
BPJ	1.207	-				
BCC	0.857	0.412	-			
BSC	0.878	0.857	0.783	-		
BRC	1.035	1.036	0.814	0.864	-	
BRS	0.975	0.982	0.911	0.841	0.975	-

<Table 5. 4: Discriminant validity (HTMT confidence interval) -Buyer>

Relationships	Bias Corrected 95% C.I.
BDJ → BCC	[0.522, 0.722]
BDJ → BSC	[0.530, 0.729]
BDJ → BRC	[0.699, 0.859]
BPJ → BCC	[0.526, 0.726]
BPJ → BSC	[0.507, 0.710]
BPJ → BRC	[0.697, 0.858]
BCC → BRS	[0.189, 0.402]
BSC →BRS	[0.041, 0.261]
BRC → BRS	[0.329, 0.558]

Table 5.3 shows that the HTMT results, some of correlations were over 1.0 which could not meet the HTMT cutoff value of 0.90 (BDJ-BPJ: 1.207; BDJ-BRC: 1.035; BPJ-BRC: 1.036). However, as Henseler et al. (2015) noted, the factor loadings were relatively high and similar to other constructs – for instance, BDJ -BPJ has very similar / high factor loadings (see table 5.1). From the confidence interval criterion (Table 5.4), all constructs meet the HTMT criterion. Additionally, in the CFA process, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.2). Hence, it can be concluded that there is discriminant validity among the theoretical constructs.

5.2.2. Supplier's model

The same procedures were adopted for supplier's model. Table 5.5 represents the values of AVE and CR. Every AVE value is above the criterion of 0.50 (Fornell and Larcker 1981), with the factor loadings ranging from 0.492 - 0.968 and hence, this model assures convergent validity. As noted in the buyer's model, we adopted cut-off criteria for the factor loadings of 0.40 for the supplier's model. In the process of CFA, same items that deleted from the buyer's model were deleted due to the low loadings. Regarding CR, all of the values well exceed the cut off of 0.6 and thus, a high level of reliability of the model has been guaranteed. As in the buyer's model, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.6), it can be concluded that there is discriminant validity among the theoretical constructs.

<Table 5. 5: Construct analysis – Supplier>

Construct			Factor Loadings	Average Variance Extracted	Composite Reliability	Cronbach alpha
SDJ	Supplier's perception of Distributive justice in its relationship with the buyer	SDJ1	0.881	0.657	0.783	0.716
		SDJ2	0.854			
		SDJ3	0.797			
		SDJ4	0.699			
SPJ	Supplier's perception of Procedural justice in its relationship with the buyer	SPJ1	0.940	0.623	0.792	0.713
		SPJ2	0.769			
		SPJ3	0.688			
		SPJ5	0.736			
SCC	Supplier's Cognitive Capital	SCC1	0.954	0.609	0.848	0.752
		SCC3	0.701			
		SCC4	0.807			
		SCC5	0.618			
SSC	Supplier's Structural Capital	SSC1	0.842	0.537	0.773	0.729
		SSC4	0.651			
		SSC6	0.691			
SRC	Supplier's Relational Capital	SRC2	0.928	0.820	0.864	0.716
		SRC3	0.968			
		SRC4	0.777			
		SRC5	0.936			
SRS	Supplier's Disruption Recovery Performance	SRS1	0.492	0.520	0.743	0.714
		SRS2	0.871			
		SRS3	0.644			
		SRS5	0.794			
		SRS7	0.746			

* SDJ5, SPJ4, SRC1&6, SRS4&6 are deleted due to the low loadings

<Table 5. 6: Construct level correlation analysis -Supplier>

Constructs	(SDJ)	(SPJ)	(SCC)	(SSC)	(SRC)	(SRS)
(SDJ)	0.811	-	-	-	-	-
(SPJ)	0.520	0.789	-	-	-	-
(SCC)	0.510	0.428	0.780	-	-	-
(SSC)	0.288	0.466	0.493	0.733	-	-
(SRC)	0.474	0.500	0.498	0.464	0.906	-
(SRS)	0.557	0.567	0.438	0.475	0.580	0.721

Note: n = 239; all correlations are significant at $p < .01$.

To ascertain whether the supplier's model has good / acceptable fit, multiple criteria of fit indices were used. Specifically, the supplier's model represents that of

Chi-square: 285.4 (df = 187); CFI = 0.908; TLI = 0.948, GFI = 0.908; AGFI = 0.852; and RMSEA= 0.047. Hence, the model fit results show good / acceptable fit.

<Table 5. 7: Discriminant validity (HTMT criterion) -Supplier>

Constructs	SDJ	SPJ	SCC	SSC	SRC	SRS
SDJ	-					
SPJ	0.822	-				
SCC	0.789	0.349	-			
SSC	0.408	0.585	0.627	-		
SRC	0.892	0.889	0.817	0.676	-	
SRS	0.855	0.823	0.626	0.596	0.985	-

<Table 5. 8: Discriminant validity (HTMT confidence interval) -Supplier>

Relationships	Bias Corrected 95% C.I.
SDJ → SCC	[0.483, 0.690]
SDJ → SSC	[0.187, 0.430]
SDJ → SRC	[0.574, 0.764]
SPJ → SCC	[0.398, 0.619]
SPJ → SSC	[0.311, 0.542]
SPJ → SRC	[0.558, 0.752]
SCC → SRS	[-0.106, .0.123]
SSC → SRS	[-0.009, 0.200]
SRC → SRS	[0.551, 0.784]

As in the buyer model, we further examined discriminant validity using the heterotrait-monotrait (HTMT) method (Henseler et al., 2015). Table 5.7 shows that the all of HTMT values are below the 1.0, and except SRC-SRS (0.985), all are below the 0.90, thus corroborating discriminant validity (Henseler et al., 2015; Hair et al. 2016). Additionally, the confidence interval criterion (Table 5.8) also confirm that all constructs satisfy discriminant validity (Henseler et al., 2015).

5.2.3. Common method bias

Given that self-reported data was used and that the same respondents answered the questions on both performance (response and recovery performance) and its

determinants, common method bias was a possibility (Podsakoff *et al*., 2003). Several steps were taken in the research process to avoid this. First, detailed information about the necessary qualifications of key informants in the questionnaires to ensure that they were mid- to senior-level managers carrying out procurement activities (title 2 and title 3 ISM members) was provided. Second, the respondents were assured that their identities would be kept anonymous (Podsakoff *et al*., 2003). Third, through the CFA process, the proposed research models showed good / acceptable fit indices, which easily surpassed the cut off criteria.

Additionally, Harman's one-factor test was conducted to for the existence of common method bias. The unrotated factor solution showed that the largest factor accounted for 39.029% (buyer's model) and 33.538% (supplier's model) which suggests that common method bias was an unlikely problem (Malhotra *et al*., 2005). Lastly, the potential for this bias was tested using the marker variable technique (Lindell and Whitney, 2001). As Lindell and Whitney (2001) suggested, common method bias can be assessed by identifying a marker variable that is not related to other variables used in the research model. A marker variable (buyer model: supplier perceived buyer's reward power; supplier model: buyer's coercive power, which are not used nor related to the main models) was added, and its correlations with the main variables were examined. In the buyer's model, the correlations varied from 0.003 to 0.124, and none of them was significantly correlated with other variables (Table 4.7). In supplier's model, the correlations varied from -0.003 to 0.120 and none of them also was significantly correlated with other variables (Table 4.8). Moreover, the correlations between the constructs that were hypothesised to be significant remained significant after controlling for the effect of the marker variable. To summarise, the results of Harman's single-factor test, and the marker variable test indicated that common

methods bias was not a problem in this study.

5.3. Structural Model

After checking for reliability and validity, the structural model was operationalised to test the research hypotheses. The structural model had satisfactory model fit results, as shown in Table 5.9 (buyer's model), and 5.11 (supplier's model).

5.3.1. Buyer's model: Hypotheses test results

First, the buyer's structural model had satisfactory model fit results, Chi-square: 414.8, df: 315; Fit indices: CFI= 0.970, TLI= 0.958, GFI= 0.899, AGFI = 0.851, and RMSEA= 0.036. From the structural model results, the positive and significant path loadings linking buyer perception of distributive justice in its relationship with supplier to buyer's cognitive capital (supports H1a: $\beta = 0.549$ (0.713), $p < 0.000$), structural capital (supports H2a: $\beta = 0.165$ (0.322), $p < 0.05$) and relational capital (supports H3a: $\beta = 0.444$ (0.417), $p < 0.000$) confirmed that the buyer's perception of distributive justice in its relationship with the supplier is positively related to the level of its social capital (all three dimensions) in the buyer-supplier relationship (supports H1a, H2a, and H3a). The buyer's structure model results show that its perception of procedural justice in its relationship with the supplier its positively related to their accumulation structural capital (supports H5a: $\beta = 0.232$ (0.547), $p < 0.000$), and relational capital (supports H6a: $\beta = 0.309$ (0.349), $p < 0.000$), however, support was not found in the relationship with cognitive capital (not supports H4a: $\beta = 0.136$ (0.213), $p = 0.052$). These relationships confirm that when the buyer perceives a high level of their supplier's fairness in the decision making process, this helps to develop the buyer's structural and relational capital in the relationship (supports H5b, and H6c, not support H4a).

Regarding the relationship between the buyer's social capital accumulation and the disruption recovery performance, cognitive, structural and relational capital are found to have had a positive impact on recovery (supports H7a: $\beta = 0.501$ (0.507), $p < 0.000$; supports H8a: $\beta = 0.259$(0.175), $p < 0.005$; supports H9a: $\beta = 0.103$ (0.144), $p < 0.005$). Regarding the R^2 for the endogenous variables in the buyer's model, 0.770 for the cognitive capital, 0.722 for the structural capital, 0.620 for the relational capital and 0.584 for the recovery performance. The path analysis results of the buyer's model can be seen in Table 5.9, and Figure 5.1 illustrates these results.

<Table 5. 9: Path Analysis results – Buyer>

	Hypothesis	Estimate	Std Estimate	S.E.	C.R.	*P* value	Results
H1a	Buyer's perception of Distributive Justice in its relationship with the supplier (BDJ) → Buyer's Cognitive Capital (BCC)	0.549	0.713	0.081	6.783	***	Support
H2a	Buyer's perception of Distributive Justice in its relationship with the supplier (BDJ) → Buyer's Structural Capital (BSC)	0.165	0.322	0.067	2.461	0.014	Support
H3a	Buyer's perception of Distributive Justice in its relationship with the supplier (BDJ) → Buyer's Relational Capital (BRC)	0.444	0.417	0.099	4.487	***	Support
H4a	Buyer's perception of Procedural Justice in its relationship with the supplier (BPJ) → Buyer's Cognitive Capital (BCC)	0.136	0.213	0.07	1.939	0.052	Not Support
H5a	Buyer's perception of Procedural Justice in its relationship with the supplier (BPJ) → Buyer's Structural Capital (SSC)	0.232	0.547	0.069	3.356	***	Support
H6a	Buyer's perception of Procedural Justice in its relationship with the supplier (BPJ) → Buyer's Relational Capital (SRC)	0.309	0.349	0.093	3.327	***	Support

H7a	Buyer's Cognitive Capital (SCC) → Buyer's Recovery Performance (BRS)	0.501	0.507	0.083	6.063	***	Support
H8a	Buyer's Structural Capital (SSC) → Buyer's Recovery Performance (BRS)	0.259	0.175	0.103	2.512	0.012	Support
H9a	Buyer's Relational Capital (SRC) → Buyer's Recovery Performance (BRS)	0.103	0.144	0.036	2.864	0.004	Support

Note: **$p < .05$; *** $p < .01$; Control variable: (1) frequency of disruption experienced, (2) buyer & (3) supplier firm size (no of employee), (4) supplier's dependence on the buyer, (5) buyer's financial loss (size of disruption) Chi-square: 414.8, df: 315; Fit indices: CFI= 0.970, TLI= 0.958, GFI= 0.899, AGFI = 0.851, and RMSEA= 0.036

In addition, for testing the mediating effect of social capital (cognitive, structural and relational capital) between justice (distributive and procedural justice) and disruption response and recovery performance, the bootstrapping method has been deployed. Bootstrapping is a nonparametric statistical procedure in which the dataset is repeatedly sampled and indirect effects are calculated (Preacher and Hayes, 2008). These indirect effects are then tested for significance using confidence intervals. If the indirect effects are significant, mediation is inferred in the model. For the present study, the significance of the indirect effects was measured by setting the number of sampling iterations at n = 2,000. Regarding the buyer's model, all of the mediating effects of social capital between justice and disruption response and recovery performance were statistically significant at $p<0.05$. Specifically, cognitive capital was found to have an indirect effect on the relationship between the distributive and procedural justice and disruption response and recovery performance, but the direct effect was found to be insignificant, thus indicating full mediation. In terms of structural and relational capital, these emerged as partially mediating the relationship between the distributive justice and disruption response and recovery performance, whilst fully mediating the relationship between the procedural justice and disruption response and recovery

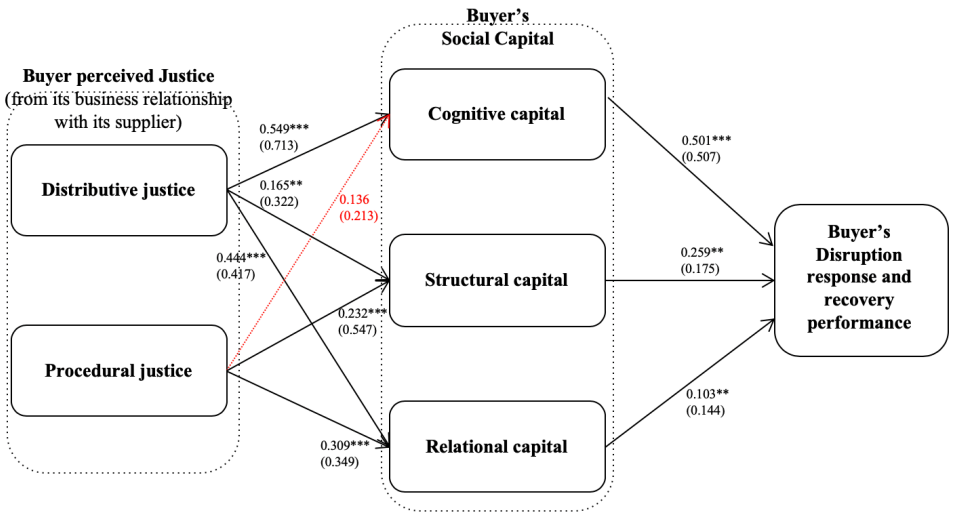
performance. Table 5.10 shows more details regarding the mediation test results for the buyer.

<Table 5. 10: Mediation test for the buyer's model – bootstrapping results>

Independent variable	Mediating Variable	Dependent variable	Direct effect	Indirect effect	Result
Distributive justice	Cognitive Capital	Response and recovery performance	0.923(ns)	0.054 **	Full mediation
Distributive justice	Structural Capital	Response and recovery performance	0.406***	0.084***	Partial mediation
Distributive justice	Relational Capital	Response and recovery performance	0.520***	0.093***	Partial mediation
Procedural justice	Cognitive Capital	Response and recovery performance	0.072 (ns)	0.072**	Full mediation
Procedural justice	Structural Capital	Response and recovery performance	-0.007(ns)	0.070**	Full mediation
Procedural justice	Relational Capital	Response and recovery performance	0.023 (ns)	0.024**	Full mediation

Note: ** p < .05; *** p < .01

<Figure 5. 1: Path Analysis results – Buyer>



Note: ** p < .05; *** p < .01

5.3.2. Supplier's s model: Hypotheses test results

The supplier's structural model had satisfactory model fit results, as shown in Table 5.11, these being Chi-square: 494.4, df: 338; Fit indices: CFI= 0.953, TLI= 0.930, GFI= 0.886, AGFI = 0.821, and RMSEA= 0.044. The supplier's path model results show that its level of cognitive capital and relational capital can be raised when it perceives a high level of buyer's fairness in outcome distribution (supports H1b: $\beta = 0.286$ (0.392), $p < 0.000$; supports H3b: $\beta = 0.213$ (0.365), $p < 0.000$). However, it does not have positive impact on accumulation of the supplier's structural capital (not support H2b: $\beta = -0.123$ (-0.163), $p = 0.157$). As can be seen in Table 5.11, the supplier's perception of procedural justice in its relationship with the buyer is positively related to all of dimensions of social capital development. That is, when the supplier perceives that its buyer treats it with a high level of fairness in output distribution, this helps the supplier in establishing cognitive capital (supports H4b: $\beta = 0.349$ (0.401), $p < 0.000$), structural capital (supports H5b: $\beta = 0.624$ (0.692), $p < 0.000$), and relational capital (supports H6b: $\beta = 0.279$(0.401), $p < 0.000$).

From the test on the impact of the supplier's social capital on its disruption recovery performance, the results show that its cognitive and relational capital support this performance (supports H7b: $\beta = 0.695$ (0.724), $p < 0.000$; supports H9b: $\beta = 0.361$ (0.301), $p < 0.000$). However, there was no significant relationship between the supplier' s structural capital and its disruption recovery performance (not support H8b: $\beta = -0.025$ (0.027), $p = 0.781$). Regarding the R^2 for the endogenous variables in the supplier's model, 0.531 for the cognitive capital, 0.339 for the structural capital, 0.477 for the relational capital and 0.341 for the recovery performance. The path analysis results of supplier's model can be seen in Table 5.11 and are illustrated in Figure 5.2.

<Table 5. 11: Path Analysis results – Supplier>

	Hypothesis	Estimate	Std Estimate	S.E.	C.R.	*P* value	Results
H1b	Supplier's perception of Distributive Justice in its relationship with the buyer (SDJ) → Supplier's Cognitive Capital (SCC)	0.286	0.392	0.062	4.586	***	Support
H2b	Supplier's perception of Distributive Justice in its relationship with the buyer (SDJ) → Supplier's Structural Capital (SSC)	-0.123	-0.163	0.087	-1.416	0.157	Not Support
H3b	Supplier's perception of Distributive Justice in its relationship with the buyer (SDJ) → Supplier's Relational Capital (SRC)	0.213	0.365	0.047	4.524	***	Support
H4b	Supplier's perception of Procedural Justice in its relationship with the buyer (SPJ) → Supplier's Cognitive Capital (SCC)	0.349	0.401	0.084	4.147	***	Support
H5b	Supplier's perception of Procedural Justice in its relationship with the buyer (SPJ) → Supplier's Structural Capital (SSC)	0.624	0.692	0.135	4.615	***	Support
H6b	Supplier's perception of Procedural Justice in its relationship with the buyer (SPJ) → Supplier's Relational Capital (SRC)	0.279	0.401	0.063	4.461	***	Support
H7b	Supplier's Cognitive Capital (SCC) → Supplier's Recovery Performance (SRS)	0.695	0.724	0.134	5.188	***	Support
H8b	Supplier's Structural Capital (SSC) → Supplier's Recovery Performance (SRS)	-0.025	-0.027	0.09	-0.277	0.781	Not Support
H9b	Supplier's Relational Capital (SRC) → Supplier's Recovery Performance (SRS)	0.361	0.301	0.082	4.389	***	Support

Note: $^{**}p < .05$; $^{***}p < .01$; Control variable: (1) frequency of disruption experienced, (2) buyer & (3) supplier firm size (no of employee), (4) buyer's dependence on the supplier, (5) supplier's financial loss (size of disruption) Chi-square: 494.4, df: 338; Fit indices: CFI= 0.953, TLI= 0.930, GFI= 0.886, AGFI = 0.821, and RMSEA= 0.044

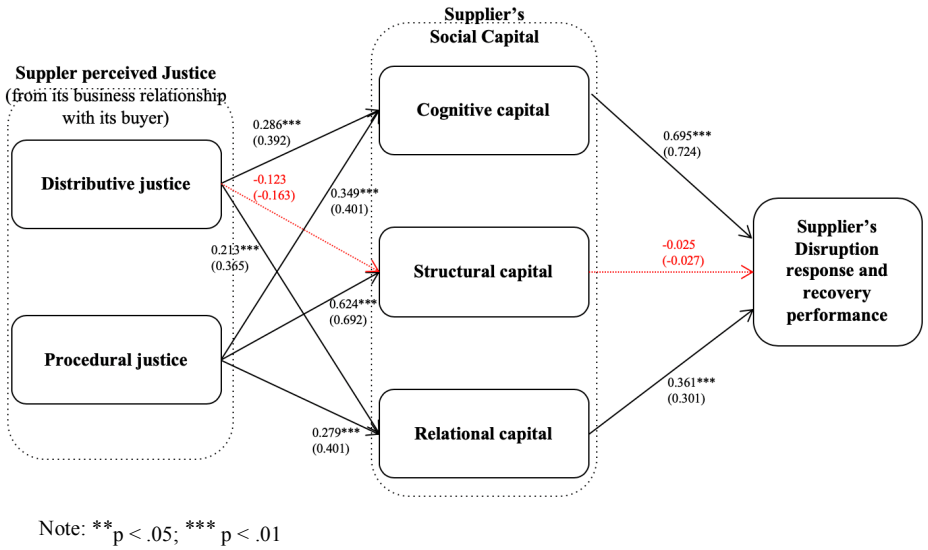
As with the supplier's model, to test the mediating effect of social capital (cognitive, structural, relational capital) between the justice (distributive and procedural justice) and disruption response and recovery performance, the bootstrapping method was adopted for applying to the supplier's model. It was found that cognitive capital fully mediates the relationships between the distributive and procedural justice and disruption response and recovery performance, whilst relational capital only partially mediates such relationships. Regarding the structural capital, as in the path analysis that had insignificant results, there was no mediation effect on the relationship between distributive justice and disruption response and recovery performance, whereas there was partial mediation on the relationship between procedural justice and disruption response and recovery performance. Table 5.12 provides more details regarding the mediation test results for the supplier.

