

Agent Characteristics and Compliance Behavior in Supply Chain Disruptions

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The literature suggests that compliance behaviors are important in sustaining supply chain relationships when dealing with supply disruptions. This study empirically examines the role of agent-level factors on compliance in supply chain relationships, departing from previous research that focused mainly on firm-level factors. We find that after controlling for dependence and relational norms, some dimensions of agent cooperativeness and assertiveness are still significantly related to compliance. These findings suggest that certain characteristics of decision-making agents do matter in supply chain relationship dynamics, and encourage further research on the role of agent-level factors in affecting various aspects of supply chain phenomenon.

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Introduction & Background

Firm Compliance

Compliance has been studied in much of the existing buyer-supplier relationship literature (e.g., Gassenheimer & Calantone, 1994; Heide & John, 1990; Joshi & Arnold, 1998; Payan & McFarland, 2005). It is a reaction portraying the sacrifices and generation of alternative solutions made by firms to preserve an existing firm relationship. Compliance communicates a sense of involvement that takes into account the position of the channel partner as well as available alternatives. It also communicates the desire to maintain relational ties, even if just for a short while (Etzioni, 1961). Etzioni (1961, p.3) describes compliance as referring “both to a relation in which an actor behaves in accordance with a directive supported by another actor’s power and to the orientation of the subordinated actor to the power applied.” It is positively driven by supplier assistance and economic dependence, and the expectation of financial rewards is an additional dealer incentive to comply, since most organizations have economic goals (Gassenheimer & Calantone, 1994).

Buyer compliance can be defined as the reception given by a buying firm to a request made by its supplier for relationship continuance, despite potential costs incurred by the buying firm when agreeing to such a request (Etzioni, 1961; Gassenheimer & Calantone, 1994; Kumar, Stern & Achrol, 1992). Buyers who are dependent on their supplier are expected to comply more readily with supplier requests. However, buyers that make specific investments in supplier relationships will be more willing to undertake relationship maintenance actions, such as accommodating particular requests by the supplier. This is because sustaining existing firm relationships is a necessary means by which to recover the value of their specific asset investments (Ganesan, 1994; Heide & John, 1990), an argument that is echoed in the transaction cost economics literature (Williamson, 1985). Greater levels of dependency encourage buyers to comply with the requests of their supplier (Anderson & Narus, 1990). By complying with partner requests, the dependent party gives up the opportunity to extract benefits from its partner. In comparison to prior research (e.g., Keith, Jackson & Crosby, 1990, p. 33), the costs (or benefits foregone) of compliance are significant (Joshi & Arnold, 1998).

The Relational Supply Chain

For nearly two decades, the issues of trust and partnerships among firms have been discussed in the buyer-supplier and supply chain literature. Studies have shown that through long-term, close firm relationships, mutual collaboration and accommodation, companies and suppliers can create high performing supply chains together (Dyer, 1996; Dyer & Ouchi, 1993; Stank, Keller & Daughterty, 2001). Some major industry sectors (i.e., the automotive sector), have seen the movement toward such partnerships through the use of massive supply base reductions and longer-term relationships between automakers and their key suppliers (Helper & Sako, 1995). One of the most well-known models of supplier management is the Japanese keiretsu. With its interlocking board of directorates, the keiretsu creates a sense of mutual destiny for both the manufacturer and its supplier network (e.g., Chang, 2002;

Cusumano & Takeishi, 1991; Kamath & Liker, 1994). It is also based on a high degree of trust and close bonds between the buyer and supplier (Dyer & Ouchi, 1993). More recent terms such as 'relational contracting' (Dyer & Singh, 1998) and 'relational exploration strategies' (Tokman et al., 2007) describe this hybrid form of governance between the use of market and vertical hierarchy.

Inspired by the high supply chain performance observed in the partnerial Japanese buyer-supplier networks (Clark & Fujimoto, 1991; Cusumano & Takeishi, 1991; Dyer, 1996; Dyer & Ouchi, 1993), many firms have emulated characteristics of the more relational supply chain model in their own supply chains. These more committed firm relationship structures foster greater continuity through the use of longer-term contracts and trust-based mechanisms, as well as a greater supply chain resiliency in both organizational and production processes in order to address unforeseen uncertainty and disruptions that can arise. Having resilient, close-knit, long-term buyer-supplier relationships can help absorb the impact of various supply chain disruptions that may occur. In these types of relational supply chains, partners are more willing to accommodate each others' needs and comply with their partner's requests in order to preserve the working relationship. For example, in February of 1997, a devastating fire broke out at Aisin Seiki Co., a supplier to Toyota. Since it halted production in all of Toyota's Japanese plants, the company rallied the help of its other keiretsu suppliers to help replace the lost capacity. This also allowed Toyota to accommodate and comply with Aisin Seiki's need for recovery time from the disastrous and disruptive fire (Sheffi & Rice, 2005).

The Problems with Disruptions

Supply disruptions can come in various forms with many different causes. They can come in the form of production or shipment delays caused by labor strikes and material shortage, and can also include random events such as natural disasters, accidents, or even intentional disruptions like sabotage or acts of terrorism (Hendricks & Singhal, 2005; Sheffi & Rice, 2005). Supply chain disruptions can interrupt the normal flow of goods and materials within a supply chain and expose supply chain partners to operational and financial risks (Craighead et al., 2007). For example, the longshoreman union strike at the Los Angeles-Long Beach port in 2002 disrupted the supply chain and interrupted supply deliveries to many U.S. firms. Its damaging impact on the port operations and schedules lingered for six months after the strikes had ended. Another supply disruption incident took place as lightning struck a Philips semiconductor plant in New Mexico in 2000. The resulting 10-minute blaze contaminated millions of chips and delayed shipments to Nokia in Finland and to Ericsson in Sweden, disrupting the flow of their operations.

But whatever the form, a disruption essentially indicates a firm's inability to match its supply to the demand. Such supply chain disruptions can hinder the delivery of product to customers at stipulated times. Recently, disruptions have been recognized as having the potential to cause significant negative economic and financial impacts on firms and their supply chains (Hendricks & Singhal, 2005). As a result, the topic of supply disruption is receiving more and more attention in much of the literature (e.g., Billington, Johnson & Triantis, 2002; Kilgore, 2003; Lee, Padamanabhan & Whang, 1997).

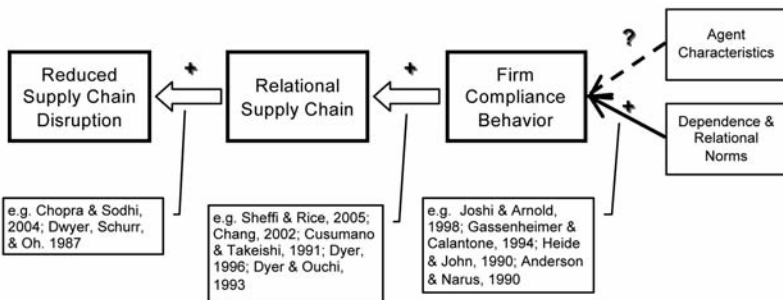
Supply chains are more susceptible to disruptions today than they were several years ago. Some reasons for this are increased global competition, more volatile demand, increased product variety, rapid advances in product technology, and shorter product life cycles – all of which make it challenging to match supply to demand and manage the supply chain (e.g., Mylnek et al., 2005). Once supply disruption occurs, there is little evidence to suggest that the resulting economic and financial recovery of firms experiencing disruption happens quickly (Hendricks & Singhal, 2005). Earlier work has shown that firm relationships that weather such disruption crises and thrive over the long-term, are characterized by an attitude of dynamic adjustment, cooperation and collaboration (Chopra & Sodhi, 2004; Dwyer, Schurr & Oh, 1987). Regardless, the significant negative impacts of disruptions and the lack of quick firm recovery provide the impetus to give close attention to the risk of disruptions and the supply chain characteristics to absorb the impact.

Focus of the Study

We take the position that since supply disruptions can be difficult to predict, supply chain managers can cope with such problems by developing more resilient, accommodating and relational relationships with firms in their supply network. The literature discussed above suggests that compliance behaviors in supply chain relationships are characteristic of longer-term, trust-based, relational supply chains, which can enhance the supply chain’s capability to cope with disruption risks. Thus, understanding what factors influence compliance behaviors in supply chain relationships could prove useful in creating resilient supply chains.

The literature has suggested that dependence is a key factor in commanding compliance behaviors from exchange partners, whereas relational norms moderate the relationship between dependence and compliance (e.g., Joshi & Arnold, 1998). To extend the current knowledge on compliance behaviors in supply chains, we empirically examine the role of agent characteristics in influencing compliance, which departs from previous research that focuses primarily on the effects of firm-level factors (i.e., dependence and relational norms) on compliance. Specifically, this study investigates the effects of agent cooperativeness and assertiveness on compliance in supply chain relationships. The focus of this study is summarized in Figure 1 below.

Figure 1: Flow of Arguments



Hypotheses: Cooperativeness, Assertiveness, & Compliance

The exchange relationship literature is filled with studies regarding how buyer and supplier firms behave and relate towards one another. However, managers in buyer and supplier firms often act as decision-making agents in terms of firm exchange decisions (i.e., purchasing and parts procurement). These individual agents in the buyer-supplier dyad may engage in dynamic processes embedded in their exchange relationships such as information sharing, negotiation, and conflict resolutions. Therefore, the agents' behaviors in these processes could make or break the relationships between firms whom the agents represent.

Wilmot and Hocker (2001) base negotiation characteristics on a cooperativeness and assertiveness framework. According to Wilmot and Hocker, cooperativeness is required in the presence of concern for others. That is, individuals with greater concern for others have greater cooperative tendency. Cooperativeness is a multifaceted construct consisting of social acceptance (hereafter acceptance), empathy, teamwork orientation/helpfulness (hereafter teamwork), compassion, and conscience (Cloninger et al., 1994; Cloninger, Svrakic & Przybeck, 1993). Highly cooperative individuals are described as tolerant, empathetic, supportive, compassionate, fair and principle-centered, and are service-oriented. They also attempt to cooperate with each other as much as possible. We contend that when it comes to complying with the request from a supplier in distress, buyer agents possessing high degrees of cooperativeness that are concerned for others and focus more on mutual benefits, will be more likely to comply with supplier requests. This line of reasoning yields the following hypotheses:

Hypothesis 1: The Cooperativeness of the decision-making agent has a significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 1A: The Empathy of the decision making agent has a significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 1B: The Compassion of the decision making agent has a significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 1C: The Teamwork of the decision making agent has a significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 1D: The Acceptance of the decision making agent has a significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 1E: The Conscience of the decision making agent has a significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Referring back to the same cooperativeness and assertiveness framework proposed by Wilmot and Hocker, assertiveness is required when a tendency of concern for oneself exists. That is, individuals with a greater concern for self have a greater assertiveness tendency. Like cooperativeness, assertiveness is also a multifaceted construct, comprised of initiation, request refusal/right expression (hereafter expression), and confrontation (Chan, 1993; Kearney et al., 1984; Law, Wilson & Crossini, 1979). Highly assertive individuals tend to stand up for themselves, take initiation, exercise their rights, refuse requests from others when within their legitimate rights, and openly confront with others in disagreement (Rathus, 1972; Rathus, 1973). Assertiveness thus enables individuals to act in their own best interests. We assert that decision-making agents exhibiting high degrees of assertiveness are less likely to comply with a supplier when the request is putting their own interests at risk. This line of reasoning suggests the following hypotheses:

Hypothesis 2: The Assertiveness of the decision-making agent has a negative significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 2A: The Initiation of the decision making agent has a negative significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 2B: The Expression of the decision making agent has a negative significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Hypothesis 2C: The Confrontation of the decision making agent has a negative significant effect on compliance when controlling for dependence and relational norms in the buyer-supplier relationship.