<Table 5. 12: Mediation test for the Supplier's model – bootstrapping results>

Independent variable	Mediating Variable	Dependent variable	Direct effect	Indirect effect	Result
Distributive justice	Cognitive Capital	Response and recovery performance	-0.328 (ns)	0.721**	Full mediation
Distributive justice	Structural Capital	Response and recovery performance	0.590***	-0.023(ns)	No mediation
Distributive justice	Relational Capital	Response and recovery performance	0.438 ***	0.161***	Partial mediation
Procedural justice	Cognitive Capital	Response and recovery performance	0.195 (ns)	0.233**	Full mediation
Procedural justice	Structural Capital	Response and recovery performance	0.213***	0.217**	Partial mediation
Procedural justice	Relational Capital	Response and recovery performance	0.414**	0.149**	Partial mediation

Note: $^{**}p < .05$; $^{***}p < .01$

<Figure 5. 2: Path Analysis results – Supplier>



Note: ** p < .05; *** p < .01

5.3.3. Multi-group analysis

While the separate models showed how justice perception impact social capital development, and impact of social capital on disruption recovery from each perspective, it is not clear to compare these two groups – buyer group and supplier group - that the relationships remain significant or invariant across the group. To formally compare the buyer and the supplier perspectives, a multi-group analysis of structural invariance (invariance test) across firm (buyer group and supplier group) was conducted in Amos. Table 5.13 summarises the path estimates and Chi-square statistics for the buyer and the supplier.

We found significant differences in the Chi-square ($\Delta\chi^2$= 144.375, Δdf = 25, p < 0.05) between the baseline model (e.g., the structural model parameters varied freely across the two uncertainty groups), and the constrained model (e.g., structural parameters constrained to be equal across the two uncertainty groups), which suggest variance of the buyer and the supplier models.

<Table 5. 13. Multi-group analysis results>

	χ^2	df	χ^2/df	IFI	CFI	NNFI	RMSEA	$\Delta\chi^2$	Δdf	χ^2test Results	Buyer Model	Supplier Model
1.Baselien model	1048.30	527	1.989	0.927	0.924	0.861	0.045					
2.Constrained Model	1192.68	552	2.161	0.923	0.921	0.855	0.045	144.375	25	0.004		
DJ→CC	1344.82	553	2.432	0.926	0.924	0.861	0.045	296.524	1	0.045	0.824***	0.605***
DJ→SC	1415.86	553	2.56	0.926	0.923	0.861	0.045	367.556	1	0.009	0.494***	-0.032
DJ→RC	1269.19	553	2.295	0.927	0.924	0.861	0.045	220.890	1	0.293	0.550***	0.373***
PJ→CC	1301.72	553	2.354	0.926	0.924	0.861	0.045	253.416	1	0.125	-0.019	0.277**
PJ→SC	1295.16	553	2.342	0.926	0.924	0.861	0.045	246.864	1	0.147	0.316**	0.627***
PJ→RC	1322.65	553	2.392	0.926	0.924	0.861	0.045	274.346	1	0.075	0.174**	0.393***
CC→RP	1298.28	553	2.348	0.926	0.924	0.861	0.045	249.984	1	0.136	0.337***	0.408***
SC→RP	1432.50	553	2.59	0.926	0.923	0.861	0.045	384.196	1	0.007	0.400***	0.082
RC→RP	1517.44	553	2.744	0.925	0.923	0.860	0.046	469.138	1	0.001	0.102**	0.361***

Note: **p < .05; *** p < .01; Control variable: (1) frequency of disruption experienced, (2) Buyer & (3) Supplier firm size (no of employee), (4) buyer's & (5) supplier's dependence, (6) buyer & (7) supplier financial loss (size of disruption)

- DJ: Distributive Justice
- PJ: Procedural Justice
- CC: Cognitive Capital
- SC: Structural Capital
- RC: Relational Capital
- RS: Disruption Recovery Performance
- CC: Buyer's use of Coercive Power
- RC: Buyer's use of Reward Power

We then tested the equality of the paths between the buyer and the supplier groups. A significant χ^2 difference ($\Delta\chi^2$= 296.524, p < 0.05) indicates there is differences between the buyer and the supplier group in distributive justice – cognitive capital relationship. The relationship supported from both buyer (β= 0.824***) and the supplier (β= 0.605***) as hypothesised, and this relationship found to be stronger in the buyer's

perspective. A significant χ^2 difference ($\Delta\chi^2$= 367.556, $p < 0.05$) was found in the relationship between distributive justice and structural capital, only buyer (β= 0.494***) model support hypotheses. The relationship between distributive justice on the relational capital was supported by both the buyer (β= 0.550***) and the supplier (β= 0.373***), but insignificant χ^2 difference ($\Delta\chi^2$= 220.890, not significant) was found.

The relationship between procedural justice on cognitive capital was supported from supplier's model only (β= 0.277**) and χ^2 difference test was not significant ($\Delta\chi^2$= 253.416, not significant) that indicates fail to find significant differences between the groups. Both buyer and supplier models support the relationship between the procedural justice on structural capital (β= 0.316** in buyer model, β= 0.627***in supplier model) and procedural justice on relational capital (β= 0.174** in buyer model, β= 0.393***in supplier model), χ^2 difference test was not significant for both relationships, ($\Delta\chi^2$= 246.864 ; 274.346, not significant) that indicates fail to find significant differences between the groups.

The relationship between cognitive capital and disruption recovery performance is significant in both buyer (β = 0.337***) and supplier model (β = 0.408***), but χ^2 difference test suggests invariance ($\Delta\chi^2$= 249.984, not significant) of the relationship across the groups. A significant χ^2 difference ($\Delta\chi^2$= 384.196, $p < 0.05$) was found in the relationship between structural capital and disruption recovery performance, but only buyer's model supports the relationship (β= 0.400***). Lastly, the relationship between relational capital and disruption recovery performance is significant in both buyer(β = 0.102***) and supplier model (β = 0.361***) and also χ^2 difference test results was significant ($\Delta\chi^2$= 469.138, $p < 0.05$) that indicates there is differences between the buyer and the supplier group. Given that the supplier model has higher coefficient value, the

disruption recovery performance promoting role of relational capital is more strengthened in the supplier's model.

5.3.4. Endogeneity test

We also took further measures to account for potential issues of endogeneity arising in our models. There is a possibility that firms could achieve successful recovery from the disruption not because of the relationship with partnering firm, but because of their own capabilities. Thus, if this source of endogeneity existed, the error terms of the endogenous explanatory variables would be correlated with the error terms of the dependent variable, leading to biased and inconsistent results (Greene, 2003**).** To address the potential endogeneity problem, between each dimension of social capital and supply chain disruption recovery performance, a two-stage least squares (2SLS) estimation procedure was adopted. In the first stage, each social capital dimensions were regressed on all assumed exogenous variables on three separate regressions – (1) cognitive capital, (2) structural capital, and (3) relational capital - in order to obtain predicted values for these potentially endogenous variables. In the second stage, the predicted values from the first stage were included as independent variables to replace the values of the assumed endogenous variables.

Before the 2SLS was executed, we had to identify instrumental variable candidates that met validity requirements. First, in a regression with only assumed exogenous variables from the original count model, we identified candidates that were not significantly correlated with disruption recovery performance at the 5% significance level. From this step, we chose firm sales and risk management approach as instruments for both structural characteristics for the buyer model, and chose buyer's and supplier's risk management approach level were used for the supplier's model.

Firms with higher sales tend to have access to a greater number of resources (Tsai, 2001). Thus, difference in sales could mean that there is a difference in the amount of resource or speed in adapting to the situation, i.e. impacting in varying ways on achieving timely disruption recovery. Firms' risk management approach (basic – advanced) also impact disruption recovery performance (Norman and Jansson, 2004). Using Ericson's case, Norman and Janson (2004) showed that firms can minimise the negative consequences of disruption when the efficient crisis organisation is in place and adopt proactive approach to cope with accident.

The table 5.14 and 5.15 (Models (1), (2), and (3)) shows the results of the first stage regressions for dimensions of social capital and disruption recovery performance of buyer's and supplier's model, respectively. In the first stage regression, we regressed social capital (cognitive, structural, and relational capital) on all assumed instrumental variables and control variables (Gligor, 2018; Liu et al., 2016). Models 1, 2, and 3 in Table 5.14 indicate that the R^2 of the regressions are 0.469, 0.474, and 0.676 respectively, significantly higher than the R^2 of the regressions with only control variables. In supplier's model, the table 5.15 also shows that R^2 of the regressions are 0.494, 0.452, and 0.676 respectively, significantly higher than the R^2 of the regressions with only control variables. The results suggest that firm sales and their risk management approach can be treated as adequate instrumental variables for cognitive, structural, and relational capital in the buyer model. Also, in the supplier, the buyer's and supplier's risk management approach as can be treated as adequate instrumental variables as well.

Following previous studies (Bellamy et al., 2014; Liu et al., 2016), in the second stage we tested the predicted values of the assumed endogenous variables and used them to test the relationships between social capital dimensions and disruption recovery

performance. As shown by Model 4 in Table 5.14 (buyer) and Table 5.15 (supplier), the relationship between the predicted value of social capital dimensions and disruption recovery performance is significant and positive in both buyer and the supplier model. In addition, the 2SLS results are also consistent with the SEM results presented in Table 5.9, Figure 5.1 (buyer model) and Table 5.11, Figure 5.2 (supplier model).. Hence, we conclude that our results and conclusions were unlikely to be unduly affected by endogeneity.

After running the 2SLS, we performed a Durbin–Wu–Hausman postestimation test of endogeneity, which adds the error terms from the first stage (using robust variance estimates) and separately tests whether they are correlated with error terms in the original count model (Cameron and Trivedi, 2009). Using the error terms from the first stage for the assumed endogenous variables in separate tests, both endogeneity test statistics had p-values greater than 0.10 (buyer model: $F(1,231)=0.959$, $p = 0.3284$; supplier model: $F(1,231)=2.49986$, $p=0.1151$) indicating that we fail to reject the null that these variables are exogenous for both buyer and the supplier model. Hence, the parameter estimates for these variables in our original count model do not appear to be unduly influenced by endogeneity.

<Table 5. 14: buyer model – 2SLS model testing for endogeneity >

	Cognitive capital Model 1 (OLS)	Structural capital Model 2 (OLS)	Relational capital Model 3 (OLS)	Disruption recovery performance Model 4 (2SLS)
Ind_Auto	-0.090	-0.014	-0.141	-0.075
Ind_Elec	-0.143	0.077	-0.125	-0.134
Ind_Food	-0.287	-0.007	-0.161	0.017
Ind_Hard	-0.144	0.114	-0.048	0.147
Frequency	0.022	0.017	0.003	0.034
BuSize	-0.025	0.075	-0.038	0.066
SuSize	-0.042	0.031	-0.034	-0.014
BuFinancialloss	0.000	0.000	0.000	0.000
SuFinancialloss	0.000	0.000	0.000	0.000

BuDep	0.251***	0.370***	0.069	0.112
SuDep	0.074	0.081	0.102	-0.010
BuSales[a]	0.000	0.000	0.001	
BuRiskMgt[a]	0.030	-0.017	0.021	
BDJ	0.227**	0.351**	0.371***	0.113
BPJ	0.235**	0.134	0.374***	0.137
BCC				0.234***
BSC				0.070
BRC				0.243***
R^2	0.469	0.474	0.676	0.655
F-Value	13.120***	13.409***	30.997***	26.388***

Notes: $p \leq 0.05$**, $p \leq 0.01$***.
[a] Variables used as instruments for assumed endogenous variables.

<Table 5. 15: Supplier model – 2SLS model testing for endogeneity >

	Cognitive capital Model 1 (OLS)	Structural capital Model 2 (OLS)	Relational capital Model 3 (OLS)	Disruption recovery performance Model 4 (2SLS)
Ind_Auto	-0.242	0.158	-0.130	-0.428
Ind_Elec	-0.174	0.377	-0.094	-0.468
Ind_Food	-0.183	0.298	-0.185	-0.445
Ind_Hard	-0.191	0.027	-0.114	-0.456
Frequency	-0.051**	0.040	0.041	0.013
BuSize	-0.078**	-0.029	-0.093**	0.085**
SuSize	0.061	0.129**	-0.035	-0.188**
BuFinancialloss	0.000	0.000**	0.000	0.000
SuFinancialloss	0.000	0.000	0.000	0.000**
BuDep	-0.116	-0.016	-0.226	0.030
SuDep	0.185**	0.447***	0.151***	0.036
SuRiskMgt[a]	0.103	0.006	0.009**	
SuNoWeeks[a]	-0.007	0.000	-0.007	
SDJ	0.391***	0.037	0.360***	0.276***
SPJ	0.114**	0.253***	0.339***	0.123**
SCC				-0.090
SSC				0.166**
SRC				0.447***
R^2	0.494	0.452	0.676	0.606
F-Value	14.527***	12.255***	30.997***	22.871***

Notes: $p \leq 0.05$**, $p \leq 0.01$***.
[a] Variables used as instruments for assumed endogenous variables.

5.3.5. Mutual perspective

While the separate models (side by side approach) showed how justice perception impact social capital development, and impact of social capital on disruption recovery from each the byer and the supplier perspective, it cannot show that how a dyad (mutual) perceive

such shared relationship. To further investigate mutual perspective, degree-symmetry score (Straub et al., 2004, Klein et al., 2007), by considering the average value of the responses of both parties as well as the discordance between the responses. Straub et al. (2004) and Klein et al. (2007) provide a detailed description of the degree- symmetry approach. Following the procedures, we implement the following step to operationalize the degree-symmetric variables for this study: (*1) the scores for each items are summed and then standardized to obtain a value between 0 and 1 for the buyer data (C_1) and the supplier data (C_2), which represents the magnitude for the buyer and the supplier; (2) average the buyer and the supplier to get the degree (magnitude) of the dyad, CD = (C_1 + C_2)/2; (3) between C_1 and C_2, divide the smaller one by the bigger one to get another standardized value between 0 and 1, C_S, which represents the symmetric value of the construct; (4) average C_D and C_S to yield the degree-symmetric value for the construct across the dyad, C_{DS}.* Using these steps, we operationalize the degree-symmetric values for all of the constructs in the proposed model.

5.3.6. Test of Confirmatory Factor Analysis (CFA) for mutual perspective

We also conducted CFA using the degree-symmetric variables and the fit indexes showed a good fit for the dyad data as well. The same procedures were adopted for the buyer and the supplier's models. Table 5.16 represents the values of AVE and CR. Every AVE value is above the criterion of 0.50 (Fornell and Larcker 1981), with the factor loadings ranging from 0.581 - 0.947 and hence, this model assures convergent validity. As noted above, we adopted cut-off criteria for the factor loadings of 0.40 for the supplier's model. In the process of CFA, same items that deleted from the buyer's model were deleted due to the low loadings. Regarding CR, all of the values well exceed the cut off of 0.6 and thus, a high level of reliability of the model has been guaranteed.

As in the buyer and the supplier's models, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.17), it can be concluded that there is discriminant validity among the theoretical constructs.

<Table 5. 16: Construct analysis – Mutual>

Construct[1]			Factor Loadings	Average Variance Extracted	Composite Reliability	Cronbach alpha
MDJ	Mutual perception of Distributive justice in the relationship	MDJ1	0.965	0.585	0.993	0.707
		MDJ2	0.807			
		MDJ3	0.687			
		MDJ4	0.536			
MPJ	Mutual perception of Procedural justice in the relationship	MPJ1	0.974	0.520	0.996	0.792
		MPJ2	0.718			
		MPJ3	0.623			
		MPJ5	0.479			
MCC	Mutual perception of Cognitive Capital	MCC1	0.678	0.536	0.991	0.754
		MCC3	0.719			
		MCC4	0.762			
		MCC5	0.765			
MSC	Mutual perception of Structural Capital	MSC1	0.732	0.536	0.995	0.685
		MSC4	0.606			
		MSC6	0.839			
MRC	Mutual perception of Relational Capital	MRC2	0.881	0.502	0.984	0.760
		MRC3	0.658			
		MRC4	0.603			
		MRC5	0.660			
MRS	Mutual perception of Disruption Recovery Performance	MRS1	0.841	0.506	0.999	0.786
		MRS2	0.647			
		MRS3	0.727			
		MRS5	0.586			
		MRS7	0.729			

* SDJ5, SPJ4, SRC1&6, SRS4&6 are deleted due to the low loadings
[1] all constructs were operationalized by the degree- symmetric approach

<Table 5. 17: Construct level correlation analysis -Mutual>

Constructs	(MDJ)	(MPJ)	(MCC)	(MSC)	(MRC)	(MRS)
(MDJ)	0.765	-	-	-	-	-
(MPJ)	0.648	0.721	-	-	-	-
(MCC)	0.350	0.318	0.732	-	-	-
(MSC)	0.299	0.398	0.267	0.732	-	-
(MRC)	0.630	0.577	0.271	0.308	0.709	-
(MRS)	0.505	0.462	0.300	0.238	0.479	0.711

Note: n = 239; all correlations are significant at $p < .01$.

To ascertain whether the pooled model has good / acceptable fit, multiple criteria of fit indices were used. Specifically, the supplier's model represents that of Chi-square: 383.9 (df = 205); CFI = 0.901; TLI = 0.866, GFI = 0.873; AGFI = 0.814; and RMSEA= 0.061. Hence, the model fit results show good / acceptable fit. Based on the CFA results and fit indices, it is concluded the buyer, supplier, and mutual models have good / acceptable fit as well as assured validity and reliability.

As in the buyer and supplier model, we further examined discriminant validity using the heterotrait-monotrait (HTMT) method (Henseler et al., 2015). Table 5.18 shows that the HTMT results, all constructs meet the HTMT criterion, except MDJ-MPJ which was over 1.0 (1.081). However, MDJ-MPJ has very similar / high factor loadings (see Table 5.16) and confidence interval (Table 5.19) showed that all constructs meet the HTMT criterion. Additionally, in the CFA process, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.17). Hence, it can be concluded that there is discriminant validity among the theoretical constructs.

<Table 5. 18: Discriminant validity (HTMT criterion) -Mutual>

Constructs	MDJ	MPJ	MCC	MSC	MRC	MRS
MDJ	-					
MPJ	1.081	-				
MCC	0.774	0.231	-			
MSC	0.707	0.824	0.754	-		
MRC	0.848	0.900	0.513	0.697	-	
MRS	0.761	0.707	0.638	0.504	0.622	-

<Table 5. 19: Discriminant validity (HTMT confidence interval) -Mutual >

Relationships	Bias Corrected 95% C.I.
MDJ → MCC	[0.375, 0.599]
MDJ → MSC	[0.309, 0.541]
MDJ → MRC	[0.453, 0.665]
MPJ → MCC	[0.362, 0.587]
MPJ → MSC	[0.365, 0.590]
MPJ → MRC	[0.475, 0.684]
MCC → MRS	[0.151, 0.399]
MSC → MRS	[-0.048, 0.208]

MRC → MRS	[0.179, 0.423]

5.3.7. Common method bias for mutual perspective

Several steps were taken in mutual perspective model to avoid common method bias. First, as in the buyer and supplier's model, detailed information about the necessary qualifications of key informants in the questionnaires to ensure that they were mid- to senior-level managers carrying out procurement activities (title 2 and title 3 ISM members) was provided. Second, the respondents were assured that their identities would be kept anonymous (Podsakoff *et al*., 2003). Third, through the CFA process, the proposed research models showed good / acceptable fit indices, which easily surpassed the cut off criteria.

Additionally, Harman's one-factor test was conducted to for the existence of common method bias. The unrotated factor solution showed that the largest factor accounted for 41.961% which suggests that common method bias was an unlikely problem (Malhotra *et al*., 2005). Lastly, the potential for this bias was tested using the marker variable technique (Lindell and Whitney, 2001). As Lindell and Whitney (2001) suggested, common method bias can be assessed by identifying a marker variable that is not related to other variables used in the research model. A marker variable (buyer's risk management approach, which are not used nor related to the main models) was added, and its correlations with the main variables were examined. The correlations varied from -0.054 to 0.016 and none of them also was significantly correlated with other variables (Table 4.9). Moreover, the correlations between the constructs that were hypothesised to be significant remained significant after controlling for the effect of the marker variable. To summarise, the results of Harman's single-factor test, and the marker variable test indicated that common methods bias was not a problem in this study.

5.3.8. Structural Model

The mutual structural model had satisfactory model fit results, as shown in Table 5.20, these being Chi-square: 456.3, df: 326; Fit indices: CFI= 0.963, TLI= 0.947, GFI= 0.890, AGFI = 0.833, and RMSEA= 0.041. The mutual path model results show that its level of cognitive capital (β = 0.221 (0.448), p < 0.05) and relational capital (β = 0.393 (0.547), p < 0.000) can be raised when it perceives a high level of fairness in outcome distribution. However, it does not have positive impact on accumulation of structural capital (not support: β = -0.013 (-0.051), p = 0.767).