Research Methodology

Experimental Design & Subjects

We conducted a scenario-based experiment with 161 business professionals in MBA courses to test our proposed hypotheses. Seven students did not complete the survey and were excluded from the study. In the final sample of 154 subjects, 62% had at least five years of professional working experience and 97.4% had at least one year of professional experience, with the average of 6.7 years. 20% of the subjects had at least five years of management experience and 50.0% had at least one year of management experience, with the average of 1.8 years. The management responsibilities of these subjects ranged from supervisory to executive positions. 55%

of the subjects had executive, senior-level or mid-level management experience. 60.4% were male and 39.6% were female with the average age of 28.7 years old. In addition, 76.6% were Caucasian, and 23.4% were non-Caucasian.

We used the validated buyer-supplier relationship scenario from Joshi and Arnold's study (1998) (see Appendix A for the full description of the scenario) and randomly assigned subjects into four groups based on a two-by-two experimental design of low versus high relational norms and low versus high dependence. The subjects read a short business case verbatim that was taken from the validated scenario created by Joshi and Arnold (1998). In the business scenario, subjects were asked to assume the role of a manager at a midsize electronic equipment manufacturer responsible for the purchase of microchips from a partnering supplier. Each subject was also exposed to a combination of dependence and relational norms manipulations, depending on which group the subject was assigned to. After reading the scenario, subjects were asked to rate their reaction in terms of their compliance to the supplier's request for order, knowing that the supplier was faced with a labor dispute potentially leading to a supply disruption and that this could cause problems for the subject's firm in meeting delivery schedules to its customers.

The manipulation checks were successfully performed as t-tests indicated (1) that the average rating on the manipulation check item, "I personally feel that my company is highly dependent on the supplier." The average rating of subjects in the High Dependence groups (mean = 6.04; 1 = strongly disagree, 7 = strongly agree) was statistically different from that of subjects in the Low Dependence groups (mean = 3.74) at $p < 0.001$ level, and (2) the average rating on the manipulation check item, "I personally feel that my company has an informal, close, cooperative relationship with the supplier" of subjects in the High Relational Norms groups (mean = 5.95) was statistically different from that of subjects in the Low Relational Norms groups (mean = 2.78) at $p < 0.001$ level.

Measurements and Statistical Models

Dependent variable: Compliance. We measured subjects' compliance using Joshi and Arnold's (1998) validated instrument consisting of six 1-7 scale items (1 = strongly disagree, 7 = strongly agree), including (1) 'I would hang in there and wait for the labor dispute to be resolved,' (2) 'I would be continually looking out for another supplier to replace the existing supplier (reverse coded),' (3) 'I would patiently wait for the supplier's performance to return to its original level,' (4) 'I would accept the terms and conditions of an alternative supplier (reverse coded),' (5) 'In my negotiations with this supplier, I would imply that they were in danger of losing our business (reverse coded),' and (6) 'I would terminate our relationship with this supplier (reverse coded).' Principal Component Analysis (PCA) showed that the four items of compliance (items 1, 2, 3 and 6) were highly correlated and loaded onto a single component with a Cronbach's alpha of 0.75. The other two items did not load significantly onto the factor and were excluded from the analysis. Therefore, these four items were combined into a single component measure of compliance in this study, indicating the likelihood that the subjects will comply with the request from the supplier (i.e. placing an order with the supplier while knowing that there is a potential for supply disruption).

Independent variables: Cooperativeness and Assertiveness. We used a 30-item survey instrument with a 1-7 rating system to measure cooperativeness. This instrument was developed based on the notion that cooperativeness is a multifaceted higher-order construct that consists of acceptance, empathy, teamwork, compassion, and conscience. The original instrument developed by Cloninger et al. (1993) and Cloninger et al. (1994) was not appropriate for the study due to its length. Initially, our instrument had 39 items, which are existing questionnaire items in the literature (Goldberg, 2006; O'Shea et al., 2004; Yilmaz & Hunt, 2001). After we pretested it with 48 undergraduate business students, 9 items were dropped due to their low intercorrelation with other items, and several items were reworded to improve their clarity. The final version of the 30-item instrument (6 items per sub-scale) used in this study is shown in Appendix B.

We performed correlation analysis and PCA to assess the fit of the items in each subscale. We found that the selected items for *Empathy* (B1, B2, B3 and B4) were highly loaded onto a single component with a Cronbach's alpha of 0.83. The selected items for *Teamwork* (C1, C2, and C4) were highly loaded onto a single component with a Cronbach's alpha of 0.62. The selected items for *Compassion* (D2, D3 and D4) were highly loaded onto a single component with a Cronbach's alpha of 0.75. We also found that certain items of the acceptance subscale were more strongly correlated with some items of the conscience subscale and vice versa. Thus, we reassigned those items accordingly.

We grouped items A2, A3, A6, and E3, and renamed them *Considerateness*. Originally, A2, A3, and A6 measured the Acceptance dimension of Cooperativeness, while E3 measured the Conscience dimension of Cooperativeness. Further analysis of these items showed that these items could explain an agent's inclination to being considerate, which is more specific than Acceptance and Conscience. PCA indicated that A2, A3, A6, and E3 were highly loaded onto a single component with a Cronbach's alpha of 0.62. We grouped items A1, A4, E5, and E6, and renamed them *Humility*. PCA also indicated that A1, A4, E5, and E6 highly loaded onto a single component with a Cronbach's alpha of 0.64. According to Collins' (2001) findings in his Good-to-Great research, level-5 leaders, who are the most effective leaders with personal humility and professional will, tend to put the best interest of their organization above all else. It is possible that business professionals of humility will honor the greater purpose of their organization and make their decision accordingly. As such, they are less likely to put their organization's viability at risk by simply complying with the supplier's request without exploring other possible alternatives in the face of impending supply disruption. Finally, the factor score from each PCA was later used as a single-component measure for each of the five cooperativeness dimensions.