As can be seen in Table 5.20, the mutual perception of procedural justice in the relationship is positively related to all of dimensions of social capital development. That is, when the parties perceives that their counterparty treats them with a high level of fairness in output distribution, this helps them in establishing cognitive capital (β = 0396 (0.642), p < 0.005), structural capital (β = 0.248 (0.746), p < 0.005), and relational capital (β = 0.461 (0.511), p < 0.005). From the test on the impact of the mutual perception of social capital on their disruption recovery performance, the results show that its cognitive (β = 0.409 (0.345), p < 0.005) and relational capital (β = 0.289 (0.355), p < 0.005) support this performance. However, there was no significant relationship between the structural capital and its disruption recovery performance (β = -0.0211 (-0.096), p = 0.781).

<Table 5. 20: Path Analysis results – Mutual>

	Mutual Perspective	Estimate	Std Estimate	S.E.	C.R.	*P* value	Results
Buyer (H1a) Supplier (H1b)	Mutual perception of Distributive Justice in the relationship (MDJ) → Mutual perception of Cognitive Capital (MCC)	0.221	0.448	0.094	2.35	0.019	Support

Buyer (H2a) Supplier (H2b)	Mutual perception of Distributive Justice in the relationship (MDJ) → Mutual perception of Structural Capital (MSC)	-0.013	-0.051	0.045	-0.296	0.767	Not Support
Buyer (H3a) Supplier (H3b)	Mutual perception of Distributive Justice in the relationship (MDJ) → Mutual perception of Relational Capital (MRC)	0.393	0.547	0.116	3.383	***	Support
Buyer (H4a) Supplier (H4b)	Mutual perception of Procedural Justice in the relationship (MPJ) → Mutual perception of Cognitive Capital (MCC)	0.396	0.642	0.126	3.139	0.002	Support
Buyer (H5a) Supplier (H5b)	Mutual perception of Procedural Justice in the relationship (MPJ) → Mutual perception of Structural Capital (MSC)	0.248	0.746	0.084	2.947	0.003	Support
Buyer (H6a) Supplier (H6b)	Mutual perception of Procedural Justice in the relationship (MPJ) → Mutual perception of Relational Capital (MRC)	0.461	0.511	0.141	3.259	0.001	Support
Buyer (H7a) Supplier (H6b)	Mutual perception of Cognitive Capital (MCC) → Recovery Performance (MRS)	0.409	0.345	0.183	2.229	0.026	Support
Buyer (H8a) Supplier (H8b)	Mutual perception of Structural Capital (MSC) → Recovery Performance (MRS)	-0.211	-0.096	0.213	-0.988	0.323	Not Support
Buyer (H9a) Supplier (H9b)	Mutual perception of Relational Capital (MRC) → Recovery Performance (MRS)	0.289	0.355	0.145	1.992	0.046	Support

Note: **$p < .05$; *** $p < .01$; Control variable: (1) frequency of disruption experienced, (2) buyer & (3) supplier firm size (no of employee), (4) financial loss (size of disruption)
Chi-square: 368.0, df: 264; Fit indices: CFI= 0.946, TLI= 0.923, GFI= 0.895, AGFI = 0.838, and RMSEA= 0.04

To test the mediating effect of social capital (cognitive, structural, relational capital) between the justice (distributive and procedural justice) and disruption response and recovery performance, the bootstrapping method was adopted for applying to the mutual model. It was found that cognitive and structural capital fully

mediates the relationships between the distributive and procedural justice and disruption response and recovery performance, whilst relational capital only partially mediates such relationships. Regarding the cognitive capital, as in the path analysis that had insignificant results, there was no mediation effect on the relationship between procedural justice and disruption response and recovery performance, whereas structural capital fully mediate, and relational capital partially mediate the relationship between procedural justice and disruption response and recovery performance. Table 21 provides more details regarding the mediation test results for the mutual perspectives.

<Table 5. 21: Mediation test for the mutual model – bootstrapping results>

Independent variable	Mediating Variable	Dependent variable	Direct effect	Indirect effect	Result
Distributive justice	Cognitive Capital	Response and recovery performance	0.130(ns)	0.147(ns)	No mediation
Distributive justice	Structural Capital	Response and recovery performance	0.598**	0.263**	Partial mediation
Distributive justice	Relational Capital	Response and recovery performance	0.299**	0.135**	Partial mediation
Procedural justice	Cognitive Capital	Response and recovery performance	0.073(ns)	0.082(ns)	No mediation
Procedural justice	Structural Capital	Response and recovery performance	0.116(ns)	0.075**	Full mediation
Procedural justice	Relational Capital	Response and recovery performance	0.689***	0.418**	Partial mediation

Note: $^{**}p < .05$; $^{***}p < .01$

5.3.9. Endogeneity test

As in the buyer and supplier mode, we also took further measures to account for potential issues of endogeneity arising in a mutual model. To address the potential endogeneity problem, between each dimension of social capital and supply chain

disruption recovery performance, a two-stage least squares (2SLS) estimation procedure was adopted. Same procedures as in the buyer and supplier model were adopted: in the first stage, each social capital dimensions were regressed on all assumed exogenous variables on three separate regressions – (1) cognitive capital, (2) structural capital, and (3) relational capital - in order to obtain predicted values for these potentially endogenous variables. In the second stage, the predicted values from the first stage were included as independent variables to replace the values of the assumed endogenous variables.

Before the 2SLS was executed, we had to identify instrumental variable candidates that met validity requirements. First, in a regression with only assumed exogenous variables from the original count model, we identified candidates that were not significantly correlated with disruption recovery performance at the 5% significance level. From this step, we chose buyer's and supplier's risk management approach level for the mutual model. Firms' risk management approach (basic – advanced) also impact disruption recovery performance (Norman and Jansson, 2004). Using Ericson's case, Norman and Janson (2004) showed that firms can minimise the negative consequences of disruption when the efficient crisis organisation is in place and adopt proactive approach to cope with accident.

The table 5.22 (Models (1), (2), and (3)) shows the results of the first stage regressions for dimensions of social capital and disruption recovery performance of mutual model. In the first stage regression, we regressed social capital (cognitive, structural, and relational capital) on all assumed instrumental variables and control variables (Gligor, 2018; Liu et al., 2016). Models 1, 2, and 3 in Table 5.22 indicate that the R^2 of the regressions are 0.326, 0.376, and 0.418 respectively, significantly higher than the R^2 of the regressions with only control variables. The results suggest that the

buyer's and supplier's risk management approach as can be treated as adequate instrumental variables.

Following previous studies (Bellamy et al., 2014; Liu et al., 2016), in the second stage we tested the predicted values of the assumed endogenous variables and used them to test the relationships between social capital dimensions and disruption recovery performance. As shown by Table 5.22 , the 2SLS results are also consistent with the SEM results presented in Table 5.20. Hence, we conclude that our results and conclusions were unlikely to be unduly affected by endogeneity.

After running the 2SLS, we performed a Durbin–Wu–Hausman postestimation test of endogeneity, which adds the error terms from the first stage (using robust variance estimates) and separately tests whether they are correlated with error terms in the original count model (Cameron and Trivedi, 2009). Using the error terms from the first stage for the assumed endogenous variables in separate tests, both endogeneity test statistics had p-values greater than 0.10 ($F(2,231)=1.8568$, $p=0.1585$) indicating that we fail to reject the null that these variables are exogenous for both buyer and the supplier model. Hence, the parameter estimates for these variables in our original count model do not appear to be unduly influenced by endogeneity.

<Table 5. 22: Mutual model – 2SLS model testing for endogeneity >

	Cognitive capital	Structural capital	Relational capital	Disruption recovery performance
	Model 1 (OLS)	Model 2 (OLS)	Model 3 (OLS)	Model 4 (2SLS)
Ind_Auto	-0.001	0.025	0.004	-0.015
Ind_Elec	-0.013	0.018	0.020	-0.018
Ind_Food	-0.017	0.010	-0.009	-0.012
Ind_Hard	-0.006	0.012	-0.005	0.003
Frequency	0.000	0.001	0.006	0.005
BuSize	-0.007**	-0.002	-0.004	0.011**
SuSize	-0.004	0.001	-0.002	-0.021***
BuFinancialloss	0.000	0.000	0.000	0.000***

SuFinancialloss	0.000	0.000	0.000	0.000
BuDep	0.005	0.026***	0.006	0.010
SuDep	0.005	0.015**	0.011	0.007
BuRiskMgt[a]	-0.003	-0.002	-0.006	
SuRiskMgt[a]	0.009	0.012	0.000	
MDJ[1]	0.134***	0.075	0.215***	0.200***
MPJ[1]	0.125**	0.279***	0.384***	0.115
MCC[1]				0.219**
MSC[1]				0.034
MRC				0.097*
R^2	0.326	0.376	0.418	0.449
F-Value	7.178***	8.975***	10.671***	11.284***

Notes: $p \leq 0.05$**, $p \leq 0.01$***.

[a] Variables used as instruments for assumed endogenous variables.

[1] Mutual construct were operationalized by the degree-symmetric approach

Statistical Results for the 2nd study

5.4. Moderation Tests: Buyer's intention to use Mediated Power (coercive and reward)

This section discusses the Confirmatory Factory Analysis (CFA) and the moderation test in detail for the second study. AMOS 14.0 was employed to perform the CFA, and SPSS 21 was used for the moderation tests. Through CFA, convergent and discriminant validity and reliability were examined. After their assurance was elicited, a moderation test was undertaken to test the model and hypotheses. Lastly, simple slope analyses were performed to assess the interaction effect. To operationalise mutual perspectives, as in the first study's mutual model, degree-symmetry score approach has been adopted (Straub et al., 2004, Klein et al., 2007) by considering the average value of the responses of both parties as well as the discordance between the responses. Straub et al. (2004) and Klein et al. (2007) provide a detailed description of the degree-symmetry approach. Following the procedures, we implement the following step to operationalize the degree-symmetric variables for this study: (*1) the scores for each items are summed*

and then standardized to obtain a value between 0 and 1 for the buyer data (C_1) and the supplier data (C_2), which represents the magnitude for the buyer and the supplier; (2) average the buyer and the supplier to get the degree (magnitude) of the dyad, CD = (C_1 + C_2)/2; (3) between C_1 and C_2, divide the smaller one by the bigger one to get another standardized value between 0 and 1, C_S, which represents the symmetric value of the construct; (4) average C_D and C_S to yield the degree-symmetric value for the construct across the dyad, C_{DS}. Using these steps, we operationalize the degree-symmetric values for all of the constructs in the proposed model.

5.4.1. Test of Confirmatory Factory Analysis (CFA)

The purpose of CFA is to test the unidimensionality of the constructs and to assure reliability (Fornell and Larcker, 1981; Bagozzi and Yi, 1988). Scales having both convergent and discriminant validity are considered as being unidimensional (Anderson and Gerbing, 1988).

CFA is used to assess the internal and external consistency of all the constructs measured with multi-item reflective indicators. Table 5.23 presents the factor loadings, demonstrating significant relationships with their underlying theoretical constructs and the average variance extracted (AVE) values are all well above the criterion of 0.50 (Fornell and Larcker 1981), i.e. they range from 0.540 - 0.585. These results collectively provide evidence of convergent validity. In addition, reliability by Cronbach's coefficient alpha and composite reliabilities (CR) were assessed. The value of Cronbach's Alpha of the construct 'MCP (buyer's intention to use coercive power)' and 'MRP (buyer's intention to use reward power)' are lower than the 0.7 cut-off point. However, there are varying views on the cut-off for Cronbach's Alpha, with some claiming it is somewhat arbitrary. Hair et al. (2016) and Aron et al. (2013) proposed

that acceptable Cronbach's alpha value could be 0.6, whilst Peterson (1994) proposed that even a value of over 0.5 should be considered to suffice. Additionally, this study conducted CFA for the constructs used and all constructs meet the cut-off of 0.70 in Composite Reliability, which is considered to be acceptable. Taken together, these results indicate that the theoretical constructs exhibit good psychometric properties.

<Table 5. 23: Construct analysis – Mutual perspective>

Construct[1]			Factor Loadings	Average Variance Extracted	Composite Reliability	Cronbach alpha
MRC	Relational Capital in the relationship (mutual perception)	MRC1	0.735	0.544	0.995	0.657
		MRC2	0.501			
		MRC3	0.831			
		MRC5	0.836			
MCP	Buyer's use of Coercive power (mutual perception)	MCP1	0.642	0.540	0.997	0.551
		MCP2	0.906			
		MCP3	0.675			
		MCP4	0.688			
MRP	Buyer's use of Reward Power (mutual perception)	MRP1	0.897	0.585	0.995	0.591
		MRP2	0.357			
		MRP3	0.907			
MRS	Disruption recovery performance in the relationship (mutual perception)	MRS1	0.895	0.570	0.997	0.713
		MRS2	0.830			
		MRS3	0.722			
		MRS5	0.654			
		MRS7	0.643			

- MRC: Mutual level of relational capital
- MCP: Mutual level of coercive response
- MRP: Mutual level of cooperative response
- MRS: Mutual level of disruption response and recovery performance

[1] all constructs were operationalized by the degree- symmetric approach

In the model, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.24). Hence, it can be concluded that there is discriminant validity among the theoretical constructs. The goodness of fit was evaluated by multiple criteria to ascertain how well the specified one reproduces the covariance matrix among the indicator variables. Specifically, the buyer's model represents that of Chi-square: 166.8 (df = 84); CFI = 0.914; TLI = 0.877, GFI =

0.915; AGFI = 0.862; and RMSEA = 0.064. The model fit results show good / acceptable fit.

<Table 5. 24: Construct level correlation analysis – Mutual perspective>

Constructs	(MRC)	(MCP)	(MRP)	(MRS)
(MRC)	0.738	-	-	-
(MCP)	0.210	0.735	-	-
(MRP)	0.356	0.387	0.765	-
(MRS)	0.367	0.163	0.125	0.755

- MRC: Mutual level of relational capital
- MCP: Mutual level of coercive response
- MRP: Mutual level of cooperative response
- MRS: Mutual level of disruption response and recovery performance

Addition to the mutual perspective, to see if individual view (the buyer and the supplier) also able to assure reliability, convergent and discriminant validity, CFA was conducted for the individual perspectives as well. Table 5.25 and Table 5.26 presents the factor loadings for the buyer and the supplier, respectively, demonstrating significant relationships with their underlying theoretical constructs and the average variance extracted (AVE) values are all well above the criterion of 0.50 (Fornell and Larcker 1981), i.e. they range from 0.500 - 0.558 for the buyer, and from 0.539 – 0.693 for the supplier. These results collectively provide evidence of convergent validity. Additionally, this study conducted CFA for the constructs used and all constructs meet the cut-off of 0.70 in Composite Reliability, which is considered to be acceptable. Taken together, these results indicate that the theoretical constructs exhibit good psychometric properties.

<Table 5. 25: Construct analysis – buyer perspective>

	Construct		Factor Loadings	Average Variance Extracted	Composite Reliability	Cronbach alpha
BRC	Relational	BRC1	0.874	0.558	0.872	

	Capital in the relationship	BRC2	0.828			0.763
		BRC3	0.455			
		BRC5	0.758			
BCP	Buyer's use of Coercive power	BCP1	0.933	0.515	0.752	0.551
		BCP2	0.607			
		BCP3	0.631			
		BCP4	0.650			
BRP	Buyer's use of Reward Power	BRP1	0.922	0.549	0.661	0.591
		BRP2	0.573			
		BRP3	0.684			
BRS	Disruption recovery performance in the relationship	BRS1	0.954	0.500	0.781	0.709
		BRS2	0.737			
		BRS3	0.577			
		BRS5	0.634			
		BRS7	0.560			

- BRC: Buyer perceived level of relational capital
- BCP: Buyer perceived level of coercive response
- BRP: Buyer perceived level of cooperative response
- BRS: Buyer perceived level of disruption response and recovery performance

<Table 5. 26: Construct analysis – supplier perspective>

Construct			Factor Loadings	Average Variance Extracted	Composite Reliability	Cronbach alpha
SRC	Relational Capital in the relationship	SRC1	0.919	0.693	0.879	0.809
		SRC2	0.980			
		SRC3	0.592			
		SRC5	0.784			
SCP	Buyer's use of Coercive power	SCP1	0.855	0.539	0.798	0.612
		SCP2	0.676			
		SCP3	0.608			
		SCP4	0.773			
SRP	Buyer's use of Reward Power	SRP1	0.997	0.669	0.721	0.512
		SRP2	0.803			
		SRP3	0.607			
SRS	Disruption recovery performance in the relationship	SRS1	0.674	0.613	0.785	0.714
		SRS2	0.996			
		SRS3	0.871			
		SRS5	0.782			
		SRS7	0.498			

- SRC: Supplier perceived level of relational capital
- SCP: Supplier perceived level of coercive response
- SRP: Supplier perceived level of cooperative response
- SRS: Supplier perceived level of disruption response and recovery performance

In the buyer and the supplier construct level correlation analysis, none of the

squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.27 and 5.28). Hence, it can be concluded that there is discriminant validity among the theoretical constructs.

<Table 5. 27: Construct level correlation analysis – Buyer perspective>

Constructs	(BRC)	(BCP)	(BRP)	(BRS)
(BRC)	0.747	-	-	-
(BCP)	0.488	0.718	-	-
(BRP)	0.531	0.513	0.741	-
(BRS)	0.548	0.386	0.459	0.707

<Table 5. 28: Construct level correlation analysis – Supplier perspective>

Constructs	(SRC)	(SCP)	(SRP)	(SRS)
(SRC)	0.832	-	-	-
(SCP)	0.340	0.734	-	-
(SRP)	0.278	0.574	0.818	-
(SRS)	0.533	0.287	0.199	0.783

For the model, the goodness of fit was evaluated by multiple criteria to ascertain how well the specified one reproduces the covariance matrix among the indicator variables. Specifically, the buyer's model represents that of Chi-square: 257.6 (df = 80); CFI = 0.891; TLI = 0.836, GFI = 0.890; AGFI = 0.814; and RMSEA = 0.097. the supplier model represents that of Chi-square: 201.2 (df = 78); CFI = 0.924; TLI = 0.883, GFI = 0.901; AGFI = 0.828; and RMSEA = 0.081. The model fit results show good / acceptable fit. The model fit results show good / acceptable fit for both buyer and the supplier model.

We further examined discriminant validity using the heterotrait-monotrait (HTMT) method (Henseler et al., 2015). HTMT represents the ratio of within construct correlations to the between construct correlation. HTMT helps assess discriminant validity in two ways: as a criterion and as a statistical test. We further examined

discriminant validity using the heterotrait-monotrait (HTMT) method (Henseler et al., 2015). HTMT represents the ratio of within construct correlations to the between construct correlation. HTMT helps assess discriminant validity in two ways: as a criterion and as a statistical test. Although the exact HTMT ratio that would trigger a discriminant validity violation is open to some interpretation, Henseler et al. (2015) suggest that HTMT being below 1.0, preferably 0.85 and 0.90, satisfies the discriminatory criterion. However, even if two constructs are highly correlated (values close to 1.0 or over), the criterion is unlikely to indicate a lack of discriminant validity, particularly when the loadings are homogeneous and high or the sample size is large (Henseler et al., 2015). To satisfy discriminant validity, the second option for HTMT is confidence interval should not include the value of one (Henseler et al., 2015).

<Table 5. 29: Discriminant validity (HTMT criterion) -Mutual>

Constructs	MRC	MCP	MRP	MRS
MRC	-			
MCP	0.599	-		
MRP	0.580	0.931	-	
MRS	0.687	0.417	0.323	-

<Table 5. 30: Discriminant validity (HTMT criterion) -Buyer>

Constructs	BRC	BCP	BRP	BRS
BRC	-			
BCP	0.695	-		
BRP	0.902	1.054	-	
BRS	0.916	0.550	0.806	-

<Table 5. 31: Discriminant validity (HTMT criterion) -Supplier>

Constructs	SRC	SCP	SRP	SRS
SRC	-			
SCP	0.532	-		
SRP	0.475	1.147	-	
SRS	0.896	0.486	0.388	-

Most of constructs meet the HTMT criterion of 0.90 or 1.0, however, BCP-BRP and SCP-SRP shows rather high correlation (1.054 and 1.147, respectively) and hence could not meet the cutoff. However, from the confidence interval criterion (Table 5.29; 5.30; 5.31), all constructs meet the HTMT criterion. Additionally, in the CFA process, none of the squared correlations are equal to or higher than the AVE for each individual construct (see Table 5.32; 5.33; 5.34). Hence, it can be concluded that there is discriminant validity among the theoretical constructs.

<Table 5. 32: Discriminant validity (HTMT confidence interval) - Mutual >

Relationships	Bias Corrected 95% C.I.
MRC → MRS	[0.304, 0.536]
MCP → MRS	[0.149, 0.395]
MRP → MRS	[0.096, 0.345]

<Table 5. 33: Discriminant validity (HTMT confidence interval) -Buyer>

Relationships	Bias Corrected 95% C.I.
SRC → SRS	[0.631, 0.809]
SCP → SRS	[0.205, 0.447]
SRP → SRS	[0.097, 0.346]

<Table 5. 34: Discriminant validity (HTMT confidence interval) -Supplier>

Relationships	Bias Corrected 95% C.I.
SRC → SRS	[0.631, 0.809]
SCP → SRS	[0.205, 0.447]
SRP → SRS	[0.097, 0.346]

5.4.2. Common method bias

Given that self-reported data were used and that the same respondents answered the questions on both performance (response and recovery performance) and its determinants, common method bias was a possibility (Podsakoff *et al.*, 2003). As in the first study, several steps were taken in the research process to avoid this. First, detailed

information about the necessary qualifications of the key informants in the questionnaires was provided to ensure that they were mid- to senior-level managers carrying out procurement activities (title 2 and title 3 ISM members). Second, the respondents were assured that their identities would be kept anonymous (Podsakoff *et al*., 2003). Third, through the CFA process, the proposed research models showed good / acceptable fit indices, which easily surpassed the cut off criteria.

Additionally, Harman's one-factor test was conducted to check for the existence of common method bias. The unrotated factor solution showed that the largest factor accounted for the mutual model, buyer and supplier model were 39.240%, 40.937%, and 36.033% respectively which suggests that common method bias was an unlikely problem (Malhotra *et al*., 2005; Podsakoff al. 2012). Lastly, the potential for this bias was tested using the marker variable technique (Lindell and Whitney, 2001). As Lindell and Whitney (2001) suggested, common method bias can be assessed by identifying a marker variable that is not related to other variables used in the research model. Hence, a marker variable (mutual: mutual level of structural capital; buyer: supplier's resource reconfiguration capability; supplier: buyer's resource reconfiguration capability, which are not used nor related to the main models) was added and its correlations with the main variables were examined. The results revealed that the correlations varied from -0.111 to 0.075 for mutual model, from 0.022 to 0.118 for buyer model, from -0.014 to 0.103 for supplier model and hence, none of them was significantly correlated with other variables (mutual: Table 4.9; buyer: Table 4.7; supplier: Table 4.8). Moreover, the correlations between the constructs that were hypothesised to be significant remained significant after controlling for the effect of the marker variable. To summarise, the results of Harman's single-factor test, and the marker variable test indicated that common methods bias was not a problem in this study.

5.5. Moderation Test: Buyer's Mediated Power (coercive and reward)

Hypothesis 10 postulates that (1) coercive power negatively affects the relationship between relational social capital and disruption recovery performance (H10a), and (2) reward power positively affects the relationship between relational capital and disruption recovery performance (H10b). In this study, the buyer-supplier's mutual perspectives of relational capital, buyer's use of mediated power, and disruption recovery performance were adopted.

The data were examined using moderated hierarchical OLS regression techniques, with the results being presented in Table 5.35. Model 1, a base model, includes only the control variables, whilst Model 2 adds buyer-supplier mutual perception of relational capital (MRC), buyer's use of coercive power (MCP) and reward power (MRP) as independent variables. The coefficient value for mutual perception of relational capital is significantly positive in the model ($B = 0.349$, $p < 0.00$). However, buyer's use of coercive power (MCP) and reward power (MRP) do not have significant impact on the recovery performance. Model 3 includes main effects of mutual perception of relational capital (MRC), buyer's use of coercive power (MCP) and reward power (MRP) as in the model 2, and as well as interaction terms - variables for interactions between mutual perception of relational capital and buyer's use of coercive power (MRCxMCP) and between mutual perception of relational capital and buyer's use of reward power (MRCxMRP). To avoid the potential problem of multicollinearity, mean-centred independent variables were used before creating the interaction terms, as suggested by Aiken and West (1991). From the results of moderation tests, all of the relationship was not significant thus providing evidence of no moderation effect of coercive and reward power on the relationship between relational capital and disruption recovery performance ($B = 0.924$, *n.s;* $B = 0.291$, *n.s*).

<Table 5. 35: Results of regression analysis for moderation - mutual>

Results of regression analysis for moderation by coercive, reward power			
	Model 1	Model 2	Model 3
	B (std B)	*B (std B)*	*B (std B)*
Control			
Frequency	0.005 (0.095)	0.004 (0.078)	0.003 (0.070)
MFinancialloss	0.000 (0.098)	0.000 (0.178)**	0.000 (0.159)**
BuSize	0.003 (0.045)	0.011 (0.151)**	0.010 (0.130)
SuSizes	-0.022 (-0.329)	-0.020 (-0.295)***	-0.018 (-0.276)**
BuDep	0.026 (0.208)	0.006 (0.047)	0.011 (0.083)
SuDep	0.011 (0.110)	0.004 (0.034)	0.003 (0.027)
Automotive	0.006 (0.036)	-0.020 (-0.128)	-0.007 (-0.046)
Electronics	-0.006 (-0.031)	-0.020 (-0.097)	-0.007 (-0.034)
Food	0.002 (0.012)	-0.010 (-0.063)	0.002 (0.012)
Hardware	0.012 (0.051)	0.002 (0.010)	0.015 (0.066)
Main Effect			
MRC		0.349 (0.414)***	-0.603 (-0.715)
MCP		0.134 (0.116)	-0.550 (-0.474)
MRP		0.064 (0.068)	-0.143 (-0.152)
Moderating effect			
MRCxMCP			0.924 (1.187)
MRCxMRP			0.291 (0.404)
S.E	0.068	0.061	0.060
Overall R^2	0.141	0.315	0.332
Adj R^2	0.103	0.276	0.288
R^2 Changes			
Overall model F	3.732	7.976	7.404

P <0.001***, P<0.05**

- Dependent variable: Mutual disruption recovery performance
- BuSize (SuSize): Buyer (Supplier) firm size
- BuDep (SuDep): Dependence on the relationship with the supplier (Buyer)
- Frequency: frequency of disruption
- MFinancialloss (severity of the disruption): Financial loss due to the disruption (mutual)
- MRC: Mutual level of relational capital
- MCP: Mutual level of coercive response
- MRP: Mutual level of cooperative response
- Automotive: automotive industry
- Electronics : electronics industry
  Food: food & beverage industry

While the mutual perspective showed that how a dyad (mutual) perceives the moderation effect of the buyer's use of coercive and reward power on their disruption recovery performance, this approach cannot show how the individual parties in a dyad – the buyer and the supplier – perceive the relationship. Thus, to investigate further whether the buyer and supplier's separate perspectives are different or to that of the

dyad, the individual perspectives of both parties were examined (CFA test results for individual perspective can be found on p.168 - 170).

As in the mutual model, the data were examined using moderated hierarchical OLS regression techniques, with the results being presented in Table 5.36 (buyer), and in Table 5.37 (supplier). In the buyer model, Model 1, a base model, includes only the control variables, whilst Model 2 adds buyer's perception of relational capital (BRC), buyer perceived their use of coercive power (BCP) and reward power (BRP) as independent variables. The coefficient value for buyer perception of relational capital is significantly positive in the model ($B = 0.567$, $p < 0.00$). Buyer's use of reward power (BRP) is significantly positive in the model as well ($B = 0.187$, $p < 0.05$), however, buyer's use of coercive power (BCP) do not have significant impact on the recovery performance ($B = 0.072$, *n.s*). Model 3 includes main effects of buyer's perception of relational capital (BRC), buyer perceived their use of coercive power (BCP) and reward power (BRP) as in the model 2, and as well as interaction terms - variables for interactions between buyer's perception of relational capital and buyer perceived their use of coercive power (BRCxBCP) and between buyer's perception of relational capital and buyer perceived their use of reward power (BRCxBRP). The test results showed that the buyer perceived their use of reward power (BRCxBRP) can positively moderates the relationship between relational capital and disruption recovery performance ($B = 0.247$, $p < 0.05$). However, their use of coercive power was not significantly moderating the relationship between relational capital and disruption recovery performance ($B = -0.158$, *n.s*).

<Table 5. 36: Results of regression analysis for moderation - Buyer>

Results of regression analysis for moderation by coercive, reward power			
	Model 1	Model 2	Model 3
	B (std B)	*B (std B)*	*B (std B)*

Control			
Frequency	0.080 (0.169)**	0.048 (0.102)	0.036 (0.023)
BFinancialloss	0.000 (-0.075)	0.000 (0.004)	0.000 (0.000)
BuSales	0.096 (0.095)	-0.018 (-0.018)	-0.044 (0.048)
SuDep	0.000 (0.051)	0.000 (-0.039)	-0.001 (0.000)
Automotive	-0.129 (-0.086)	-0.050 (-0.033)	0.022 (0.111)
Electronics	-0.072 (-0.036)	-0.154 (-0.078)	-0.083 (0.122)
Food	-0.097 (-0.064)	-0.071 (-0.047)	0.036 (0.110)
Hardware	0.144 (0.065)	0.070 (0.032)	0.160 (0.130)
Main Effect			
BRC		0.567 (0.620)***	0.633 (0.692)***
BCP		0.072 (0.055)	0.062 (0.048)
BRP		0.187 (0.158)**	0.203 (0.172)**
Moderating effect			
BRCxBCP			-0.158 (0.156)
BRCxBRP			0.247 (0.289)**
S.E	0.676	0.466	0.456
Overall R^2	0.078	0.568	0.590
Adj R^2	0.046	0.547	0.566
R^2 Changes			
Overall model F	2.426	27.136	24.891

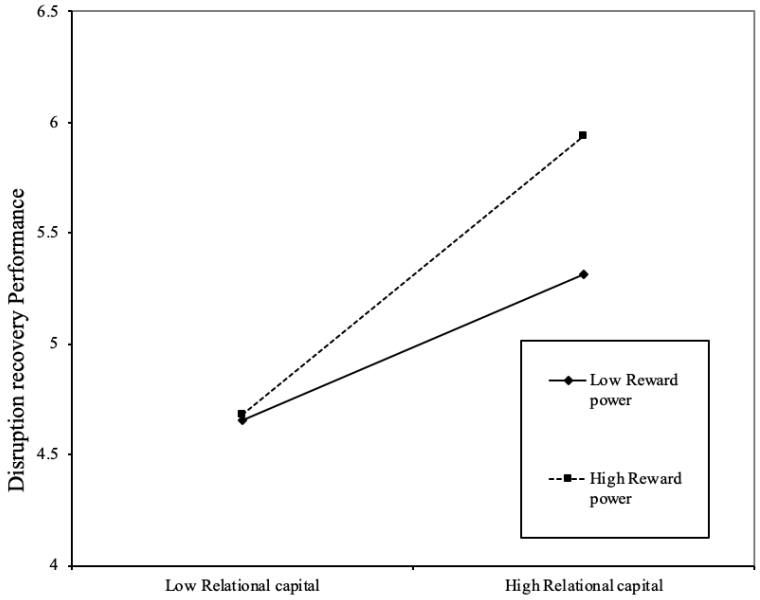
In the supplier model, in the model 2, the coefficient value for supplier perception of relational capital is significantly positive in the model ($B = 0.700$, $p < 0.00$). However, supplier perceived buyer's use of coercive power (SCP) and reward power (SRP) do not have significant impact on the recovery performance ($B = 0.133$, *n.s;* $B = -0.103$, *n.s*). The results from model 3 showed that all of the relationship was not significant thus providing evidence of no moderation effect of coercive and reward power on the relationship between relational capital and disruption recovery performance ($B = 0.118$ *n.s;* $B = -0.016$, *n.s*).

<Table 5. 37: Results of regression analysis for moderation - Supplier>

Results of regression analysis for moderation by coercive, reward power			
	Model 1	Model 2	Model 3
	B (std B)	*B (std B)*	*B (std B)*
Control			
Frequency	0.037 (0.073)	0.008 (0.016)	0.003 (0.006)
SFinancialloss	0.000 (-0.032)	0.000 (0.095)	0.000 (0.006)
SuSales	0.000 (-0.251)**	0.000 (-0.161)**	0.000 (-0.145)**

BuDep	-0.025 (-0.019)	0.055 (0.042)	0.067 (0.051)
Automotive	-0.475 (-0.297)	-0.297 (-0.186)	-0.261 (-0.163)
Electronics	-0.211 (-0.100)	-0.271 (-0.127)	-0.214 (-0.101)
Food	-0.016 (-0.010)	-0.170 (-0.105)	-0.121 (-0.075)
Hardware	-0.232 (-0.097)	-0.319 (-0.134)	-0.276 (-0.116)
Main Effect			
SRC		0.700 (0.681)***	0.148 (0.525)
SCP		0.133 (0.113)	-0.471 (-1.146)
SRP		-0.103 (-0.099)	-0.041 (-0.098)
Moderating effect			
SRCxSCP			0.118 (1.494)
SRCxSRP			-0.016 (-0.198)
S.E	0.700	0.508	0.505
Overall R^2	0.145	0.554	0.564
Adj R^2	0.115	0.533	0.538
R^2 Changes			
Overall model F	4.862	25.657	22.354

<Figure 5. 3. Relational capital and disruption recovery performance by reward power – buyer perspective>



From the moderation tests, only buyer perceived their use of reward power can positively moderates the relationship between relational capital and disruption recovery performance (BRCxBRP, $B = 0.247$, $p < 0.05$). To probe this moderated effect further, interaction effects were plotted and found to be significant for high and low levels of reward power. High and low values have been defined as plus and minus one standard

deviation from the mean (Cohen and Cohen, 1983), with Figure 5.3 illustrating these effects. High levels of buyer perceived reward power is shown positively to reinforce the relationship between buyer's perception of relational capital and their disruption recovery performance, as supported by a significant simple slope calculation ($\beta = 0.880$, $p < 0.000$). Low levels of reward power also have a significant effect ($\beta = 0.386$, $p = 0.001$). Hence, there is positive moderating effect of buyer' reward power on the relationship between relational capital and disruption recovery performance.

Finally, it should be noted that the control variable buyer size has a positive impact on the disruption recovery performance in the mutual model (Model 2: $\beta = -0.020$, $P<0.00$), however, supplier size has a negative impact on the disruption recovery performance in the mutual model (Model 2: $\beta = -0.020$, $P<0.00$; Model 3: $\beta = -0.018$, $p<0.05$). Bigger buyer would appear to be more likely to have larger redundant capacity and more safety stock. However, smaller suppliers, while not as rich in resources, may have the ability to be nimble in the face of adversity, due to the shorter chain of command (D'Amboise and Muldowney, 1988; Ramaswami et al., 2009). In other words, the larger the supplier size makes a firm less flexible and thus, difficult to adjust, which will result in it being less capable of responding in a timely manner to unexpected events.

5.6. Endogeneity test

As in the first study, we also took further measures to account for potential issues of endogeneity arising in the second study model. A two-stage least squares (2SLS) estimation procedure and Durbin–Wu–Hausman postestimation test of endogeneity was adopted. In the first stage, relational capital was regressed on all assumed exogenous variables in order to obtain predicted values for potentially endogenous

variables. In the second stage, the predicted values from the first stage were included as independent variables to replace the values of the assumed endogenous variables. Before the 2SLS was executed, we had to identify instrumental variable candidates that met validity requirements. First, in a regression with only assumed exogenous variables from the original count model, we identified candidates that were not significantly correlated with disruption recovery performance at the 5% significance level. From this step, we chose buyer's and supplier's risk management approach level (basic – advance) were used for mutual, buyer and the supplier model. Firms' risk management level impact disruption recovery performance. Using Ericson's case, Norman and Janson (2004) showed that firms can minimise the negative consequences of disruption when the efficient crisis organisation is in place and adopt proactive approach to cope with accident.

The table 5.38 (mutual) Model 1 shows the results of the first stage regressions for relational capital and disruption recovery performance. In the first stage regression, we regressed relational capital on all assumed instrumental variables and control variables (Gligor, 2018; Liu et al., 2016). The results indicated that the R^2 of the regression is 0.278, significantly higher than the R^2 of the regressions with only control variables. The buyer (Table 5.39) and the supplier (Table 5.40) model also showed that R^2 of the regressions are 5.501 and 5.807 respectively, and that is significantly higher than the R^2 of the regressions with only control variables. The results suggest that buyer's and supplier's risk management approach can be treated as adequate instrumental variables for relational capital in the mutual model, and in the buyer and the supplier model as well.

Following the previous studies (Bellamy et al., 2014; Liu et al., 2016), in the second stage we tested the predicted values of the assumed endogenous variables and

used them to test the relationships between relational capital and disruption recovery performance. As shown by Model 2 in Table 5.38 (mutual), Table 5.39 (buyer) and Table 5.40 (supplier) the relationship between the predicted value of relational capital and disruption recovery performance is significant and positive. Hence, we conclude that our results and conclusions were unlikely to be unduly affected by endogeneity.

After running the 2SLS, we performed a Durbin–Wu–Hausman postestimation test of endogeneity, which adds the error terms from the first stage (using robust variance estimates) and separately tests whether they are correlated with error terms in the original count model (Cameron and Trivedi, 2009). Using the error terms from the first stage for the assumed endogenous variables in separate tests, all the endogeneity test statistics had p-values greater than 0.10 (mutual: F(2,231) = 1.456, p=0.2352; buyer: F(2,231) = 1.98556, p=0.1396; supplier: F(2,231) = 1.991, p=0.1389), indicating that we fail to reject the null that these variables are exogenous for both buyer and the supplier model. Hence, the parameter estimates for these variables in our original count model do not appear to be unduly influenced by endogeneity.

<Table 5. 38: 2SLS model testing for endogeneity: mutual level>

	Relational capital Model 1 (OLS)	Disruption recovery performance Model 2 (2SLS)
B_Ind_Auto	0.010	-0.015
B_Ind_Elec	0.027	-0.017
B_Ind_Food	-0.003	-0.004
B_Ind_Hard	0.008	0.009
Frequency	0.009**	0.004
BuSize	-0.006	0.010
SuSize	-0.003	-0.021**
BuFinancialloss	0.000	0.000**
SuFinancialloss	0.000	0.000
BDep	0.011	0.010
SDep	0.009	0.003
Buyer risk management approach[a]	-0.010	
Supplier risk management approach[a]	-0.007	
Mutual_RC		0.314***
Mutual_CP	0.095	0.167**

Mutual_RP	0.196	0.057
R^2	0.158	0.313
F-Value	2.780***	7.295***

Notes: $p \leq 0.05$**, $p \leq 0.01$***.
[a] Variables used as instruments for assumed endogenous variables.

<Table 5. 39: 2SLS model testing for endogeneity: buyer level>

	Relational capital Model 1 (OLS)	Disruption recovery performance Model 2 (2SLS)
Ind_Auto	-0.156	-0.004
Ind_Elec	-0.009	-0.047
Ind_Food	-0.126	0.052
Ind_Hard	-0.052	0.183
Frequency	0.005	0.041
BuSize	0.008	0.071
SuSize	-0.008	0.004
BuFinancialloss	0.000	0.000
SuFinancialloss	0.000	0.000
BDep	0.316	0.137
SDep	0.128	-0.018
Buyer risk management approach[a]	0.010	
Supplier risk management approach[a]	0.008	
BRC		0.557***
BCP	0.180	0.064
BRP	0.197	0.103
R^2	0.270	0.577
F-Value	5.501***	21.842***

Notes: $p \leq 0.05$**, $p \leq 0.01$***.
[a] Variables used as instruments for assumed endogenous variables.

<Table 5. 40: 2SLS model testing for endogeneity: supplier level>

	Relational capital Model 1 (OLS)	Disruption recovery performance Model 2 (2SLS)
Ind_Auto	4.78	-0.378
Ind_Elec	-0.129	-0.362
Ind_Food	0.038	-0.271
Ind_Hard	0.058	-0.384
Frequency	0.043	0.012
BuSize	0.051	0.108**
SuSize	-0.073	-0.167***
BuFinancialloss	-0.068	0.000
SuFinancialloss	0.000	0.000
BDep	0.000	0.093
SDep	-0.158	0.032
Buyer risk management approach[a]	-0.135	
Supplier risk management approach[a]	0.024	
SRC		0.727***

SCP	0.329**	0.113
SRP	-0.016	-0.037
R^2	0.281	0.582
F-Value	5.807***	22.314***

Notes: $p \leq 0.05$**, $p \leq 0.01$***.
[a] Variables used as instruments for assumed endogenous variables.

5.7. Summary

Regarding the tests the first study, the data analysis results of the measurements and structural models have been reported. The measurement data have been shown to fit the both buyer and supplier model well. Each construct has unidimensionality because convergent and discriminant validity were assured through CFA. The structural model's overall fit indicates that it is consistent with the data. Accordingly, the hypotheses were tested based on the structural path links and moderation tests. Figures 5.1 and 5.2 show the buyer and supplier model's significant path coefficients and interaction effect results. In the second study, CFA was performed to assure validity and reliability. Then, a moderated regression test was performed to test the second study's model and hypotheses. Additionally, simple slope analysis was performed to assess the interaction effect. Figures 5.3 represent the simple slope analysis after moderation tests. Lastly, to address potential issues of endogeneity arising in the second study model, a two-stage least squares (2SLS) estimation procedure and Durbin–Wu–Hausman postestimation test of endogeneity was adopted.

VI. Discussion and Conclusion

6.1. Overview

A supply chain disruption is an event that interrupts the flow of materials, logistics and operations in a supply chain (Jüttner et al., 2003; Craighead et al., 2007), thereby negatively impacting on firm performance. Additionally, its negative impact propagates through the supply chain and the involved parties (Scheibe and Blackhurst, 2018; Blackhurst et al., 2011), even damaging relationships (Sheffi and Rice 2005; Wang et al., 2014). Supply chain management literatures have identified sources of supply chain disruption (Svensson, 2000; Jüttner, 2005; Wagner and Bode, 2009), and suggested strategies (Nagel et al., 1995; Jüttner et al., 2003; Braunscheidel and Suresh, 2009), and firm level capabilities (Braunscheidel and Suresh, 2009; Gligor et al., 2015; Blackhurst et al., 2011; Pettit et al., 2013; Ambulkar et al., 2015; Scholten and Schilder, 2015; Chowdhury and Quaddus, 2016) to mitigate this risk. However, it is still impossible to prevent supply chain disruptions from happening completely, for in today's volatile business context some such disruption is unavoidable (Scholten and Schilder, 2015).

Hence, following disruption, to minimise negative impact from it, particular attention needs to be paid to the response and recovery phase - the last phase of supply chain disruption management. This phase is the most overlooked area among the supply chain risk and disruption studies (Sodhi et al., 2012). That is, only a limited number of previous studies have empirically explored the ways to achieve quick response and recovery from supply chain disruption (e.g. Chowdhury and Quaddus, 2016; Kamalahmadi and Parast, 2016; Yang and Fan, 2016).