We measured assertiveness using an 18-item instrument with the 1-7 rating system. We developed the assertiveness scale based on existing questionnaire items in the literature. The items of the assertiveness scale developed by Rathus (1973) were initially considered. However, some empirical research has indicated that Rathus's assertiveness scale is not unidimensional, and assertiveness appears to be a multi-dimensional construct consisting of initiation, expression, and confrontation (Chan,

1993; Kearney et al., 1984; Law et al., 1979). Therefore, the items used in this study were organized into these three subscales. Initially, our assertiveness scale had 24 items. After the pretest, 6 items were dropped due to their low intercorrelation with other items, and some items were reworded to improve their clarity. The final 18-item instrument (6 items per sub-scale) used is shown in Appendix C.

Similarly, we conducted correlation analysis to identify groups of items with strong correlations among those for assertiveness. We followed with PCA and found that the selected items for *Initiation* (F1, F2, F3, F4, and F5) were highly loaded onto a single component with a Cronbach's alpha of 0.85. The selected items for *Expression* (G3, G4, G5, and G6) were highly loaded onto a single component with a Cronbach's alpha of 0.70. The selected items for *Confrontation* (H1, H2, H3, and H5) loaded onto a single component with a Cronbach's alpha of 0.70. Finally, the factor score from each PCA was later used as a single-component measure for each of the three assertiveness dimensions in this study.

Control variables: Dependence, Relational Norms, Subjects' Managerial Experience, Responsibility, Campus, and Gender. Since the main thrust of the study was to investigate the effects of agent-level factors (i.e., cooperativeness and assertiveness) on compliance in buyer-supplier relationship contexts, we controlled for dependence and relational norms, which are major firm-level factors influencing the dynamics in buyer-supplier relationships and well-established in the literature. Dependence and relational norms were experimental manipulations both of which were coded as 1 and 0, respectively. Relational norms conditions were as well. We also controlled for other variables including (a) subjects' years of managerial experience, which was kept as a continuous variable, (b) subject's professional responsibility – executive, middle-management, first-line management, staff experience, and other positions without management responsibilities, which were coded as 5, 4, 3, 2 and 1, respectively, (c) campus: 2 for urban campus, 1 for suburban campus, and 0 for rural campus, (d) gender – female and male coded as 0 and 1, respectively.

Statistical Models: We used a regression model to test our proposed hypotheses by examining the effects of agents' Cooperativeness and Assertiveness on Compliance in the buyer-supplier relationship after controlling for Dependence, Relational Norms and other control variables (Hypotheses 1 and 2). The regression model is as follows:

$$\text{Model: Compliance} = \text{constant} + b_1\text{Empathy} + b_2\text{Compassion} + b_3\text{Teamwork} + b_4\text{Considerateness} + b_5\text{Humility} + b_6\text{Initiation} + b_7\text{Expression} + b_8\text{Confrontation} + b_9\text{Dependence} + b_{10}\text{Relational Norms} + b_{11}(\text{Dependence} \times \text{Relational Norms}) + b_{12}\text{Managerial Experience} + b_{13}\text{Responsibility} + b_{14}\text{Campus} + b_{15}\text{Gender} + \text{errors}$$

Data Analysis & Results

Descriptive Statistics and Correlation Matrix

We began the data analysis by performing correlation analyses, the results of which are depicted in Table 1. Correlations summarized in Table 1 indicate that there are some significant associations among our control variables. For example, a subject's Managerial Experience had a significant positive association with Responsibility, indicating that the longer managerial experience was associated with the higher level

of managerial responsibility. Empathy had significant positive associations with Considerateness, Compassion, Teamwork, and Humility, while Initiation had significant positive association with Expression and Confrontation. Despite the correlations among these variables, Variance Inflation Factors did not indicate multicollinearity among them. Thus, the underlying assumptions of multiple regression analysis were not violated.

Table1 : Correlation Matrix

	Mean	Std Dev.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14	15
1. Compliance	0.00	1.51	1.00														
2. Empathy	0.00	1.63	0.10	1.00													
3. Compassion	0.00	1.41	0.02	0.22**	1.00												
4. Teamwork	0.00	1.31	-0.05	0.20*	0.19*	1.00											
5. Considerateness	0.00	1.37	0.14	0.50***	0.28***	0.11	1.00										
6. Humility	0.00	1.38	-0.20*	0.25**	0.36***	-0.10	0.30***	1.00									
7. Initiation	0.00	1.78	-0.02	0.02	0.01	0.22**	-0.07	-0.18*	1.00								
8. Expression	0.00	1.46	-0.11	-0.23**	0.04	-0.06	-0.11	0.04	0.39***	1.00							
9. Confrontation	0.00	1.47	0.00	-0.07	-0.13	0.16*	-0.04	-0.21**	0.45***	0.30***	1.00						
10. Dependence	0.49	0.50	0.21**	0.14	-0.04	0.01	0.01	0.00	0.07	0.02	0.02	1.00					
11. Relational	0.51	0.50	0.46***	-0.05	0.07	0.02	0.06	0.07	0.00	0.06	0.02	0.00	1.00				
12. Managerial Exp	1.76	2.67	0.04	-0.14	0.04	0.04	0.04	0.03	0.29***	0.14	0.08	0.03	0.04	1.00			
13. Responsibility	1.81	1.02	0.03	-0.13	0.07	-0.09	0.04	0.06	0.20*	0.15	0.08	-0.02	-0.06	0.58***	1.00		
14. Campus	1.25	0.82	-0.11	-0.05	-0.11	-0.06	0.03	0.08	-0.09	-0.11	0.10	-0.02	-0.03	-0.19*	-0.03	1.00	
15. Gender	0.60	0.49	-0.02	-0.21**	-0.19*	0.15	-0.09	-0.27***	0.21*	0.17*	0.26**	0.07	-0.03	0.15	0.08	-0.12	1.00

* p<0.05 ** p<0.01 *** p<0.001

Hypotheses Testing

Table 2 displays the results of multiple regression analyses with Compliance as the dependent variable. Models A1, A2, and A3, in addition to the control model, were used to test the effects of Cooperativeness and Assertiveness (agent-level factors) on Compliance (Hypotheses 1 and 2). Results of Model A1 indicate that after controlling for the control variables, the measures for Cooperativeness, Teamwork (p<0.1), and Humility (p<0.001) were negatively related to Compliance, while Considerateness (p<0.05) was positively related to Compliance in the buyer-supplier relationship. The incremental R² for Model A1 over the control model was highly significant (p<0.001), with the agent Cooperativeness improving the total explained variation in Compliance by 38.6% (28.4% R² in the control model versus 39.3% R² in Model A1).