This thesis consists of two studies, and all of the relationships in the studies were considered from the buyer and supplier dyadic perspective. By capturing both

perspectives, this has allowed for more comprehensive insights into how timely response and recovery can be achieved through the use of the parties' relationship than is possible with a one-sided examination. Additionally, adopting both perspectives can also reduce the possibility of single rater bias, such as an exception fallacy (Roh et al., 2013).

For the first study, organisational justice and social capital theory were applied to the supply chain disruption context and the impact of the buyer-supplier's accumulated social capital in the relationship on disruption response and recovery performance was investigated. To reflect both the buyer and supplier's perspective, we proposed two separate models for the buyer and the supplier in the first study were proposed and examined. Based on the idea that social capital accumulation in the buyer-supplier relationship promotes coordination of resources and cooperative action in a disruption situation (e.g. Giunipero and Eltantawy, 2004; Jüttner et al., 2003; Craighead et al., 2007; Oke and Gopalakrishnan, 2009), it was proposed that the development of social capital helps firms to engage in collective action in such a situation, thereby contributing to them achieving a timely response and recovery from the disruption. Prior to investigating the role of social capital in achieving timely disruption response and recovery, it was suggested that social capital accumulation can be influenced by justice in the exchange relationship before the disruption. Specifically, the positive impact of distributive and procedural justice on accumulation of cognitive, structural, and relational capital in the buyer-supplier relationship was postulated and examined. Then, it was proposed that, following the disruption accumulated social capital can help firms in achieving timely response and recovery.

As a second study, the moderating role of the buyer's intention to use mediated power during the process of disruption response and recovery in the relationship

between the buyer-supplier's relational capital and their disruption response and recovery performance was investigated. Relational capital in the relationship permits privileged access to key resources of others (Uzzi, 1997; Kale et al., 2000), and motivates the parties in the supply chain to take additional risks and to cooperate even beyond contractual provision (Villena et al., 2011).

While relational capital in the relationship offers benefit towards achieving successful recovery from a disruption situation by facilitating the parties' coordination of resources for collective action (e.g. Olcott and Oliver, 2014), the ability of the relational capital can be rather limited and sometimes fails to motivate other parties to be engaged in collective action. Supply chain disruption can lead to increased relational conflicts between the parties, such as dissatisfaction, blame, anger, and conflict, based on the belief that the other party was responsible for the disruption (Primo et al., 2007; Bode et al., 2011). Hence, relational capital may not always yield the supplier's commitment for collective action in a disruption situation.

In addition to using relational capital, the buyer can use the influence mechanism based on its power–force compliance to motivate the supplier into going along with its wishes. By promising rewards when the supplier conforms to the buyer's influence attempt (reward power) or punishing it when failing to do so (coercive power), the buyer can produce intended changes in the supplier's behaviour to engage in collective action, thereby achieving a quick response and recovery from the disruption. Specifically, it was hypothesised that the buyer's use of coercive power can hinder timely disruption response and recovery by reducing relational capital's ability to facilitate coordination of resources and collective action in a disruption situation. Moreover, it was proposed that the buyer's use of reward power during the process of disruption response and recovery positively moderates between the impact of the

relational capital on the disruption response and recovery performance.

In the second study, unlike the first, where a matched pair data set was used with two separated models for the buyer and the supplier to capture each party's perception on the postulated relationships being examined, for the second study, matched dyads were analysed as dyadic units by using a pooled model for both parties. Side-by-side comparisons enabled each group (i.e. buyer and supplier as in the first study) to articulate their individual perceptions relative to the shared relationship, while matched dyads allowed for evaluation the level of agreement within each dyad (Whipple et al., 2015). By adopting the buyer and the supplier's mutual perception for the second study, this enabled capturing of the dyadic perception on the buyer's intention to use power and its impact on their relationship, and as well as the matched dyad's disruption recovery performance. Also, as the relational capital is embedded in the relationship (Nahapiet and Ghoshal, 1998), use of mutual perception was considered an appropriate way to see how both parties perceived the relationship and its impact on disruption recovery. To operationalise the mutual perspective on the factors, Straub et al. (2004) and Klein et al.'s (2007) method of averaging the buyer and the supplier scores to produce the degree (magnitude) of mutual understanding of the dyad was utilised.

The results of the first study add to the stream of research that holds that fairness in output distribution (distributive justice) and fairness in the decision making process (procedural justice) in the buyer-supplier relationship can contribute to firms in a supply chain having congruent goals, values, and understanding (cognitive capital) as well as promoting formal and informal social interactions (structural capital), respect, friendship and trust (relational capital) between parties. The first study's results also suggest that this accumulated of social capital in the buyer-supplier relationship facilitates firms in engaging in coordination and collective action in a disruption

situation, thereby leading to a quick response and recovery from it. Regarding both the buyer and the supplier models, with the exception of the postulated relationships of structural capital in the supplier's perspective (distributive justice → structural capital, and structural capital → disruption response and recovery performance), all of the postulated relationships have been found to be significant. These results suggest that, both the buyer and the supplier have similar perceptions regarding the relationship between the impact of justice and social capital accumulation as well as the influence of social capital and the disruption recovery performance.

Regarding the results from the second study examining the moderating role of the buyer's intention to use power in the association between relational capital and disruption response and recovery performance, it was found that only reward power positively moderates the link between these. The following sections provide more details regarding the test results.

6.2. Discussion

6.2.1. Distributive Justice and Social Capital

<Table 6. 1: Path Analysis results – H1 ~ H3 >

Hypothesis				Path coefficient		
				Buyer model	Supplier model	Pooled model
H1	Distributive Justice	→	Cognitive Capital	0.549 (0.713)***	0.286 (0.392)***	0.221 (0.448)***
H2	Distributive Justice	→	Structural Capital	0.165 (0.322)**	-0.123 (-0.163)(*n.s*)	-0.013 (-0.051) (*n.s*)
H3	Distributive Justice	→	Relational Capital	0.444(0.417)***	0.213 (0.365)***	0.393 (0.547)***

Note: $^{**}p < .05$; $^{***}p < .01$

Distributive justice can be determined by assessing whether the perceived ratio of outcomes to inputs is equivalent to those of a comparative other (Adams, 1965) or whether resource distributions match appropriate norms (Leventhal, 1976). In this

study, distributive justice refers to the fairness of a decision's results (Luo, 2007; Liu et al., 2012; Poppo and Zhou, 2014).

Hypothesis 1 postulated a positive relationship between distributive justice perception and cognitive capital (H1a, buyer's perspective; H1b, supplier's perspective). The definition of cognitive capital used in this study is 'those resources providing shared representations, interpretations, and systems of meaning among parties' (Nahapiet and Ghoshal, 1998, p. 244). This dimension of social capital encompasses the shared the values, goals and understanding between the parties in a relationship (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998; Inkpen and Tsang, 2005). From the results, the buyer's perception of distributive justice in its relationship with the supplier was found to be positively related to its accumulation of the buyer's cognitive capital (support H1a). The matched supplier's structural model result supports this relationship as well (support H1b). Additionally, mutual model also support the relationship. These results indicates that, if both the buyer and supplier perceive fairness in outcome distribution in the relationship, they are more likely to have mutual goals and values as well as collective understanding in the relationship. This is consistent with the previous literature, in which it is held that parties that are rewarded fairly can be expected to be more positive in their attitude and more willing to act in ways that support the relationship, which in turn, will make them commit to mutual goals and values (Coote et al., 2004). This is because distributive justice helps the parties to see that their own benefits are interdependent with the performance in the relationship (Jap, 1999), which will make them willingly adjust their interest for mutual benefit (Bosse et al., 2009). Specifically, distributive justice promotes stronger agreements on the expectations of the relationship (Rouziès and Hulland, 2014) and a norm of reciprocity (Bosse et al. 2009), which results in the parties

to making an effort to align their priorities and resolve their differences with one another to meet the expectations in the relationship. In this process, mutual goals and a norm for further cooperation can be prioritised. Additionally, this result confirms that fair allocation of output encourages the development of common understandings between the parties. This is because distributive justice encourages transparency of communication between the two (Luo, 2009), which leads to less ambiguity and possibility of misunderstanding in the communication, thus common understanding (e.g. common situational awareness etc.) can be promoted. In this regard, both the buyer and the supplier model's significant results were expected.

Additionally, from multi-group analysis, there was significant χ^2 difference ($\Delta\chi^2$= 296.524, $p < 0.05$) for H1 and the buyer's path coefficient (0.824***) was higher than the supplier's (0.605***), which indicates that when the buyer perceives that there is fairness in output distribution, this leads to it having a higher level of cognitive capital (sharing of goals, values, norms and understanding) accumulation in the relationship than the supplier. One of the possible reasons for the buyer's higher coefficient is, as Benton (2013) noted, most of manufacturers (buyers) rely on the supplier to get components and materials, with the amount of spending on suppliers being normally over 70% of the revenue. This huge amount of spending on the supplier is not only directly related to the buyer's purchasing cost management, but also critical to its competitiveness in the market. Hence, when it comes to sharing the goals, values and understanding to maintain the relationship with the supplier, the buyer may view the fairness in the output distribution as being more critical than the supplier's perspective.

Hypothesis 2 postulated a positive relationship between perceived distributive justice and the level of structural capital accumulation in the relationship from the buyer (H2a) and supplier (H2b) perspectives. Structural capital was assessed by the actors'

social interactions, both formal and informal (Tsai and Ghoshal, 1998; Oh et al., 2004). The results for hypothesis 2a indicate that buyer firms are more likely to initiate socialisation with the supplier when there is high level of perceived distributive justice in the relationship with the supplier (support H2a). This result in line with the literature, that the perception of fair allocation of reward/return leads to the involved parties being satisfied with what they earn from the relationship, and they can find benefits in maintaining it, which stimulates them into making the effort to be more connected with each other (Kumar et al., 1995; Leana and Van Buren, 1999; Luo, 2009). This finding also can be explained by the fact that the fair allocation of reward/return also reduces hazards, such as withholding information and shirking obligations by another party (Luo, 2009). That is, it helps firms to lessen the worry of such exploitation (Skarlicki and Folger, 1997; Tyler and Bies, 1990), thereby encouraging parties in an exchange relationship to contact each other more frequently and initiate social interaction.

However, the result of the matched supplier's analysis did not support a positive relationship between its perceived distributive justice and its structural capital accumulation (not supporting H2b). Additionally, mutual model also did not support the relationship. That is, even if the supplier perceives a high level of fairness in the outcomes distribution in the relationship with the buyer, this will not lead to it becoming involved in social interaction with the buyer. The possible explanation for this may be because suppliers are generally considered to be the less dominant party in the relationship (e.g. Benton and Maloni, 2005; Ireland and Webb, 2007; Zhao et al., 2008), and this imbalance rather passive and cautious when it comes to have social interaction with the buyer. Social interaction with the more powerful party (the buyer in this study) sometimes entails a burdensome request to the weaker party, such as that the buyer exercises implicit pressure on the supplier to lower the price of outsourced products or

to transfer its key technologies. Due to the supplier's weak position in the relationship, such requests from the buyer cannot be refused for fear of losing business (Nyaga et al., 2013). From the supplier's perspective, this can be viewed as the buyer's opportunistic behaviour, and thus, social interaction with it sometimes can be viewed as a different way of the buyer potentially controlling the supplier. As a safeguard, suppliers may be reluctant to become involved in social interaction with the buyer, thus diminishing the chance of being exposed to its opportunism, even if there is fairness in the distribution of output in the relationship with the buyer.

Hypothesis 3 held that there is a positive relationship between a distributive justice perception and the level of relational capital accumulation, from the buyer (H3a), supplier (H3b). In this study, relational capital is viewed as the strength of the relationship built over time (Krause et al., 2007), and represented by the friendship, obligations, respect and trust that parties have developed with each other through a history of interactions (Nahapiet and Ghoshal, 1998; Kale et al., 2000). From the results, both the buyer and supplier's structure model (supporting H3a, H3b) and as well as mutual model support that there is a positive association between distributive justice and relational capital in the relationship.

This result indicates that when both the buyer and supplier perceive fairness in the outcomes distribution in the relationship, they are more likely to establish trust, respect, friendship and reciprocity in the relationship. Studies have supported the perspective that the buyer and supplier's distributive justice positively affects relational outcomes, such as trust (Colquitt and Rodell, 2011; Colquitt et al., 2012; Kumar et al., 1995; Ramaswami and Singh, 2003; Hoffer et al., 2012) and reciprocity (Luo, 2007; Bosse et al., 2009). Specifically, when a firm believes that its contributions to the relationship have been fairly rewarded, the parties in the exchange relationship conform

to a reciprocal relationship by adjusting their contribution so as to match the perceived level of distributive justice (Bosse et al, 2009). That is, when a firm believes that its contributions to the relationship are fairly rewarded, it reciprocates by developing a stronger bond with the partner (Cropanzano et al., 2002; Griffith et al., 2006). Additionally, the results confirm Hofer et al.'s (2012) finding that when one party perceives fairness in distribution of the outcomes, it will believe that the other party is reliable and can be trusted. In most business contexts where outcomes are allocated in accordance with relevant inputs, equity in the relationship is appreciated (Adams, 1965; Leventhal, 1976). Such fair distribution of output in the relationship can lead to the other party's competence, dedication, reliability, and trust (Colquitt et al., 2012). Hence, the significant result for both models was to be expected.

While there was insignificant χ^2 difference result from multi-group analysis ($\Delta\chi^2$= 220.890, not significant), in terms of the path coefficients comparison, the path coefficients of the buyer model and supplier model were 0.550*** and 0.373***, respectively. Possible reasons for the buyer's higher path coefficient would be, the supplier's role in the relationship is more likely to be supplying goods and materials that the buyer ordered, the buyer role is making a payment for it and have responsibility. The buyer would clearly acknowledge their role that they are responsible to pay what they received from the supplier and aware that this is their key role in the relationship with the supplier. Additionally, For the powerful party (the buyer in this study), which can fight for its rights and set up desired procedures for the relationship, procedural justice can be relatively less important (Kumar et al., 1995), and its impact on the relational output can be rather limited (Anderson and Weitz, 1992). By contrary, distributive justice would be more explicit and straight forward reference point than procedurals to behave fairly – this cannot be easily manipulated as such monetary related conditions would

be specified in a formal contract.

Overall, the results have shown that most of the hypothesised relationship between the distributive justice and the social capital accumulation are significant in both buyer and supplier, and as well as mutual models. That is, regardless whether the buyer or supplier, they view that fairness of output distribution can lead them to accumulate social capital in the relationship. Specifically, all of the associations between distributive justice perception and the three dimensions of social capital have been found to be supported in the buyer's model. In the supplier's model, the results support the impact of distributive justice on cognitive and relational justice; however, a relationship with structural capital has not been supported. More detailed discussion regarding the findings and theoretical contribution will be provided at the end of the following subsection.

6.2.2. Procedural Justice and Social Capital

Procedural justice refers to the fairness perception of the methods or processes used to derive the distribution of outcomes (Korsaard and Roberson, 1995). In buyer–supplier relationships, it is manifested through clarity of expectations as well as the extent of involvement in and explanation of the procedures (Kim and Mauborgne, 1998; Narasimhan et al., 2013). In this study, it was held that procedural justice captures whether each party uses consistent procedures, does not discriminate, and has a voice in the decision-making process prior to experiencing supply chain disruption (e.g. Luo, 2007; Griffith et al., 2006; Liu et al., 2012; Narasimhan et al., 2013; Poppo and Zhou, 2014).

<Table 6. 2: Path Analysis results – H4 ~ H6>

Hypothesis				Path coefficient		
				Buyer model	Supplier model	Pooled model
H4	Procedural Justice	→	Cognitive Capital	0.136 (0.213) (*ns)*	0.349 (0.401)***	0.396 (0.642)**
H5	Procedural Justice	→	Structural Capital	0.232 (0.547)***	0.624 (0.692)***	0.248 (0.746)**
H6	Procedural Justice	→	Relational Capital	0.309 (0.349)***	0.279 (0.401)***	0.461 (0.511)**

Note: $^{**}p < .05$; $^{***}p < .01$

From the results for both the buyer and supplier structural models, it has been shown that only supplier perceived procedural justice in the relationship with a partner is positively related to the accumulation of cognitive capital (supporting H4b), and the relationship also supported in the mutual model. This was an expected result, given extant literature has suggested that a party's procedural fairness perception nourishes the acceptance of collective values (e.g. Folger and Konovsky, 1989; Kim and Mauborgne, 1998) as well as establishing a mutual understanding of the process (Larson, 1992; Liu, 2012), common policy, norms and standards in the relationship (Tyler, 1989). This is because, just process encourages an organisation's willingness to serve in the relationship's goals and interests (Cropanzano et al., 2007; Narasimhan et al., 2013), and also helps to minimise interparty incongruities in the strategic orientation, corporate culture, and managerial style (Shenkar and Zeira, 1992). However, the relationship was not supported in buyer's model (Not support H4a). That is, high level of fairness in the decision making process in the relationship with the supplier will not lead buyers to share the goal and culture with the supplier, and thus mutual perception would not support this relationship.

The reason for this difference between the group is, that inconsistent use of procedures is more likely to have occurred by the powerful party and due to the power gap, the supplier finds it difficult to achieve fair procedures through fighting for its rights, when, in its eyes, the buyer has treated it procedurally unfairly (Kumar et al., 1995). Conversely, when the buyer treats the supplier in a procedurally just manner,

the supplier may be more appreciative of this than the buyer does, and this leads to it seeking mutual goals, values, and norms in the relationship. Alternatively, the buyer may know that the supplier is unlikely to behave unfairly in terms of procedures, and even if unfair procedures arise from the supplier, the buyer may be able to change the supplier's behaviour to being right for the relationship through its power. Thus, the buyer may be relatively less appreciative of the supplier's procedurally just manner. Also, the exchange relationship's goals, values, and norms might be more driven by the dominant party in the relationship. Thus, the buyer's goals, values and norms are in more stable and less influenced by the relationship. For the supplier, its own goals, values and norms may need to be changed to a greater extent than on the buyer side. Thus, in the process of adjustment, its goals, values and norms can be influenced a lot by the relationship's characteristics, such as the level of procedural justice.

Both the buyer and supplier structure models support the fifth hypothesis, which postulated that there is a positive relationship between procedural justice and structural capital in the relationship (support H5a and H5b) and the relationship also supported in the mutual model. These results indicate that when both the buyer and the supplier perceive a high level of procedural justice in the relationship, this promotes their involvement in interaction and socialisation. And hence, mutual model also support this relationship. These results are in line with previous studies that have reported how when both the buyer and supplier perceive that the other party is treating them with consistent standards and polices (procedural justice), they are more likely to engage in communication and interaction with the other party (Griffith et al., 2006**;** Hofer et al., 2012; Narasimhan et al., 2013) and hence a significant result for both models was to be expected. Fairness of processes helps the relationship to be maintained and continued, whilst also increasing firms' confidence levels (Luo, 2007), which is often associated

with improved openness and communication in buyer–supplier relationships (Luo, 2005). Hence, procedural justice provides the basis for interaction with the other party (Tyler and Blader, 2001; Narasimhan et al., 2013).

While χ^2 difference test was not significant for the relationships from multi-group analysis ($\Delta\chi^2$= 246.864, not significant), in terms of the path coefficients comparison for the buyer and supplier models, revealed that the supplier's path coefficient (0.627***) was higher than the buyer's (0.316***), which indicates that suppliers are more likely to initiate and become involved in social interaction with the buyer firm when they perceive there to be fairness in the procedures. A high level of procedural justice in the relationship denotes a clear level of engagement with, and expectation of the relationship, which promotes the expectation of fair treatment in the future (Kumar et al., 1995). This lead, in turn, to the supplier's worrying less about the buyer's unexpected requests - such as lower pricing of outsourced products or transferring of the supplier's key technologies - and they know that they will be protected by the fairness of procedurals in the relationship during the socialisation. From the buyer's perspective, it may be less influenced by the procedural justice perception when it comes to socialisation with the supplier as it is more capable of dealing with unfairness in the procedures from the other party, due to its more powerful position in the relationship.

Support was also found for the sixth hypotheses, that procedural justice perception in the relationship with the partnering firm is positively related to the accumulation of relational capital (supports H6a, H6b). The relationship also supported in the mutual model. Relational capital fostering the role of procedural justice has been emphasised from the buyer (Kumar et al., 1995; Wang et al., 2014; Hofer et al., 2012) and supplier's perspectives (Boyd et al., 2007; Suh, 2005; Zaefarian et al., 2016), which

thus makes the consistent results in this thesis to be expected. The results suggest that when both the buyer and supplier perceive a high level of procedural justice in the relationship, this stimulates them to engender trust, reciprocity, respect and friendship in the relationship. This provides support for the idea that, procedural justice signals that the parties' benefits are well protected through the policies (Liu, 2012). This, in turn, will make the participants in the exchange relationship more willing to engage with and invest in the relationship (Liu, 2012). Hence, fair procedures are associated with positive attitudes toward the relationship (Lind and Tyler, 1988). As a result, it increases the overall relationship quality (Kumar et al. 1995) and the development of trust in it (Korsgaard et al., 1995; Liu, 2012). Through procedural justice, where parties have the clear level of engagement with, explanation about and expectations of the process, this contributes to members feeling that they are valued and respected (Korsgaard et al., 1995; Kim and Mauborgne, 1998). In turn, each party reciprocates by increasing its relational behaviour (Griffith et al., 2006). Additionally, having input into a decision makes members feel the other party values them and affirms their status in the relationship (Korsgaard et al., 1995). which contributes to making them believe that they are valued and respected (Korsgaard et al., 1995; Kim and Mauborgne, 1998).

While χ^2 difference test was not significant for the relationships from multi-group analysis ($\Delta\chi^2$= 274.346, not significant), in terms of the path coefficients comparison, the path coefficients for the both the buyer and the supplier models, as with H4 and H5, the supplier' (0.393***) was higher than the buyer's (0.174***). This indicates that the supplier may be more likely to have a high level of trust, respect, and reciprocity when there is a high level of procedural justice in the relationship. For the powerful party (the buyer in this study), which can fight for its rights and set up desired procedures for the relationship, procedural justice can be relatively less important (Kumar et al., 1995),

and its impact on the relational output can be rather limited (Anderson and Weitz, 1992). However, unlike the buyer, the less powerful party's (the supplier in this study) trust can be hugely impacted upon by procedural justice (Kumar et al., 1995). This explains why the supplier's path coefficient was higher than that of the buyer. Overall, both the buyer and supplier structure models support all of the hypothesised relationships between procedural justice perception and the dimensions of social capital. That is, regardless whether the buyer or supplier, they view that fairness of procedures can lead them to accumulate social capital in the relationship.

Theoretical contributions from the relationship between the justice perception and social capital accumulation (H1 – H6) are as follows. First, distributive justice perception can lead to parties accumulating social capital in the relationship. All of the associations between distributive justice perception and the three dimensions of social capital have been found to be supported in the buyer's model. In the supplier's model, except for the relationship with structural capital, the results support the impact of distributive justice on cognitive and relational capital. Given the insignificant results of the supplier's perceived distributive justice's impact on its accumulation of structural capital, this implies that even if the supplier perceives a high level of fairness in output distribution in the relationship with the buyer, the supplier's involvement in the socialisation with the buyer is not guaranteed. This may result from the supplier's weak position in the relationship, whereby it may be reluctant to become involved in social interaction with the buyer so as to lessen the chance of being exposed to the buyer's opportunism that could be brought about when it engages in social interaction. From the results, overall, it has been elicited that perception of fairness in output distribution in the relationship can promote social capital accumulation in the relationship, from both the buyer and the supplier perspectives.

Second, procedural justice perception can lead to parties accumulating social capital in the relationship. Supplier structure model support all of the hypothesised relationships between procedural justice perception and the dimensions of social capital. That is, supplier view that fairness of procedures can lead them building cognitive, structural and relational capital in the relationship. In the buyer's model, their procedural justice perception lead them to develop structural and relational capital in the relationship, however, not lead them to accumulate cognitive capital. Possible reason may be, due to the buyer's dominant position in the relationship, the exchange relationship's goals, values, and norms might be more driven by the dominant party in the relationship. That is, even if the buyer inconsistently use procedures, their goals, values and norms are in more stable and less influenced by the relationship.

Third, except for these two insignificant results, all of the postulated relationships between justice (distributive and procedural justice) and social capital (cognitive, structural, and relational capital) have been found to be significant for both the buyer and the supplier. That is, the buyer and the supplier have a similar perception on their relationship in terms of the impact of justice perception (procedural, and the distributive justice) on their social capital (cognitive, structural, and relational capital) accumulation. These consistent results are interesting as previous literature has suggested that the two sides of a dyad – the buyer and the supplier - possess different views about the relationship (Ellram and Hendrick, 1995; Geiger et al., 2012; Corsten and Kumar, 2005; Nyaga et al., 2010; Ro et al., 2016). That is, each party's perception on the fairness and its impact on the social capital accumulation can be different. The reason for this may be that, even if their perspectives on their relationship and the motive for maintaining it might be different, when their output distribution is commensurate with their input (distributive justice), and they are treated in a

procedurally just manner by the other party (procedural justice), both parties realise that their relationship is mutually beneficial and worthwhile maintaining. These can be strong motivations to both the buyer and the supplier to maintain the relationship, and even seek further interaction with the other party. Through their continuous relationship, consequently, they prioritise the relationship's goals, values, and norms. They consider social interaction with the other party as being important for developing trust, respect, and reciprocity. Through their continuous exchange relationship, their justice perception enables both parties to accumulate social capital.

Fifth, in terms of path coefficient comparison between the buyer and the supplier model, the buyers were higher than those of the supplier in every hypothesised relationship between distributive justice and social capital accumulation (H1, H2, H3). As noted previously, most of the buyers rely on their supplier to get components and materials, with the amount of spending on suppliers being normally over 70% of revenues (Benton, 2013). This huge amount of spending on the supplier is directly related to its purchasing cost management, which is critical to its competitiveness in the market. Hence, the buyer may view distributive justice as being more critical for accumulating social capital with the supplier, than does the latter.

In contrast, all of the supplier's path coefficients higher than those of the buyer in the postulated relationships between procedural justice and social capital accumulation (H4, H5, H6). This may because, as noted previously, the powerful party (the buyer in this study) can fight for its rights by setting up desired procedures for the relationship. Hence, procedural justice can be relatively less important to the buyer (Kumar et al., 1995), and its impact on the relational output can be rather limited (Anderson and Weitz, 1992). Accordingly, the supplier's path coefficients were higher than the buyer's in the relationship between procedural justice and social capital.

6.3. Social Capital and Disruption Recovery Performance

The impact of justice on social capital accumulation prior to the supply chain disruption has been discussed (subsection 6.2.1.). In this subsection, the impact of social capital on response and recovery performance in a disruption situation is the focus.

<Table 6. 3: Path Analysis results – H7 ~ H9>

Hypothesis				Path coefficient		
				Buyer model	Supplier model	Pooled model
H7	Cognitive Capital	→	Disruption Recovery Performance	0.501(0.507)***	0.695 (0.724)***	0.409 (0.345)**
H8	Structural Capital	→	Disruption Recovery Performance	0.259 (0.175)**	-0.025(-0.027) (*n.s*)	-0.211 (-0.096) *(n.s)*
H9	Relational Capital	→	Disruption Recovery Performance	0.103 (0.144)**	0.361 (0.301)***	0.289 (0.355)**

Note: $^{**}p < .05$; $^{***}p < .01$

In terms of cognitive capital, its positive relationship with achieving faster response and recovery was found to be significant for both the buyer and supplier (support H7a, H7b) and as well as mutual model which indicates that having congruent goals, values and collective understanding between parties in the relationship helps both to achieve more speedy and effective response and recovery from supply chain disruption. Cognitive capital is accumulated in the relationship and shared by the both parties, and regardless whether the buyer or the supplier, their shared understanding, goals, and congruent values can be helpful to them in putting mutual effort into the disruption response and recovery. Hence, these significant results were to be expected.

To deal with supply chain disruptions, parties need to put mutual effort into the coordination of capabilities, realignment of their existing resources and processes (Ambulkar et al., 2015) as well as restructuring their resource base (Sirmon et al., 2007; Eddleston et al., 2008), to overcome the slowing down or stoppage of planned

production. Since these actions cannot be achieved by a single firm's effort, the parties need to have mutual understanding and share a common goal as this makes coordination and mobilisation of resources easier (Olcott and Oliver, 2014).

Cognitive capital, with the shared values, rules and/or goals it embodies, promotes interaction and the development of common understandings, whilst also supporting collaborative efforts towards accomplishing goals and tasks (Inkpen and Tsang, 2005). Additionally, as the extant literature has suggested, when the firms have mutual values, rules and/or goals in the relationship (cognitive capital), it facilitates their having collective sensemaking and common situational awareness (Olcott and Oliver, 2014; Johnson et al., 2013), which supports collaborative efforts towards accomplishing goals and tasks (Inkpen and Tsang, 2005). Hence, buyer and the supplier's congruent goals and values as well as common understanding (cognitive capital) help both parties to achieve timely disruption response and recovery.

While χ^2 difference test was not significant for the relationships from multi-group analysis ($\Delta\chi^2$= 249.984, not significant), in terms of path coefficients comparison, the supplier's model reported a slightly higher one (0.408***) than for the buyer's model (0.337***). This indicates that, the supplier's disruption response and recovery performance may be more influenced by the level of the cognitive capital in the relationship with the buyer. Due to its position in the supply chain, the buyer may have a more clear and holistic view than the supplier regarding the end customer and market. This will lead to it having clearer goals and values acquired from the relationship, even in an uncertain situation. Additionally, as noted previously, the goals, values and norms of the relationship can be driven more by the dominant party and hence, it will be less likely to be confused about what should be prioritised and concentrated on. Consequently, its recovery action is less impacted upon by the relationship's cognitive

capital. However, the supplier will usually have limited knowledge regarding the market and end customers. Moreover, their goals, values and norms in the relationship with the buyer may well be somewhat different from their original ones. Hence, without congruent goals, values and norms with the buyer, the recovery action required can be seen differently by the two parties, which can hinder the recovery. That is, the supplier's recovery action can be hugely impacted upon by the cognitive capital in the relationship, which is not the case for the buyer.

The relationship between the structural capital and its response and recovery performance has found to be significant in buyer model (support H8a). This result indicate that the buyer firm is more likely to be part of a quick response and recovery from disruption when it has been involved in formal / informal social interaction with its supplier. Consistent with previous literature, this suggests that frequent communication and interactions with the other party promote rapid information exchange between the two (Cousins et al., 2006; Lawson et al., 2008). In a disruption situation, before parties in the supply chain can take action for response and recovery, they need to interact to acquire appropriate information regarding their situation, such as each firm's damage from the disruption, what the first priority is, what resources are needed and what options are available for implementing a contingency plan. Otherwise, incongruence in collective action for recovery may result due to each party's different situation and viewpoint (e.g. Corsten and Kumar, 2005; Nyaga et al., 2010). Without such interactions, identifying the disruption and its negative effect will prove difficult, thus hindering agreements regarding the recovery process. The buyer may be able to gain appropriate information through social interaction with the supplier, which can contribute to identifying problems upfront (e.g. Carey et al., 2011). This could also help the parties to have a contingency strategy for achieving timely response and recovery.

However, the matched supplier analysis results do not support there being a positive relationship between its structural capital accumulation and disruption response and recovery performance (no support for H8b), and the mutual perspective do not support this relationship as well. The reason for this insignificant result from the supplier's model may be that socialisation with the buyer and the information gathered from it is not always useful to the supplier in terms of taking action for the disruption response and the recovery. Specifically, in a disruption situation, the recovery actions to be taken by the buyer and the supplier may well be different. For instance, the supplier could be focusing on readjusting its supply base and reconfiguring the resources to deal with the part shortages caused by the disruption. In contrast, the buyer may be trying to find alternative suppliers or logistics channel that it can use temporarily to meet the end customer requests, or focusing on aid for the supplier's recovery action by monetary and/or technological support, if necessary. Given that the recovery actions to be taken by the buyer and the supplier can be different in the disruption situation, each party's required information for the recovery action can also differ. That is, for the supplier, the necessary information to take recovery action may not mainly be sourced from the buyer, and the supplier could be more knowledgeable than the buyer about the appropriate action. Hence, gathered information from the buyer through social interaction might well not them directly helpful to them in terms of taking action for the recovery. Therefore, as with the insignificant result from the supplier's model, socialisation (structural capital) with the buyer and information gathered through it has no significant impact on the disruption response and recovery performance from the supplier's perspective.

Unlike the supplier, the buyer does rely on the supplier's information for recovery action. For instance, to have contingent plan and to deal with the end customer needs

in the disruption situation, the buyer needs to know about the availability of the parts and other resources. Additionally, as long as the essential recovery action, such as resource reconfiguration and readjusting the supply base is mainly done by the supplier side, relevant information will need to be sourced from that party. This means that, according to the buyer's structure model, there is a significant relationship between structural capital and disruption response and recovery performance.

Both the buyer and supplier's structure models, as well as pooled model support the ninth hypothesis, which postulated a positive relationship between the accumulation of relational capital and disruption recovery performance (supports H9a and H9b) and the mutual perspective support this relationship as well. Relational capital's resource coordination and collective action among the party promoting role is well defined in the literature (Krause et al., 2007; Ireland and Webb, 2007; Johnson and Elliott, 2011; Johnson et al., 2013), hence these significant results were to be expected. Specifically, these findings indicate that when there is a high level of respect, friendship, reciprocity, and trust in the relationship, both the buyer and supplier are more likely to coordinate and reconfigure their resources for collective action as well as becoming involved in it for a timely disruption response and recovery. One of the central roles of relational capital in the buyer-supplier relationship is reducing the risk of opportunistic behaviour and transaction costs (Dyer and Singh, 1998). By reducing the fear of the other party's opportunism in disruption response and recovery process – such as, one party putting a great deal of effort into lessening the disruptive effect, whilst the other does not do so or one party making an extensive effort may not appropriately rewarded by its counterpart after the disruption situation –, then the hard done by party is more likely to transfer its resources and information for the recovery. Additionally, reciprocity in the relationship makes firms feel obligated to replicate certain actions by the other party

(e.g. Uzzi, 1997; Adler and Kwon, 2002). Hence, when action for the recovery is required, this helps the parties to be willing to adjust their behaviour for relationship purposes and facilitates both parties in performing the recovery actions collectively (e.g. Ireland and Webb, 2007). In particular, trust in relational capital facilitates rapid access to resources and information held by the other party, even in an insecure situation (Krause et al., 2007; Johnson et al., 2013), without the necessity for formal or contractual requisitions (Johnson and Elliott, 2011), which contributes to achieving faster disruption recovery.

In terms of the path coefficients, the supplier's model has a higher one (0.383***) than the buyer's model (0.204***) and also χ^2 difference test results from multi-group analysis was significant ($\Delta\chi^2$= 469.138, $p < 0.05$). This indicates that, the supplier's disruption response and recovery performance can be more influenced by the level of the relational capital in the relationship with the buyer. When it comes to the transferring of resources or information to the other party, the supplier may feel more vulnerable and insecure than the buyer regarding the other party's opportunism, due to its less powerful position in the relationship and it has a relatively small amount of resources. That is, it may be more actively seeking the way to protect itself from the powerful party's opportunism, in which case, the supplier might be reluctant to become involved in resource coordination and collective action. Hence, trust, reciprocity, and friendship (relational capital) in the relationship with the buyer is more important to the supplier than the buyer, which explains why path coefficient of the former is higher than that of the latter.

To summarise, the framework of social capital was deployed to understand how supply chain entities' use of their relationships for promote collective action can offer benefits towards achieving successful recovery from a disruption situation. Except for

the supplier's structural capital, every hypothesis that held that there are positive relationships between developed social capital and disruption recovery performance, has been found to be significant for both the buyer and supplier. Hence, according to the results, promoting closer relationships between buyers and suppliers in a supply chain can be an effective disruption mitigating enabler.

The theoretical contributions from the results are as follows. First, this study has revealed that both for the buyer and the supplier, accumulation of social capital in the buyer-supplier relationship can promote successful disruption response and recovery. All of the associations between social capital accumulation and disruption response and recovery performance have been found to be supported in the buyer's model. That is, the buyers view of sharing goals, values, and understanding (cognitive capital), social interaction (structural capital) and the development of trust, respect, and reciprocity in the relationship (relational capital) with the supplier can be successful enablers for achieving successful disruption response and recovery. In the supplier's model, except for structural capital, the disruption response and recovery performance can be facilitated through the accumulation of cognitive and relational capital in the relationship. In sum, this study has provided evidence that accumulation of social capital in the buyer-supplier relationship can promote successful disruption response and recovery, from both the buyer and supplier perspective.

Second, given the insignificant results regarding the supplier's impact of accumulated structural capital on its disruption response and recovery performance, this this implies that socialisation with the buyer and the information gather from it is not always helpful for the supplier in regard to taking action for disruption response and recovery. As noted previously, unlike the buyer having to rely on the supplier's information – such as the availability of stock - for its contingency plan and possibly

having to find alternative suppliers for the recovery, the supplier will most likely have greater knowledge of the information required for the recovery action. In other words, the information obtained from the buyer through social interaction may sometimes not helpful for the supplier in a disruption situation.

Third, except for the flagged up insignificant result, this study's findings have shown that all of the postulated relationships between the accumulation of social capital in the relationship and disruption response and recovery performance are significant from both the buyer and the supplier perspectives. That is, regarding the social capital accumulation in the relationship and its impact on the disruption response and recovery performance, both the buyer and the supplier have a similar view. Whilst studies have suggested that the buyer and the supplier have different views on their relationship and behave differently (Ellram and Hendrick, 1995; Geiger et al., 2012; Corsten and Kumar, 2005; Nyaga et al., 2010; Ro et al., 2016), once social capital has been accumulated through the histories of the exchange, the buyers and the suppliers are more alike in terms of the nature of the interorganisational cooperation required for achieving mutual benefit (Whipple et al., 2015). Whipple et al. (2015) showed that, from the analysis of the separate models for the matched buyer and the supplier, the results of the hypothesised relationship for each party were the same regarding the impact of social capital on operational performance. Hence, social capital in the relationship leads to both parties having similar perceptions and behaviour. Cognitive capital accumulation in the relationship makes both parties have congruence in their goals, values, and norms. Structural capital helps firms to have common understanding through the socialisation and gathered information from it. Lastly, relational capital emphasises reciprocal behaviour and promotes resources and information exchange. In sum, this study's

results have provided evidence that the accumulation of social capital in the relationship leads to both the buyer and supplier having similar perspectives and behaviour.

Fourth, in terms of path coefficient comparison between the buyer and the supplier models, the suppliers were higher in every postulated relationship between social capital accumulation and disruption response and recovery performance. This result indicates that the suppliers are more likely to be influenced by the accumulated social capital, when it comes to taking action towards response and recovery in a disruption situation. This may be because, from the buyer's perspective, disruption recovery action can be more influenced outside of the relationship with the supplier. In a disruption situation, buyer's recovery action can be finding alternative suppliers who can be temporarily used, or an alternative logistics channel to meet the end customer's requirements. That is, its recovery action can be at a broader level than the relationship with the supplier, thus being relatively less impacted upon by social capital than the supplier. From the supplier's perspective, its recovery actions – such as resource reconfiguration and adjusting the supply base, etc. – can be more motivated and impacted upon by the relationship than by outside of it. Thus, the accumulation of social capital in the relationship will most likely be more important to the supplier than the buyer.

6.4. Buyer's Mediated Power (Coercive and Reward Power) and the Relationship Between Social Capital and Disruption Recovery Performance

Relational capital in the relationship permits privileged access to key resources of others (Uzzi, 1997; Kale et al., 2000), promotes firms engaging in value creation (Zaheer et al., 1998; Johnston et al., 2004; Lawson et al., 2008) and motivates the parties in the supply chain to take additional risks and cooperate even beyond contractual

provision (Villena et al., 2011). While relational capital in the relationship offers benefit towards achieving successful recovery from a disruption situation by facilitating the parties' coordination of resources for collective action (e.g. Olcott and Oliver, 2014), the ability of the relational capital can be rather limited and sometimes fails to motivate other parties to be engaged in collective action. Parties in supply chains are often uncertain whether their expectations will be fulfilled or not and whether the other party will act cooperatively in a disruption affecting situation (Li et al., 2016). Thus, the supplier may hesitate voluntarily to become involved in collective action for disruption recovery due to uncertainty in the supply chain relationship. Even if the buyer directly requests the supplier to reallocate its resources, it may not comply as the disruption is not directly affecting its firm at the moment, or simply, it perceives that the disruption is not its fault. Additionally, supply chain disruption can lead to increased relational conflicts between the parties, such as dissatisfaction, blame, anger, and conflict, based on the belief that the other party was responsible for the disruption (Primo et al., 2007; Bode et al., 2011). Hence, relational capital may not always yield the supplier's commitment for collective action in a disruption situation.

In addition to using relational capital, therefore, the buyer can use the influence a mechanism based on power–force compliance to motivate the supplier into going along with its wishes in disruption situation, alongside relational capital. By promising rewards when the supplier conforms to the buyer's influence attempt (reward power) or punishing the supplier when failing to conform (coercive power), it can produce intended changes in the supplier's behaviour in terms of engaging in collective action, thereby achieving a quick response and recovery from the disruption. Coercive power stems from a firm's ability to punish the partner, if it fails to conform to the firm's influence attempt, whilst reward power exists where one firm has the ability to offer

rewards intended to influence the target firm (French and Raven, 1959). In the second study, it was postulated that the buyer's intention to use coercive power can negatively moderate the link between the relational capital in the relationship and disruption response and recovery performance. In contrast, it was elicited that the buyer's intention to use reward power can positively moderate this relationship.

In the tests to ascertain whether there is a moderating role of the buyer's mediated power (coercive and reward power) between the buyer and supplier's collective relational capital and disruption recovery performance, the results showed that there was no significant interaction effect (not supporting H10a, H10b). However, in the individual perspective (the buyer and the supplier), the buyer model results support the moderating role of buyer's reward power in the relationship between the relational capital and the disruption recovery performance. This indicates that the buyer's use of reward power to motivate the supplier to engage in collective action complements the effect of relational capital in achieving quick response and recovery. This result is consistent with the literature, which has reported that reward-based power reinforces the ability of trust (Ireland and Webb, 2007), reciprocity (Nyaga et al., 2013; Pulled et al., 2014; Ireland and Webb, 2007) friendly atmosphere (Leonidou et al., 2008) in the relationship. However, this relationship was not supported by the supplier model. The possible explanation for this insignificant result may be that the dominant party's reward power as mediated power is sometimes mistakenly interpreted as an intention of coercion and as a punishment (Maloni and Benton, 2000). That is, sometimes the targeted party (suppliers in this study) would be easily confused - the supplier would see this offer of reward as some type of coercion, which would thus result in an insignificant result. Probing further this moderating role of reward power, these interaction effects were plotted for high and low levels of reward power (see Figure

5.3). The slope analysis results showed that both high and low levels of reward power positively reinforce the impact of relational capital on the disruption response and recovery performance. This result implies that regardless whether level of the reward offering is high or low, the buyer's use of reward based power is positively associated with relational benefits from relational capital, thereby contributing to the parties achieving successful response and recovery.