Results of Model A2 indicate that when only Assertiveness dimensions were used as independent variables, Expression (p<0.05) was negatively related to Compliance. However, the incremental R² for Model A2 over the control model was not significant with the agent Assertiveness improving the total explained variation in Compliance by 8.4% (28.4% R² in the control model versus 30.7% R² in Model A2). Results of Model A3 indicate that when both Cooperativeness and Assertiveness dimensions were used as independent variables, Teamwork (p<0.1) and Humility (p<0.001), among the measures for Cooperativeness, were negatively related to Compliance, while Considerateness (p<0.05) was positively related to Compliance in the buyer-supplier relationship. The incremental R² for Model A3 over the control model was highly significant (p<0.001), with the agent characteristic variables improving the total explained variation in Compliance by 43.2% (28.4% R² in the control model versus 40.6% R² in Model A3). In short, the results of Model A3 show that after controlling

for firm-level factors—Dependence and Relational Norms and other control variables—some dimensions of agent Cooperativeness were still significantly associated with Compliance, whereas agent Assertiveness was not significantly related to Compliance in the presence of agent Cooperativeness variables.

Table 2: Regression Analysis Results for Compliance

Dependent Variable: Compliance	Standardized Beta			
	Control	Model A1	Model A2	Model A3
<i>Control Variables:</i>				
Dependence	0.32**	0.33***	0.31**	0.34***
Relational	0.57***	0.58***	0.57***	0.59***
Dependence x Relational Norms	-0.18	-0.20 [†]	-0.16	-0.20 [†]
Managerial Experience	-0.06	-0.04	-0.06	-0.03
Responsibility	0.09	0.08	0.11	0.09
Campus	-0.11	-0.09	-0.13 [†]	-0.10
Gender	-0.04	-0.08	-0.03	-0.06
<i>Independent Variables:</i>				
Empathy		0.02		0.00
Compassion		0.07		0.08
Teamwork		-0.13 [†]		-0.13 [†]
Considerateness		0.19*		0.18*
Humility		-0.35***		-0.34***
Initiation			-0.01	-0.02
Expression			-0.17*	-0.11
Confrontation			0.05	0.01
R Square	0.28	0.39	0.31	0.41
Adjusted R Square	0.25	0.34	0.26	0.34
F Value	8.26***	7.61***	6.35***	6.30***
Incremental R Square		0.11	0.03	0.13
Incremental F Value		5.08***	1.64	3.56***

† p<0.1 * p<0.05 ** p<0.01 *** p<0.001

These results yield partial support for Hypothesis 1 but not for Hypothesis 2. That is, these results indicate that the agent-level factors in Cooperativeness: Teamwork, Considerateness and Humility do seem to influence Compliance behavior even after controlling for Dependence and Relational Norms, whereas Assertiveness does not significantly influence Compliance behavior over and above Cooperativeness and the control variables. Thus, these results support only Hypotheses 1C, 1D, 1E, but not Hypotheses 1A and 1B (i.e., Empathy and Compassion) and Hypotheses 2A, 2B and 2C (i.e., Initiation, Expression and Confrontation). This still provides support for our overall argument that agent-level factors matter in buyer-supplier relationships even after taking firm-level factors – Dependence and Relational Norms – into consideration.

Exploratory Analysis

Since the results in Table 2 showed that certain agent-level factors could significantly influence Compliance, we performed four additional regression analyses to explore the effects of such agent-level factors on compliance across four different Dependence-Relational Norms conditions: (1) Low Dependence, (2) High Dependence, (3) Low Relational Norms, and (4) High Relational Norms, using

regression Models B, C, D and E in Table 3A and 3B. The sample was grouped into four subsamples according to the Dependence and Relational Norms conditions. Then, the data from four sub-samples were analyzed based on the respective regression models. Results in Table 2 indicate that only four dimensions from Cooperativeness and Assertiveness: Teamwork, Considerateness, Humility, and Expression had demonstrated some significant associations with Compliance. Thus, we only focus our exploratory analyses on these variables.

Table 3: Exploratory Regression Analysis

a) Low and High Dependence Conditions

Dependent Variable: Compliance	Standardized Beta			
	Low Dependence		High Dependence	
	Control B	Full B	Control C	Full C
<i>Control Variables:</i>				
Relational Norms	0.52***	0.53***	0.38***	0.40***
Managerial Experience	-0.03	0.08	-0.06	-0.08
Responsibility	0.23*	0.22*	-0.09	-0.05
Campus	0.03	0.01	-0.27*	-0.26*
Gender	-0.03	-0.04	-0.03	-0.05
<i>Independent Variables:</i>				
Teamwork		-0.24*		-0.04
Considerateness		0.31**		0.21 [†]
Humility		-0.27**		-0.28*
Expression		-0.22*		-0.09
R Square	0.32	0.48	0.26	0.36
Adjusted R Square	0.27	0.41	0.21	0.27
F Value	6.70***	7.10***	4.92***	4.08***
Incremental R Square		0.16		0.10
Incremental F Value		5.52***		2.50 [†]

b) Low and High Relational Norms Conditions

Dependent Variable: Compliance	Standardized Beta			
	Low Dependence		High Dependence	
	Control B	Full B	Control C	Full C
<i>Control Variables:</i>				
Relational Norms	0.52***	0.53***	0.38***	0.40***
Managerial Experience	-0.03	0.08	-0.06	-0.08
Responsibility	0.23*	0.22*	-0.09	-0.05
Campus	0.03	0.01	-0.27*	-0.26*
Gender	-0.03	-0.04	-0.03	-0.05
<i>Independent Variables:</i>				
Teamwork		-0.24*		-0.04
Considerateness		0.31**		0.21 [†]
Humility		-0.27**		-0.28*
Expression		-0.22*		-0.09
R Square	0.32	0.48	0.26	0.36
Adjusted R Square	0.27	0.41	0.21	0.27
F Value	6.70***	7.10***	4.92***	4.08***
Incremental R Square		0.16		0.10
Incremental F Value		5.52***		2.50 [†]