It was also postulated that there is negative moderation effect of the buyer's use of coercive power on the relationship between the buyer-supplier relational capital and disruption response and recovery performance (H10a). The results have revealed that coercive power has no significant impact on the relationship (do not support H10a) and the buyer and supplier model also do not support this relationship. This insignificant result indicates that a buyer's punitive approach to influence a supplier to go along with its wishes is ineffective in the disruption response and recovery process, and there was no negative interaction effect with the relational capital. This finding is interesting as the literature has warned that the use of coercive power can lessen the strength of the relationship (e.g. Handley and Benton, 2012; Kumar, 2005; Morgan and Hunt, 1994), trust (Kumar, 2005; Yeung et al., 2009), and commitment and willingness to cooperate (e.g. Brown et al., 1995; Maloni and Benton, 2000; Nyaga et al., 2013; Chae et al., 2017). The possible explanation for this insignificant result may be that the relationship between the buyer and the supplier has already accumulated a sufficient level of relational capital from the history of exchanges. The supplier may be convinced that the buyer is trustworthy and a reliable partner, and their relationship is continuous and strong. Therefore, even if the buyer deploys punitive behaviour (uses coercive power) to ensure its wishes regarding the disruption response and recovery process, which would be expected to be seen as a relationship damaging approach to the supplier, the

evidence from the research suggests that it does not perceive this as the buyer's opportunism towards the situation nor does it consider that the relationship quality has been marred by it.

From these test results, the theoretical contributions of the second study are as followed. First, while the mutual perspective fail to prove that the buyer's intention to use reward power in the disruption situation can positively reinforce the ability of the relational capital in promoting disruption response and recovery, buyer model support this relationship. The finding from the buyer model have shown that the buyer's intention to use reward power in the disruption situation can positively reinforce the ability of the relational capital in promoting timely disruption response and recovery from the buyer-supplier dyadic perspective. A number of studies have emphasised that reward-based power reinforces the presence of trust (Ireland and Webb, 2007), reciprocity (Nyaga et al., 2013; Pulled et al., 2014; Ireland and Webb, 2007) a friendly atmosphere (Leonidou et al., 2008) in the relationship. Hence, the results of the current study are consistent with the literature. The possible explanation for this insignificant result may be that the dominant party's reward power as mediated power is sometimes mistakenly interpreted as an intention of coercion and as a punishment (Maloni and Benton, 2000). That is, sometimes the targeted party (suppliers in this study) would be easily confused - the supplier would see this offer of reward as some type of coercion, which would thus result in an insignificant result. Hence, when it comes to using reward power, clearer messaging is required that promises rewards and is not coercion nor punishment, otherwise it will not work. Moreover, the buyer's intention to use coercive power has no significant impact on the link between the accumulated relational capital in the relationship and disruption response and recovery from the buyer-supplier dyadic perspective. As noted, the reason for this may be that it has already accumulated a

sufficient level of relational capital in the relationship to consider it stable, and its quality cannot be easily lessened by one party's coercive approach in the situation. In sum, it has been elicited that regarding the dominant party's mediated power source, only promising reward can positively reinforce the ability of relational capital in achieving successful disruption response and recovery from the buyer-supplier dyadic perspective, a coercive approach is ineffective in this respect.

Most of the literature regarding the impact of power on the relationship in the supply chain context has investigated from the single perspective; only that of the buyer or the supplier (Roh et al., 2013). One exception to this is Nyaga et al. (2013), who used dyadic data from the both buyer and the supplier; however, they focused on each party's power over the other (i.e. buyer's power over the supplier, and the matched supplier's power over the buyer). That is, they did not consider the dyadic perception of one dominant party's power as in this study. Additionally, studies investigating power in the SCRM context are even scarcer. Hence, by capturing both the buyer and supplier's dyadic perspectives on the former's intention to exert power over the relationship, this study has provided a more holistic view than simply a one-sided examination to understand how their relationship works. Specifically, this two-sided approach has led to light being shed on how power (reward or coercive) can be exerted by the dominant party and in what ways the supplier responds to this, depending on the nature of the dyadic relationship. Moreover, by using matched pair data, the results not only contribute to understanding the dyadic nature of exchange relationships in the supply chain, for this approach has also reduced the possibility of single rater bias, such as an exception fallacy (Roh et al., 2013).

6.5. Practical Contributions

Practitioners can benefit from the results in this thesis by acknowledging the importance of social and relational factors in forming relationships between their buying firms and suppliers. In particular, the findings from this study can help sales and procurement managers in dealing with supply chain disruption. Practitioners need to realise the importance of social capital accumulation in the relationship, which pertains to having shared goals, values and understanding (cognitive capital), formal / informal social interaction (structural capital) as well as respect, reciprocity, friendship and trust (relational capital) between partnering firms. This accumulated social capital can be the basis for the development of a buyer-supplier closer relationship, which can contribute to firms becoming involved in collective action in a disruption situation. Thus, the developed social capital in the relationship can be the starting point for achieving successful disruption recovery when such a situation occurs. However, this does not mean that every relationship with partners is important and thus, worth inputting more time and effort to increase the level of social capital. In the case that the partnering firm has been a good partner and reliable, putting more effort into increasing the level of social capital would be recommended. In contrast, when the partnering firm has been unreliable and has a high-risk profile, there may be the need to lessen the effort to maintain the relationship and finding a new partner might be a better idea.

Social capital in the relationship can be reinforced through the establishment of justice between the parties. Based on this study's findings, it is suggested that fairness in output distribution (distributive justice) and applying consistent rules and policy in the decision making process (procedural justice) can help firms to develop social capital. Practitioners in both parties needed to acknowledge that dealing with the other party in a just manner in the exchange relationship is a necessary condition for building social

capital. For instance, for the managers in buyer firms, there needs to be compliance with a fair procurement policy, and suppliers should be allowed to participate in the decision making process (e.g. involvement in a new product development etc.). Moreover, they should exhibit consistent practice and standards when dealing with their suppliers. Regarding the payment for the supplier, the buyer needs to comply with terms and agreements regarding this, which should also be commensurate with the supplier's input. Regarding managers in supplier firms, when dealing with the buyer, they need put effort into fulfilling the agreements related to sourcing goods in a continuous and consistent manner (e.g. meet the production volume, delivery schedule, and quality standards etc.). Moreover, they need to be transparent when it comes to payment claims for produced goods or price/payment related negotiation. Such endeavours towards acceptable fair behaviours among the parties can contribute to social capital development for both the buyer and supplier.

Second, this study has shown that the buyer and supplier's successful disruption recovery can be achieved through social capital that has accumulated prior to the disruption. Buyer-supplier relationships are sometimes characterised by an arms-length, or short-term contract base, or transactional relationship rather than a long-term and cooperative one. Practitioners need to understand that social capital is developed through histories of exchange and it thus takes time accumulate. Hence, in many cases they need put effort into maintaining the relationship, with a view to it being long-term and more cooperative. Such action can potentially not only contribute to higher performance in the normal course of business operation situation, but also, provide a social-relational backbone, where both parties prioritise mutual benefit, even in an uncertain situation, such as supply chain disruption. Specifically, practitioners should put significant effort into ensuring shared business goals, corporate values and having

a common understanding between the parties. A shared cognitive base between the parties will make the exchange relationship more robust. Thus, even when they are facing a conflict situation, both parties can focus more on the mutual benefit and long-term success, instead of being obsessed with self-interest and short-term gains or losses. Neither the buyer nor supplier may be completely happy with what has been done by each side in the disruption recovery process; however, if they share the abovementioned cognitive traits, this may well make the parties focus more on long-term gains, thereby spurring them on to engage in collective action for long-term mutual benefit. Additionally, both parties need to pay attention to how and how often, they interact socially. This is because social interactions, such as having social events, site visits and cross-functional teams are important for fostering close relationships between the parties. However, sometimes the effectiveness of social interactions is rather limited or even considered to be a waste of time (Cousins and Menguc, 2006). Specifying the objectives of interactions and information that need to be shared could help to avoid this situation.

Practitioners should acknowledge that trust, respect, and reciprocity are essential for maintaining the relationship, which can ensure the achievement of successful disruption recovery. Without these relational capital aspects, parties' effort for exchange of resource and information for successful disruption response and recovery could be rather limited and thus, take a longer time to address. This is because, without relational capital firms are less likely to exchange resources and information willingly due to the worry about the other party's opportunism. So, they may rely more on formalised processes, such as contracts and paper work when it comes to exchanging resources. These processes make the recovery process slow, thereby prolonging the performance loss (Blackhurst et al., 2005), or may even result in failure to recover from

the disruption. Through establishing a relational capital based relationship, parties can minimise the time and effort for monitoring or punishment in certain situations, thereby contributing to achieving disruption recovery.

Third, practitioners needed to know that the supplier's social interaction may not be promoted by fairness in output distribution, and also, that the supplier's involvement in such interaction may not always contribute to the achievement of timely disruption response and recovery. According to the findings of this study, suppliers are more likely to become involved in socialisation with buyers when they perceive they have been treated in a procedurally fair manner and not by fairness in outcome distribution. Managers in the buying firm need to recognise the importance of procedural justice and its social interaction promoting role in the relationship with the supplier. That is, buyers should understand that, whilst a fair allocation of output for the supplier may not be enough to lead it to become involved in social interactions, consistent use of procedures, policies and fairness in the decision-making process could well do so. Given the revelation that the supplier's structural capital has an insignificant effect on the disruption recovery performance, practitioners need to know that the supplier's social interaction benefit can be rather limited in disruption effecting situations. Hence, as aforementioned, practitioners should seek ways to increase the effectiveness of social interaction by clearly noting the purpose of the interaction and placing the emphasis on the productiveness of information sharing. Also, there should be more focus on having congruent goals, vision, and common understanding (cognitive capital) as well as the development of trust, respect and friendship (relational capital) in the relationship with the partnering firm. For, this may be more beneficial for the supplier in achieving a timely disruption response and recovery than simply relying on socialisation with the buyer.

Fourth, the study outcomes have led to important managerial implications pertaining to the use and effectiveness of the buyer's intention use power in motivating the supplier to engage in collective action quickly for disruption response and recovery. According to the results, managers in buying firms should know that the use of coercive power may not always be beneficial in a disruption situation, for it could have a harmful effect on the response and recovery performance by reducing relational benefits in the relationship. In contrast, the buyer's reward power can contribute to firms achieving quick response and recovery by being positively associated with trust, respect, and friendship reciprocity (relational capital). Practitioners in the buying firm need to acknowledge that offering rewards to influence the other party to go along with its wishes would appear to be a better approach than using punitive measures for motivating the supplier in a disruption situation. This approach is not only effective for helping firms in achieving successful response and recovery in a disruption situation, for it also can contribute to developing and maintaining a long-term collaborative relationship in a normal course of business operation situation.

6.6. Limitations

This study has several limitations, which could be addressed through several avenues in future research. First, cross-sectional data were adopted for the analysis, which thus limits the depth of understanding of the buyer-supplier relationship, especially regarding social capital, since such relational and behaviours aspects between the parties are complex and develop over time. Additionally, while we adopted number of approaches to avoid / minimise biases that related respondent's use of memory, still it is impossible to avoid such bias completely – respondents may not accurately remember the level of social capital of 3 years ago. Hence, future research should include

longitudinal data, which would enable exploration of how social capital the buyer-supplier relationship can be accumulated through the histories of exchange and provide more precise data in the past, thereby solve the issue of respondent's memory / recall and building on the findings of the current research as well.

Second, this study did not involve taking full advantage of using dyadic data. For the first investigation, two separate perspectives relating to the shared relationship were mainly adopted, whilst for the second, a mutual perspective was utilised. In future research, a way to take full advantage of dyadic data in the analysis is required by incorporating more innovative/advanced measures, such as a using symmetry (or asymmetry) measure.

Third, despite the variables for the research model being based on those found in the literature and we potential confounding factors in the model being controlled for, other variables may also have an impact on the constructs and relationship of interest. Future research could contain other contingency variables (e.g. environmental uncertainty…etc.) that may impact on the level of justice, development of social capital and/or its influence on disruption recovery performance.

Fourth, regarding structural capital, the focus has been solely on its characteristics of socialisation, whilst many other studies have viewed structural capital in terms of its network (e.g. McEvily et al., 2003; Ahuja, 2000; Burt, 2000) or informational / knowledge sharing aspects (Koka and Prescott, 2002; Krause et al., 2007; Roh et al., 2013).Consequently, by adopting structural capital with network and/or informational/knowledge sharing levels in the future study, this could provide further clarification of the findings.

Fifth, addition to the constructs of the study, combine with the secondary data – for instance, actual financial data such as return on equity (ROE) and return on asset

(ROA) – can provide better understanding of role of justice and social capital, and the importance of timely disruption response and recovery.

Sixth, while not every relationship in supply chain is collaborative, for this study, it was assumed that the buyer-supplier relationship is collaborative. In the sampling process, the buyer was asked to choose only strategic partner / key suppliers who got through the disruption together. Also, sample statistics showed that most responses for the sub-dimensions of social capital are around or over 5 (for the buyer's cognitive, structural, and relational capital the mean value was 5.090, 4.966, 5.196, respectively, whilst for the supplier, these figures were 5.196, 5.168, and 5.359, respectively). These results and adopted sample framework would indicate the relationship is based on social capital and thus, their relationship would be collaborative. However, this cannot assure that the relationship is 100% collaborative. In future work, questions in surveys to ascertain the level of collaborative relationship would be beneficial, or an appropriate control variable would be needed.

Seventh, the second study was only focused on relational capital; the interaction effect of relational capital and mediated power. This is because power has been viewed as a form of influential mechanism that is closely related relational aspects (Bachmann, 2001; Hart and Saunders, 1997; Ireland and Webb, 2007; Kumar et al., 1998; Nyaga et al., 2013; Pulles et al., 2014) and the literature provides evidence that mediated power can enhance or decrease the ability of relational capital (its key characteristics, such as trust, reciprocity etc.). However, the view is taken here that structural and cognitive dimensions would not be really associated with this influential mechanism (power) – formal/informal socialisation (structural capital) and sharing of goals, mission, culture and vision (cognitive capital) would not be enhanced or decrease when the influential mechanism has been used by dominant party. Therefore, cognitive and structural capital

were not included in the model as the power association with the other two dimensions of social capital (cognitive and structural capital) is not clear. Given this lack in extant work, it would prove beneficial to investigate how the dominant party's mediated power can be associated with other dimensions of social capital.

Eighth, unfair behaviour collaboration and its detrimental impact are well known (e.g. Poppo and Zhou, 2014; Griffith et al., 2006; Narasimhan et al., 2009). Given that the study's focus has been on disruption recovery, which is rather in short-term, one party's unfair behaviour, such as ignoring the other's situation and not putting a proper amount of effort and resource – would be sometimes helpful to them to achieve successful recovery. However, this study has only focused on collaboration / the relationship enhancing role of justice.

Ninth, some of statistics results could not meet the cut-off criterion, hence not being free from reliability and validity issues. There are varying views on the cut-off for Cronbach's Alpha, with some claiming it is somewhat arbitrary. Hair et al. (2016) and Aron et al. (2013) proposed that acceptable Cronbach's alpha value could be 0.6, whilst Peterson (1994) proposed that even a value of over 0.5 should be considered to suffice. This is important, because some constructs in the second study could not meet the cut-off criterion of 0.7 (MCP:0.551; MRP:0.591;BCP: 0.551; BRP:0.591; SRP: 0.512), but did register at over 0.5. Additionally, whilst the results from HTMT analysis for discriminant validity showed that most of constructs met the HTMT criterion of 0.90 or 1.0, some had a high correlation issue (in study 1, BDJ-BPJ: 1.207, BDJ-BRC: 1.035, BPJ-BRC: 1.036, MDJ-MPJ:1.081; in study 2, BCP-BRP: 1.054, SCP-SRP: 1.147). These constructs' factor loadings were relatively high and quite similar to each other, thus unlikely to indicate a lack of discriminant validity (Henseler et al., 2015). Moreover, all of the confidence intervals met the HTMT criterion, and none of the

squared correlations were equal to or higher than the AVE for each individual construct during the CFA process. Thus, whilst it could be concluded that there was discriminant validity among the theoretical constructs, these constructs could not meet the HTMT cut-off criterion. In future study, to avoid these issues, more robust questionnaire design procedures should be adopted and more effort put into assuring good quality responses.

Lastly, in focusing upon dyadic nature of the supply chain, both the buyer and supplier perspectives were captured. Compared to single dyad studies, it is believed that the use of a paired data set offers better understanding of the buyer-supplier relationship and also reduces the chance of erroneous from single rater data, such as an exception fallacy. However, the nature of justice and social capital in the wider context of the supply chain (i.e. triadic relationships between one buyer and two key suppliers that may or may not compete for a buying firm's business (Wu and Choi, 2005) may provide better understanding of the role of justice and social capital in the buyer-supplier relationship, whilst also offering a wider scope for supply chain disruption study. Additionally, to use the paired data set fully and examine each perspective thoroughly, two separate models for each buyer and supplier were proposed and tested. Using this data set in various other ways could add new insight future studies. For instance, combining two data sets and using the mean values (e.g. Liu et al., 2012) or focuses on the differences, such as dissonance between the buyer and supplier in the data (e.g. Son et al., 206), could prove beneficial when examined.

VII. Reference

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Appendix A. Questionnaires (Buyers)

2017 Supply Chain Disruption Recovery Survey

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We invite you to participate in the 2017 Supply Chain Disruption Recovery Study. Here, we define a supply chain disruption as an unplanned or unanticipated event that disrupts the normal flow of goods or materials to your organization. Delivery failure due to a labor strike at a port is one example of a supply chain disruption. To help organizations recover from such disruptions, this study investigates the factors that are significant to the speed of disruption recovery and the overall success of the recovery.

Given the interconnected nature of supply chains, it follows that a supply chain disruption cannot be solved by a single organization's efforts. To understand the disruption recovery from multiple perspectives in the supply chain, this study examines the experiences of both you and your suppliers.

We ask that you first complete the survey on behalf of your organization and then name the supplier who has been involved in the disruption you mention in the survey. Eliciting responses from both buyers and suppliers is an important aspect of this study design that will allow a more comprehensive assessment of disruption recovery. Please be sure to provide the name of the supplier involved; we will then contact them to ask them to participate in the study too.

Please be assured that this survey is vital to our research and we would be extremely grateful for your participation. Your responses will be treated with the strictest confidence and used solely for the purpose of this academic research. We are not interested in the identity of individual organizations (either your organization or your customer), only with results across the sample. This survey should take you approximately 15 minutes to complete.

A summary report, detailing key findings and benchmarking information, will be made available to you. If you would like to receive this report, simply attach your business card or fill in your address information when you return the survey. Please do not hesitate to contact us if you have any questions about the survey or this study more generally.

Yours sincerely,

Chang-hun Lee
Cass Business School, City, University of London
Dr. Byung-gak Son
Cass Business School, City, University of London
Dr. Sinéad Roden
Trinity Business School, Trinity College Dublin, The University of Dublin

2017 Supply Chain Disruption Recovery Survey

There are two up-front decisions to make in answering this questionnaire:

I. **Choose a disruption:** Please choose and denote a specific inbound supply chain disruption that has occurred within the last 3 years. If you have not experienced a supply disruption during this period, please refer to the most recent one.