[†] p<0.1 * p<0.05 ** p<0.01 *** p<0.001

The results of Full Model B in Table 3a indicate that under the low dependence condition, after controlling for the control variables, agent Teamwork ($p < 0.05$), Humility ($p < 0.01$), and Expression ($p < 0.05$) were negatively related to Compliance, whereas agent Considerateness ($p < 0.01$) was positively related to Compliance. The incremental R^2 for Full Model B over the control model was highly significant ($p < 0.001$), with the agent Teamwork, Considerateness, Humility, and Expression improving the total explained variation in Compliance by 52.9% (31.5% R^2 in Control Model B versus 48.1% R^2 in Full Model B). The results of Full Model C in Table 3a indicate that under the high dependence condition, Compliance had a significant positive association with agent Considerateness ($p < 0.1$) and a significant negative association with agent Humility ($p < 0.05$) after controlling for the control variables. The incremental R^2 for Full Model C over the control model was significant ($p < 0.1$, the actual value was 0.051), with the agent characteristic variable in the model improving the total explained variation in Compliance by 37.4% (26.3% R^2 in Control Model C versus 36.1% R^2 in Full Model C).

Overall, these results show that after controlling for Relational Norms and other control variables, Humility had a significant negative effect on Compliance under both low and high dependence conditions ($p < 0.01$ and $p < 0.05$, respectively). Teamwork and Expression only had significant negative effects on Compliance under the low dependence condition, while Considerateness had a far more significant positive effect on Compliance under the low dependence condition ($p < 0.01$) than under the high dependence condition ($p < 0.1$). These results indicate that the effect of agent characteristics variables on Compliance could be potentially moderated by the dependence context of the buyer-supplier relationship.

Moreover, the results of Full Model D in Table 3b indicate that under the low relational norms condition, agent Humility ($p < 0.01$), and Expression ($p < 0.05$), were negatively related to Compliance, whereas Teamwork and Considerateness had no significant effect on Compliance after control for Dependence and other control variables. The incremental R^2 for Full Model D over the control model was highly significant ($p < 0.001$), while the agent characteristic variables improving the total explained variation in Compliance by 117% (17.1% R^2 in Control Model D versus 37.0% R^2 in Full Model D). Thus, under the low relational norms condition, these agent characteristics tend to drive towards noncompliance without a significant balancing effect from agent Considerateness. Finally, the results of Full Model E in Table 3b suggest that under a high relational norms condition, agent Considerateness ($p < 0.05$) was positively related to Compliance while Humility ($p < 0.05$) was negatively related to Compliance after controlling for Dependence and other control variables. The results also show that Teamwork and Expression had no significant effect on Compliance in high relational norms. The incremental R^2 for Full Model E over the control model was significant ($p < 0.05$), with the agent characteristic variables improved the total explained variation in Compliance by 158% (7.5% R^2 in Control Model E versus 19.5% R^2 in Full Model E).

The results of this set of exploratory analyses also indicate that the effect of these agent characteristics variables on Compliance could be potentially contingent on the relational norms context of the buyer-supplier relationship. Specifically, after

controlling for Dependence and other control variables, Humility had a significant negative effect on Compliance under both low and high relational norms conditions. However, Expression only had a significant negative effect on Compliance under the low relational norms condition, while Considerateness only had a significant positive effect on Compliance under the high relational norms condition.

Discussion & Conclusion

The findings of this study show that agent-level factors (i.e. certain dimensions of cooperativeness and assertiveness) play an important role in influencing compliance behaviors in the face of an impending supply chain disruption. Specifically, Teamwork and Humility are negatively related to compliance behaviors, while Considerateness is positively related to compliance behaviors. A possible explanation is that under an impending supply disruption, buyer agents with strong Considerateness characteristics tend to be more accommodating and understanding with the problems the supplier is encountering and thus, are more likely to comply with the supplier's request. The counter-intuitive finding of the negative effects of Humility and Teamwork on compliance behaviors could be explained in the same line of Collins' (2001) logic; agents with strong Humility characteristics may realize that the collective interest of their organization should, above all else, include individual preferences, while agents with strong teamwork orientation may tend to hold their exchange partners accountable and expect their partners to contribute a fair share to the team outcomes. Thus, these buyer agents are less likely to comply with the supplier's request under an impending supply disruption at the supplier's own operations. This can cause damage to the buyer firms unless a contingency plan is put in place.

The exploratory analyses in this study also indicate that there are possible moderating effects of firm-level factors (i.e., dependence and relational norms) on the relationship between compliance and agent-level factors of cooperativeness and assertiveness. Specifically, Teamwork and Expression have significant negative effects on compliance behaviors in a low dependence context, but not in a high dependence context. Similarly, Considerateness has a substantially stronger positive effect on compliance behaviors in a low dependence context than in a high dependence context. A possible explanation is that the buyer firm agents are free to choose whether to comply with the supplier's request when the buyer firm has low dependence on the supplier. As such, agents who tend to hold the exchange partner accountable (i.e., high teamwork orientation) or those who tend to act based on their legitimate rights (i.e., high expression) have less likelihood to comply with the supplier's request in this low dependence context than in the high dependence context. In a similar fashion, agents who have a high tolerance are more willing to honor the request from the supplier in the low dependence context in which their compliance is perceived as a chosen behavior, rather than a coerced behavior as it would be in the high dependence context.

Regarding the relational norms contexts, the findings indicate that Considerateness has a significant positive effect on compliance behaviors in a high relational norms context but not in a low relational norms context. In contrast, Expression has a significant negative effect on compliance behaviors in a low relational norms context, but not in a high relational norms context. This is largely due to the fact that when the exchange relationship is contentious and competitive in nature—although agents could be very tolerant in general—they may be reluctant to help the supplier by honoring its request. On the other hand, in such a contentious and competitive exchange relationship, agents who tend to act upon their legitimate rights are not reluctant to exercise their rights by turning down the request from the supplier. These behavioral patterns of the agents are not the case in the highly cooperative exchange relationships between the buyer firm and the supplier.

As the extant literature suggests, compliance behaviors are fundamental to relational supply chain partnerships, and can help firms manage the impacts of supply chain disruptions. Given that the compliance tendency is significantly driven by certain dimensions of agent cooperativeness and assertiveness, choosing buyer agents with appropriate characteristics can thus influence the long-term viability of supply chain relationships that are capable of coping with potential supply disruptions. In addition, the dynamic interplay between firm-level factors (dependence and relational norms) and agent-level factors (cooperativeness and assertiveness) may imply that in the process of designing the supply chain and selecting supply chain partners, managers may need to take these two sets of factors into account rather than taking the one-size-fits-all best practice approach, given that the dependence and relational norms contexts in which firms operate tend to vary. The behavioral patterns of agents with different characteristics tend to vary across these contexts as well. Nevertheless, further investigations on the interaction between firm-level and agent-level factors emerging from this study are needed.

Despite several interesting results, we acknowledge that this study has some limitations. First, the study used business professionals in MBA courses as surrogates for actual purchasing and supply chain managers in a buyer-supplier relationship. This may limit external validity of the findings. Nevertheless, the extant subject surrogacy literature does suggest that MBA students exhibit similar decision-making patterns to those of actual managers in various decision-making contexts and thus, can be used as reasonable surrogates for practicing managers (e.g., Corfman & Lehmann, 1994; Ford & Hegarty, 1984; Remus, 1986). Future research can address the external validity limitation by replicating the experiment in this study, using manager subjects. Another limitation is that our scenario-based experiment was built on a hypothetical supply chain purchasing scenario. Although this scenario has been validated by Joshi and Arnold (1998), it is not a 'real world' situation involving real-time decision making. To strengthen the realism of the scenarios used in the experiment, future research may consider empirically deriving scenarios from actual business incidents. Future researchers may also examine the agent-level factors on compliance behavior using alternative data collection techniques, such as field observation and survey, other than scenario-based data. Leveraging multiple data

collection techniques allows researchers to triangulate the research findings, thus strengthening the validity of the study (Jick, 1979).

In conclusion, although this study is not all-inclusive, it does shed some light on the role of the decision-making agent in an impending supply disruption circumstance. As mentioned earlier, much of the extant literature addresses this issue at the firm level whereas the behavior of the agent is largely ignored. This study has filled the void of agent-level factors in the literature by revealing that the characteristics of agents do matter to compliance behaviors in the impending supply disruption, thus making a contribution to the literature. We also encourage future research to expand the domain of this line of research by investigating various roles and characteristics of the agents that can be consequential in the context of supply chain disruptions, so that the agent-driven impacts on compliance and other relevant behaviors to this important supply chain circumstance can be better understood.

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Appendix A: Scenario and Experimental Manipulations

Introduction

You are a purchasing manager responsible for the purchase of microchips for a midsize electronic equipment manufacturer. Microchips are an important component for the equipment that you manufacture; therefore they need to be purchased on a regular basis. You have one existing supplier for this component.

Low Dependence

As purchasing manager responsible for microchips, you find yourself in a situation wherein it is not difficult for you to find a suitable replacement for the existing supplier. If you decide to stop purchasing from this supplier, you could easily replace their volume with purchases from alternative suppliers. There are many competitive suppliers for microchips and you can switch to them without incurring any search costs. Switching suppliers is not going to have any negative effects on the quality or design of the equipment that you manufacture. Your production system can be easily adapted to use components from a new supplier. The procedures and routines that you have developed are standard and they are equally applicable with any supplier of this component. The skills that your people have acquired in the process of working with the supplier can easily be changed to fit another supplier's situation. You can therefore terminate your relationship with your present supplier without incurring any costs.

Low Relational Norms

Both you and your supplier bring a formal and contract governed orientation to this relationship. Exchange of information in this relationship takes place infrequently, formally, and in accordance to the terms of a prespecified agreement. Even if you do know of an event or change that might affect the other party, you do not divulge this information to them. Strict adherence to the terms of the original agreement characterizes your relationship with this supplier. Even in the face of unexpected situations, rather than modifying the contract, you adhere to the original terms. You have an "arm's length" relationship with your supplier. You do not think that the supplier is committed to your organization—in fact, you think that if you did not carefully monitor this supplier's performance, they would slack off from the original terms. Above all, you see your supplier as an external economic agent with whom you have to bargain in order to get the best deal for yourself.

High Dependence

As purchasing manager responsible for microchips, you find yourself in a situation wherein it is difficult for you to find a suitable replacement for the existing supplier. If you decide to stop purchasing from this supplier, you could not easily replace their volume with purchases from alternative suppliers. There are very few, if any, competitive suppliers for microchips and you cannot switch to them without incurring significant search and verification costs. Switching suppliers is also going to have negative effects on the quality or design of the equipment that you manufacture. Your production system cannot be easily adapted to use components from a new supplier. The procedures and routines that you have developed are unique and hence they are not applicable with any other supplier of this component. The skills that your people have acquired in the process of working with the supplier cannot easily be changed to fit another supplier's situation. You cannot therefore terminate your relationship with your present supplier without incurring significant costs.