The supply chain disruption that our organization experienced was mainly connected to:
(1) delay (2) delivery failure (3) quality problem (4) inventory shortage (5) other _____ *(please outline briefly)*

The purchased item that related to the disruption was purchased from…….
(1) a single vendor ( ) (2) multiple vendors ( )

How often has a similar type of disruption occurred?
(1): occurred rarely *(7): occurred very frequently*
(1) ---------- (2) ---------- (3) ---------- (4) ---------- (5) ---------- (6) ---------- (7)

II. **Choose a supplier**: Please choose and denote one specific supplier involved in the disruption.
(In order to examine how both you and your supplier recovered from the disruption, the denoted supplier will be contacted as a matched respondent. If the disruption involved more than one supplier, please refer to the one of the greatest strategic importance.)
Name of the supplier: _____

Section One: The Supply Chain Disruption and Recovery

→ Please answer all questions referring to the customer and the supply chain disruption you both encountered, denoted above

1	*When did the disruption occur?*	Month: _____Year: _____
2	*Estimate the number of weeks it took from the time of the disruption for your organization to return to normal operating performance:*	_____
3	*Estimate the total financial cost attributed to the disruption in US Dollars ($):*	_____

4 *Please select (all of) the source(s) of the disruption – if it is a 3rd party, please indicate the type of organization (e.g., a transportation organization, this supplier's supplier, etc.).*
(1) my organization (2) this supplier (3) 3rd party (_____) (4) unclear

5	*How did the **disruption affect** your organization across the following dimensions, when compared to similar disruptions?*	*Much worse than similar disruptions*						*Much better than similar disruptions*
a)	Procurement costs/prices for the purchased item(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Overall efficiency of our operations.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Product quality of our final product(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Responsiveness to customer demands.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Delivery reliability (on-time delivery, order accuracy).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	Sales.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

6	*To what extent do you agree or disagree with the following statements about the **recovery** for your organization following this disruption compared to similar disruptions?*	*Strongly disagree*						*Strongly agree*
	a) Material flow was more quickly restored.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) Normal operating performance was more quickly restored.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) Our supply chain was more easily recovered to its original state.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) The disruption was dealt with more efficiently.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) Overall, we were satisfied with the outcomes of the recovery effort for this disruption.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	f) The financial distress due to the disruption was more successfully dealt when compared to similar disruptions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	g) Production costs were better controlled when compared to similar disruptions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Two: Relationship with this Supplier prior to the Disruption

→ Please answer all questions referring to your organization's relationship with this supplier **prior to the disruption.**

7	*To what extent do you agree or disagree with the following statements regarding your firm's relationship with this supplier?*	*Strongly disagree*						*Strongly agree*
	a) Our gain from this relationship was consistent with the level of effort and investment we had put into it.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) Our gain from this relationship was commensurate with the roles and responsibilities we have taken in it.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) Our gain relative to our contribution to this relationship was about the same as that of this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) Our gain relative to our contribution to this relationship was about the same as that of other firms in similar business relationships.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) We received a just share of the outcomes given the knowledge/expertise contributions that we each made in this relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

8	*To what extent do you agree or disagree with the following statements regarding your firm's relationship with this supplier?*	*Strongly disagree*						*Strongly agree*
	a) When negotiating agreements or changes, this supplier consistently applied the same procedures and policies.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) When implementing decisions, this supplier conformed to agreed-upon standards and formats.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) The procedures for implementing changes to the contract were consistently used by this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) This supplier asked our opinion when they made decisions (or changes) that could affect our relationship	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) This supplier treated us impartially and in a non-discriminatory way.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

9	*To what extent do you agree or disagree with the following statements regarding your interpersonal relationship with this supplier's personnel?*	*Strongly disagree*						*Strongly agree*
	a) This supplier was honest in dealing with me.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) We had a friendly relationship with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) This supplier was considerate when expressing criticism.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) The business relationship with this supplier was characterized by mutual respect.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) This supplier always made us aware of important issues.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	f) This supplier often explained the reasons behind relevant policies.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

10	*To what extent do the following statements describe your firm's relationship with this supplier?*	*Not at all*						*To a very large extent*
	a) We shared a similar corporate culture and values with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) We often agreed with this supplier on what was in the best interest of the relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) We shared similar philosophies/approaches to business dealings with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) We shared compatible goals and objectives with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) We shared the same ambition and vision for our relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

11	*To what extent do the following statements describe your firm's relationship with this supplier?*	*Not at all*						*To a very large extent*
	a) This supplier was concerned about our welfare or interests when they made important decisions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) We respected this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) We trusted this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) The relationship with this supplier was characterized by high levels of reciprocity.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) We had a good friendship with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	f) This supplier was understanding when we had difficulties in meeting their demands.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	g) This supplier was willing to offer us assistance and support even if circumstances changed.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

12	*To what extent do the following statements describe your firm's relationship with this supplier?*	*Not at all*						*To a very large extent*
	a) We participated in social events with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) We shared proprietary information with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) We informed this supplier in advance of changing conditions (e.g., product(s) specifications of our order, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) We participated in joint workshops with this supplier to improve understandings of each other's business.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) The information shared in this relationship was more detailed than what was shared with other suppliers	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	f) Frequent and intensive interactions took place between our organization and this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

13	*Please indicate the degree to which you agree with each statement that describes your organization's supply network.*	*Strongly disagree*						*Strongly agree*
	a) We had good information about the technical capability of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) We had good information about the manufacturing flexibility of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) We had good information about the technical capacity of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) We had good information about the production capacity of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

14	*To what extent did the contract agreement between your organization and this supplier precisely...*	*Not at all*						*To a very large extent*
	a) Define the role of each party?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b) Define the responsibilities of each party?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c) State how each party was to perform?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d) State the legal ramifications for failure to perform?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e) State what would happen in the case of events occurring that were not planned?	(1)	(2)	(3)	(4)	(5)	(6)	(7)

	f) State how disagreements would be resolved?	(1)	(2)	(3)	(4)	(5)	(6)	(7)

15	*Please indicate your opinion on the following statements referring to the relationship with this supplier, before the disruption.*	*Strongly disagree*						*Strongly agree*
a)	If the relationship with this supplier had been discontinued, we would have had difficulty in achieving our goals.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	If the relationship with this supplier had been discontinued, it would have been difficult for us to replace this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	We were quite dependent on this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	We did not have a good alternative to this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Three: During the Disruption Response Process

→ Please answer all questions referring to the relationship with this supplier **during the disruption response phase.**

16	*In responding to the disruption, to what extent did your organization…*	*Strongly disagree*						*Strongly agree*
a)	We realigned our resources and processes in response to this disruption (e.g., realigned transportation routes, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We reconfigured our resources and processes in response to this disruption. (e.g., changed inventory decisions, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	We restructured our resource base to react to the disruption (e.g., changed production routine, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	We renewed our resource base in response to the disruption (e.g., updated production capacity, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)

17	*In responding to the disruption, to what extent did your organization…*	*Not at all*						*To a very large extent*
a)	Change inventory decisions?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Adjust production capacity levels?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Change location decisions ?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Realign transportation mix?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Realign transportation routes?	(1)	(2)	(3)	(4)	(5)	(6)	(7)

18	*Please indicate the degree to which you agree with the following statements related to **during** the disruption response process.*	*Strongly disagree*						*Strongly agree*
a)	We often implied that our firm's personnel would somehow get back at this supplier if they did not do as we asked and we found out.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We often hinted that we would take action that would reduce this supplier's profits if they did not go along with our requests.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	We often implied that we might have withdrawn certain needed services from this supplier if they did not go along with us.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	We often implied that we could made things more difficult for this supplier if they did not agree to our suggestions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

19	*Please indicate the degree to which you agree with the following statements related to **during** the disruption response process.*	*Strongly disagree*						*Strongly agree*
a)	We offered incentives to this supplier for their cooperation.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We implied that we would favor this supplier in the future if they went along with our requests.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	We offered this supplier rewards if they went along with our wishes.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Four: Post Disruption

➔ Please answer all questions referring to your organization, **once normal operating performance had resumed following the disruption**.

20	*Once normal operating performance had resumed, to what extent did your organization pursue, or make plans to pursue, the following activities?*	*Not at all*						*To a very large extent*
a)	Decreasing our reliance on this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Increasing our protective barriers against disturbances in the supply of the purchased item(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Searching for or developing alternative supplier(s) for the purchased item(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)

21	*Once normal operating performance had resumed, to what extent did your organization pursue, or make plans to pursue, the following activities?*	*Not at all*						*To a very large extent*
a)	Establishing a closer relationship with this supplier in order to collaborate better during future disruptions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Tightening the control mechanisms on this supplier (e.g., increasing monitoring).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Cooperating more intensively with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Improving information exchange with this supplier.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Engaging in risk-management activities with this supplier (e.g., development of joint contingency plans).	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Five: Background Information

➔ Please answer the following general questions regarding organization information.

22	*Please rate your organization's performance in each of the following areas as compared to the performance of your competitors.*	*Much worse than competitors*						*Much better than competitors*
a)	Percent of products returned by the customer	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Logistical costs	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Delivery speed	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Delivery reliability	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Production costs	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	Production lead time	(1)	(2)	(3)	(4)	(5)	(6)	(7)
g)	Inventory turnover ratio	(1)	(2)	(3)	(4)	(5)	(6)	(7)
h)	Production flexibility	(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Order flexibility	(1)	(2)	(3)	(4)	(5)	(6)	(7)
j)	Order fill rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)

23 *If one compared your firm with other manufacturing supply chains, which of the following would describe your supply chain position?*

(1): Supplier of raw material(s) (Upstream) *(5): OEM/Final product(s) manufacturer (Downstream)*

(1) ---------- (2) ---------- (3) ---------- (4) ---------- (5)

24 *How developed is your organization's supply chain risk management approach?*

(1): Basic *(5): Advanced*

(1) ---------- (2) ---------- (3) ---------- (4) ---------- (5) ---------- (6) ---------- (7)

25	*To what extent do you agree with the following statements related to the competitive environment in which your organization operates.*	*Not at all*						*To a very large extent*

a)	The business climate for our product(s) is very competitive.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Anything that one competitor can offer others can match readily.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Competition in this industry is cutthroat.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Winning in this marketplace is a tough battle.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

26 *What is the primary industry in which your organization competes?* _____

27 *How long have you been employed by this organization?* _____

28 *Please indicate your current role in the organization. If it is 'Other' please fill in what this is.*

Senior Vice President _____ Director _____ Senior Buyer _____ Buyer _____ Other (_____)

29 *Approximately how many employees does your organization have?*

1–100____ 101–250____ 251–500____ 501–1000____ 1001–5000____ 5001–10,000____ 10,001–25,000____ 25,000+___

30 *Total sales in 2016? [in Million US Dollars ($)]* _____

31 *Would you like to receive the summary of the study?* Yes _____ No _____

32 *If yes, please provide your name and e-mail address below:*

Name (First and Last) _____ E-mail Address _____

Thank you for participating in this research

Appendix B. Questionnaires (Suppliers)

2017 Supply Chain Disruption Recovery Survey

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We invite you to participate in the 2017 Supply Chain Disruption Recovery Study. Here, we define a supply chain disruption as an unplanned or unanticipated event that disrupts the normal flow of goods or materials to your customer. Delivery failure to your customers due to a labor strike at a port is one example of a supply chain disruption. To help organizations recover from such disruptions, this study investigates the factors that are significant to the speed of disruption recovery and the overall success of the recovery.

Given the interconnected nature of supply chains, it follows that a supply chain disruption cannot be solved by a single organization's efforts. To understand the disruption recovery from multiple perspectives in the supply chain, this study examines the experiences of both you and your suppliers.

We have engaged with one of your customers (_____), who has advised of a supply chain disruption that affected you both (When: *Month, 20XX*; Disruption type: (1) delay (2) delivery failure (3) quality problem (4) inventory shortage (5) others _____). This survey is not about assessing the cause of the disruption or attributing fault; rather, we are interested in how you and your customer responded, or collaborated, in order to rectify the problems caused and return to normal operating performance.

Please be assured that this survey is vital to our research and we would be extremely grateful for your participation. Your responses will be treated with the strictest confidence and used solely for the purpose of this academic research. We are not interested in the identity of individual organizations (either your organization or your customer), only with results across the sample. This survey should take you approximately 15 minutes to complete.

A summary report, detailing key findings and benchmarking information, will be made available to you. If you would like to receive this report, simply attach your business card or fill in your address information when you return the survey. Please do not hesitate to contact us if you have any questions about the survey or this study more generally.

Yours sincerely,

Chang-hun Lee
Cass Business School, City, University of London
Dr. Byung-gak Son
Cass Business School, City, University of London
Dr. Sinéad Roden
Trinity Business School, Trinity College Dublin, The University of Dublin

2017 Supply Chain Disruption Recovery Survey

Section One: The Supply Chain Disruption and Recovery

→ Please answer all questions referring to the customer and the supply chain disruption you both encountered, denoted above.

1 *Estimate the number of weeks it took from the time of the disruption for your organization to return to normal operating performance:* _____

2 *Estimate the total financial cost attributed to the disruption in US Dollars ($):* _____

3 *Please select (all of) the source(s) of the disruption - if it is a 3rd party, please indicate the type of organization (e.g. a transportation organization, supplier, etc.).*

(1) this customer (2) my organization (3) 3rd party (_____) (4) unclear

4	*How did the **disruption affect** your organization across the following dimensions, when compared to similar disruptions?*	*Much worse than similar disruptions*						*Much better than similar disruptions*
a)	Procurement costs/prices for the purchased item(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Overall efficiency of our operations.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Product quality of our final product(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Responsiveness to customer demands.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Delivery reliability (on-time delivery, order accuracy).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	Sales.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

5	*To what extent do you agree or disagree with the following statements about the **recovery** for your organization following this disruption* compared to *similar disruptions?*	*Strongly disagree*						*Strongly agree*
a)	Material flow was more quickly restored.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Normal operating performance was more quickly restored.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Our supply chain was more easily recovered to its original state.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	The disruption was dealt with more efficiently.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Overall, we were satisfied with the outcomes of the recovery effort for this disruption.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	The financial distress due to the disruption was more successfully dealt when compared to similar disruptions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
g)	Production costs were better controlled when compared to similar disruptions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Two: Relationship with this Customer prior to the Disruption

→ Please answer all questions referring to your organization's relationship with this customer **prior to the disruption.**

6	*To what extent do you agree or disagree with the following statements regarding your firm's relationship with this customer?*	*Strongly disagree*						*Strongly agree*
a)	Our gain from this relationship was consistent with the level of effort and investment we put into it.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Our gain from this relationship was commensurate with the roles and responsibilities we have taken on in the relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Our gain relative to our contribution to this relationship was about the	(1)	(2)	(3)	(4)	(5)	(6)	(7)

	same as that of this customer.							
d)	Our gain relative to our contribution to this relationship was about the same as that of other firms in similar business relationships.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	We received a just share of the outcomes given the knowledge/expertise contributions that we each made in this relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

7	*To what extent do you agree or disagree with the following statements regarding your firm's relationship with this customer*	*Strongly disagree*						*Strongly agree*
a)	When negotiating agreements or changes, this customer consistently applied the same procedures and policies.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	When implementing decisions, this customer conformed to agreed-upon standards and formats.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	The procedures for implementing changes to the contract were consistently used by this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	This customer asked our opinion when they made decisions (or changes) that could affect our relationship	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	This customer treated us impartially and in a non-discriminatory way.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

8	*To what extent do you agree or disagree with the following statements regarding your interpersonal relationship with this customer's personnel?*	*Strongly disagree*						*Strongly agree*
a)	This customer was honest in dealing with me.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We had a friendly relationship with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	This customer was considerate when expressing criticism.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	The business relationship with this customer was characterized by mutual respect.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	This customer always made us aware of important issues.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	This customer often explained the reasons behind relevant policies.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

9	*To what extent do the following statements describe your firm's relationship with this customer?*	*Not at all*						*To a very large extent*
a)	We shared a similar corporate culture and values with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We often agreed with this customer on what was in the best interest of the relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	We shared similar philosophies/approaches to business dealings with this buyer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	We shared compatible goals and objectives with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	We shared the same ambition and vision for our relationship.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

10	*To what extent do the following statements describe your firm's relationship with this customer?*	*Not at all*						*To a very large extent*
a)	This customer was concerned about our welfare or interests when they made important decisions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We respected this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	We trusted this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	The relationship with this customer was characterized by high levels of reciprocity.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	We had a good friendship with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	This customer was understanding when we had difficulties in meeting their demands.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
g)	This customer was willing to offer us assistance and support even if the circumstances changed.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

11	*To what extent do the following statements describe your firm's relationship with this customer?*	*Not at all*						*To a very large extent*
a)	We participated in social events with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	We shared proprietary information with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

	c)	We informed this customer in advance of changing conditions (e.g., specification of our products)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d)	We participated in joint workshops with this customer to improve understandings of each other's business.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e)	The information shared in this relationship was more detailed than what was shared with other customers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	f)	Frequent and intensive interactions took place between our organization and this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

12	*Please indicate the degree to which you agree with each statement describing your organization's supply network.*		*Strongly disagree*						*Strongly agree*
	a)	We had good information about the technical capability of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b)	We had good information about the manufacturing flexibility of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c)	We had good information about the technical capacity of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d)	We had good information about the production capacity of our alternative suppliers.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

13	*To what extent did the contract agreement between your organization and this customer precisely...*		*Not at all*						*To a very large extent*
	a)	Define the role of each party?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b)	Define the responsibilities of each party?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c)	State how each party was to perform?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d)	State the legal ramifications for failure to perform?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	e)	State what would happen in the case of events occurring that were not planned?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	f)	State how disagreements would be resolved?	(1)	(2)	(3)	(4)	(5)	(6)	(7)

14	*Please indicate your opinion on the following statements referring to the relationship with this customer, before the disruption.*		*Strongly disagree*						*Strongly agree*
	a)	If the relationship with this customer had been discontinued, we would have had difficulty in achieving our goals.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b)	If the relationship with this customer had been discontinued, it would have been difficult for us to replace this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c)	We were quite dependent on this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d)	We did not have a good alternative to this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Three: During the Disruption Response Process

→ Please answer all questions referring to the relationship with this customer **during the disruption response phase.**

15	*In responding to the disruption, to what extent did your organization…*		*Strongly disagree*						*Strongly agree*
	a)	We realigned our resources and processes in response to this disruption (e.g., realigned transportation routes, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	b)	We reconfigured our resources and processes in response to this disruption. (e.g., changed inventory decisions, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	c)	We restructured our resource base to react to the disruption (e.g., changed production routine, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	d)	We renewed our resource base in response to the disruption (e.g., updated production capacity, etc.).	(1)	(2)	(3)	(4)	(5)	(6)	(7)

16	*In responding to the disruption, to what extent did your organization…*		*Not at all*						*To a very large extent*

a)	Change inventory decisions?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Adjust production capacity levels?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Change location decisions?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Realign transportation mix?	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Realign transportation routes?	(1)	(2)	(3)	(4)	(5)	(6)	(7)

17	*Please indicate the degree to which you agree with the following statements related to **during** the disruption response process.*	*Strongly disagree*						*Strongly agree*
a)	This customer often implied that they would somehow get back at us if we did not do as they had asked and they found out.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	This customer often hinted that they would take actions that would reduce our profits if we did not go along with their requests.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	This customer often implied that they might have withdrawn certain needed services from us if we did not go along with them.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	This customer often implied that they could made things more difficult for us if our organization did not agree to their suggestions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

18	*Please indicate the degree to which you agree with the following statements related to **during** the disruption response process.*	*Strongly disagree*						*Strongly agree*
a)	This customer offered incentives to us for our cooperation.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	This customer implied that they would favor us in the future if we went along with their requests.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	This customer offered us rewards if we went along with their wishes.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Four: Post Disruption

➔ Please answer all questions referring to your organization, **once normal operating performance had resumed following the disruption**.

19	*Once normal operating performance had resumed, to what extent did your organization pursue, or make plans to pursue, the following activities?*	*Not at all*						*To a very large extent*
a)	Decreasing our reliance on this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Increasing our protective barriers against disturbances in the sales of related product(s).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Searching for or developing alternative customers for related products	(1)	(2)	(3)	(4)	(5)	(6)	(7)

20	*Once normal operating performance had resumed, to what extent did your organization pursued, or make plans to pursue, the following activities?*	*Not at all*						*To a very large extent*
a)	Establishing a closer relationship with this customer in order to collaborate better during future disruptions.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Tightening the control mechanisms on this customer (e.g., increasing monitoring).	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Cooperating more intensively with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Improving information exchange with this customer.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Engaging in risk management activities with this customer (e.g., development of joint contingency plans).	(1)	(2)	(3)	(4)	(5)	(6)	(7)

Section Five: Background Information

➔ Please answer the following general organization related questions.

21	*Please rate your organization's performance in each of the following areas as*	*Much worse than*						*Much better than*

	compared to the performance of your competitors.	*competitors*						*competitors*
a)	Percent of products returned by customers	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Logistical costs	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Delivery speed	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Delivery reliability	(1)	(2)	(3)	(4)	(5)	(6)	(7)
e)	Production costs	(1)	(2)	(3)	(4)	(5)	(6)	(7)
f)	Production lead time	(1)	(2)	(3)	(4)	(5)	(6)	(7)
g)	Inventory turnover ratio	(1)	(2)	(3)	(4)	(5)	(6)	(7)
h)	Production flexibility	(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Order flexibility	(1)	(2)	(3)	(4)	(5)	(6)	(7)
j)	Order fill rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)

22 *If one compared your firm with other manufacturing supply chains, which of the following would describe your supply chain position?*

(1): Supplier of raw material(s) (Upstream) *(5): OEM/Final product(s) manufacturer (Downstream)*

(1) ---------- (2) ---------- (3) ---------- (4) ---------- (5)

23 *How developed is your organization's supply chain risk management approach?*

(1): Basic *(7): Advanced*

(1) ---------- (2) ---------- (3) ---------- (4) ---------- (5) ---------- (6) ---------- (7)

24	*To what extent do you agree with the following statements related to the competitive environment in which your organization operates.*	*Not at all*						*To a very large extent*
a)	The business climate for our product(s) is very competitive.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
b)	Anything that one competitor can offer, others can match readily.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
c)	Competition in this industry is cut-throat.	(1)	(2)	(3)	(4)	(5)	(6)	(7)
d)	Winning in this marketplace is a tough battle.	(1)	(2)	(3)	(4)	(5)	(6)	(7)

25 *What is the primary industry in which your organization operates?* _____

26 *How long have you been employed by this organization?* _____

27 *Please indicate your current role in the organization. If it is 'Others', please fill in what this is.*

Senior Vice President _____ Director _____ Senior Sales Manager _____ Sales Manager _____ Others (_____)

28 *Approximately how many employees does your organization employ?*

1-100____ 101-250____ 251-500____ 501-1000____ 1001-5000____ 5001-10,000____ 10,001-25,000____ 25,000+___

29 *Total sales in 2016? [in Million US Dollars ($)]* _____

30 *Would you like to receive the summary of the study?* Yes _____ No _____

31 *If yes, please provide your name and e-mail address below:*

Name (First and Last) _____ E-mail Address _____

Thank you for participating in this research