High Relational Norms

Both you and your supplier bring an open and frank orientation to the relationship. Exchange of information in this relationship takes place frequently, informally, and not only according to a prespecified agreement. You keep each other informed of any event or change that might affect the other party. Flexibility is a key characteristic of this relationship. Both sides make ongoing adjustments to cope with the changing circumstances. When some unexpected situation arises, the parties would rather work out a new deal than hold each other responsible to the original terms. You tend to help each other out in case of unexpected crises. If your supplier is unable to fulfill an order, they recommend an alternative source of supply for the same. Above all, you have a sense that your supplier is committed to your organization and that they work with you keeping your best interests in mind. You see each other as partners, not rivals.

Conclusion

Recently, the supplier informed you that they are involved in a labor dispute. Consequently, they are temporarily unable to guarantee on-schedule delivery. This creates some uncertainty for your organization. Delayed delivery of microchips, may, for example, cause problems for your organization in meeting delivery schedules to customers. The supplier has called to get your regular order. Drawing from experience, how would you be most likely to react in this situation? Please rate each of these statements to the extent that they match with your expectation of your reaction.

Appendix B: Cooperativeness

Cooperativeness Items	Sources
<i>Social Acceptance:</i>	
A1: I impose my will on others. (-) (re-assigned to <i>Conscience</i>)	IPIP
A2: I easily accept people as they are.	IPIP (modified)
A3: I assume that others have good intentions.	IPIP (modified)
A4: I am quick to judge others. (-) (re-assigned to <i>Conscience</i>)	IPIP (modified)
A5: I readily accept change.*	IPIP (modified)
A6: I comfortably tolerate people who are different from me.	IPIP (modified)
<i>Empathy:</i>	
B1: I sympathize with others' feelings.	IPIP
B2: I have a soft heart.	IPIP
B3: I often take time out for others.	IPIP (modified)
B4: I feel others' emotions.	IPIP
B5: I seldom make people feel welcome. (-)*	IPIP (modified)
B6: I anticipate the needs of others.*	IPIP
<i>Teamwork:</i>	
C1: I enjoy activities that involve a high level of cooperation with other people.	Yilmaz & Hunt, 2001
C2: I prefer to work independently more often than in a group. (-)	Yilmaz & Hunt, 2001
C3: I enjoy helping others with their problems when working in the team environment.*	IPIP (modified)
C4: I believe that teamwork allows common people to achieve uncommon results.	O'Shea et al., 2004
C5: I believe that a person can best achieve his/her goals if others around him/her achieve theirs too.*	O'Shea et al., 2004
C6: I feel that working with others usually distracts from the goal. (-)*	O'Shea et al., 2004 (modified)
<i>Compassion:</i>	
D1: I forgive others when they offend me.*	IPIP (modified)
D2: I believe that people should revenge wrongs that are done to them. (-)	IPIP
D3: I hold a grudge. (-)	IPIP
D4: I do things out of revenge. (-)	IPIP
D5: I often have compassion on those less fortunate than me.*	IPIP (modified)
D6: I find it easy to forgive others.*	IPIP (modified)
<i>Conscience:</i>	
E1: I listen to my conscience when making decisions.*	IPIP
E2: When deciding to do something, I ask myself, "what in it for me?" (-)*	IPIP (modified)
E3: I often think of the good of others before my own good. (re-assigned to <i>Social Acceptance</i>)	IPIP (modified)
E4: I do not do things that violate my conscience.*	IPIP (modified)
E5: I tell stories about myself that make me look good. (-)	IPIP (modified)
E6: I enjoy playing tricks on others. (-)	IPIP (modified)

Scale: 1 = very inaccurate and 7 = very accurate in describing you as a person

*: excluded from the analysis

(-): reverse coded

Appendix C: Assertiveness

Assertiveness Items	Sources
<i>Initiation:</i>	
F1: I take charge.	IPIP
F2: I wait for others to lead the way. (-)	IPIP
F3: Other people would describe me as a person who likes to take initiative.	IPIP (modified)
F4: I take control of things.	IPIP
F5: I try to lead others.	IPIP
F6: Even if others have different opinions, I do not hesitate to express my own.*	IPIP (modified)
<i>Request Refusal/Expression of Right:</i>	
G1: Most people seem to be more aggressive and assertive than I am. (-)*	Rathus, 1973; Chan, 1993; Law et al., 1979
G2: I usually avoid hurting other people's feelings, even when I feel that I have been offended. (-)*	Rathus, 1973; Kearney et al., 1984
G3: If I am pressured by others to do something I do not want to do, I usually give in. (-)	Rathus, 1973; Kearney et al., 1984 (modified)
G4: To be honest, people often take advantage of me. (-)	Rathus, 1973; Kearney et al., 1984
G5: I often have a hard time saying 'No.' (-)	Rathus, 1973; Kearney et al., 1984
G6: I avoid doing things that upset other people, even when I have the right and the desire to do so. (-)	Rathus, 1973; Kearney et al., 1984 (modified)
<i>Confrontation:</i>	
H1: When the food served at a restaurant is not done to my satisfaction, I will complain about it.	Rathus, 1973; Kearney et al., 1984 (modified)
H2: I will confront someone if he/she has upset me.	Rathus, 1973; Kearney et al., 1984 (modified)
H3: When in disagreement with others, I will argue my position.	Rathus, 1973; Kearney et al., 1984 (modified)
H4: I complain about poor services in a restaurant and elsewhere.*	Rathus, 1973; Kearney et al., 1984
H5: I will confront somebody attempting to push ahead of me in a line.	Rathus, 1973; Kearney et al., 1984 (modified)
H6: I strive harder than other people to get ahead.*	Rathus, 1973; Chan, 1993; Law et al., 1979

Scale: 1 = very inaccurate and 7 = very accurate in describing you as a person

*: excluded from the analysis

(-): reverse coded