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Historical Supplier Performance and Strategic Relationship Dissolution: Unintentional but Serious Supplier Error as a Moderator

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ABSTRACT

How and why is the association between historical supplier performance and strategic relationship dissolution moderated by an unintentional but serious supplier error? Adopting Assimilation-Contrast Theory, we propose that this moderation effect can be either negative or positive. As an empirical test, we collected and analyzed data from 256 sourcing professionals participating in a scenario-based role-playing experiment. After confirming experimental checks, we fitted a general linear mixed effects model to the data with appropriate controls. We find, ceteris paribus, that a critical-component supplier with stellar historical performance is less likely to be terminated by the manufacturer than one with marginally-acceptable historical performance. However, when a critical-component supplier with stellar historical performance errs, its likelihood of being terminated by the manufacturer increases by a greater extent than when a supplier with marginally-acceptable historical performance commits the same mistake. This positive supplier performance penalty effect contributes to the buyer-supplier relationship dissolution literature by identifying how and why the deterrence to relationship dissolution typically engendered by stellar historical supplier performance does not hold. Our results have implications for how manufacturers should evaluate critical-component suppliers and how critical-component suppliers should manage ongoing strategic relationships with manufacturers.[Submitted: September 28, 2015. Revised: November 11, 2018. Accepted: November 11, 2018.]

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INTRODUCTION

Manufacturers are frequently advised to build and maintain strategic relationships with critical-component suppliers (Sheth & Sharma, 1997). These strategic buyer–supplier relationships are long-term partnerships intended to yield benefits to both parties (Monczka et al., 1998). The advice has merit, given the abundance of evidence attributing improved operational and financial benefits to such relationship arrangements (Dyer, 1996; Carr & Pearson, 1999).

For critical-component suppliers, performing well in supplying their customers over time, not just once, is expected to ensure relationship continuity (Shin et al., 2000; Abdul-Muhmin, 2005). Yet, expecting these suppliers to operate error-free on a continual basis is not realistic (Hibbard, Kumar, & Stern, 2001; Craighead et al., 2007). Consider, for example, Takata Corporation, a supplier of airbag inflators, which initiated a design change in 2001 to replace a tetrazole-based airbag inflator propellant with an ammonium-nitrate based propellant. The design change allowed smaller lighter inflators to be more safely manufactured but, unfortunately, resulted in passenger injuries and fatalities from airbag failures (Tabuchi, 2014).

In complex supply networks, unintentional supplier errors are inevitable "normal accidents" (Perrow, 1984); some, like the Takata incident, have serious consequences, becoming costly supply failures (Primo, Dooley, & Rungtusanatham, 2007), supply chain glitches (Hendricks & Singhal, 2003; Zsidisin, Petkova, & Dam, 2016), or supply chain disruptions (Craighead et al., 2007). Anecdotes from interviews conducted with key informants working for four manufacturers reveal that these unintentional but serious supplier errors (USEs) are commonplace and do not reflect malicious intent (see Table A1 in the Appendix of Online Supplement). Moreover, in strategic relationships with critical-component suppliers, checks-and-balance mechanisms typically exist to ensure quick detection of these errors and to prompt investigation of root causes. For example, the plant manager for a metal products manufacturer (Informant A in Table A1 in the Appendix of Online Supplement), speaking about paint (a critical component), said that it is not unusual for the paint supplier to have two-three different errors (e.g., wrong color, incorrect viscosity, etc.) occur every year and that these are quickly detected and proactively resolved. Moreover, such errors do not reflect:

> malicious behavior due to the strategic nature of our relationships and our history. Our paint supplier only supplies paint to our facility . . . so there is vested interest . . . to be a good supplier . . . we can switch if we are not happy with [the] performance. From the perspective of our safety component [supplier], we have invested a lot of time and money together to get to where we are today – [the supplier has] invested a lot of time in R&D and equipment to be able to supply us with parts. . . . there is significant impact to [the supplier's] business if we choose to partner with an alternative supplier. . . .

Our article concerns the USE or, more formally, an unplanned honest mistake committed by a critical-component supplier whose chance occurrence results in negative operational and financial consequences for both the supplier and the manufacturer being supplied. These errors, to emphasize, differ from deliberate supplier misbehaviors (e.g., opportunism and unethical behavior) intended to benefit the supplier at the expense of the manufacturer. More specifically, we ask two related questions: (i) What is the effect of a USE on the dissolution of a strategic relationship between a manufacturer and a critical-component supplier? and (ii) Does a USE moderate the association between prior supplier performance and strategic buyer–supplier relationship dissolution?

While the association between intentional supplier misbehaviors and relationship termination has been established in the literature (Ganesan et al., 2010; Wang, Kayande, & Jap, 2010), the anecdotes relayed in Table A1 in the Appendix of Online Supplement suggest that such an association may not be present in the case of USEs. Research in services also hints at this possibility, revealing that the effectiveness of mitigation schemes varies depending on the intentionality of the service failure (e.g., Iglesias, Varela-Neira, & Vázquez-Casielles, 2015). Similarly, research in accounting notes that bookkeeping errors versus deliberate misstatements elicit different public reactions (e.g., Hennes, Leone, & Miler, 2008). Finally, Zsidisin et al. (2016) report that shareholder reactions to supply chain glitches differ depending on the underlying cause.

We answer the first question conceptually by hypothesizing a direct and positive effect between a USE and strategic buyer–supplier relationship dissolution. As for the second question, we engage a strong inference approach (Platt, 1964) to hypothesize the moderation effect of a USE to be either negative or positive, depending on whether an assimilation effect or a contrast effect dominates. These two effects—assimilation versus contrast—are cognitive biases pertaining to how a new stimulus (in our case, a USE) is evaluated relative to an established standard (in our case, historical supplier performance [HSP]). An assimilation effect (or contrast effect) dominates when a new stimulus is deemed to be less discrepant (more discrepant) from an established anchor than it really is.

Data for our empirical test were collected from 256 sourcing professionals participating in a scenario-based role-playing experiment in face-to-face sessions in nine U.S.-based locations. The experimental context describes a manufacturer sourcing a critical component from a strategic supplier, who errs by shipping defective units to the manufacturer with detrimental consequences. This USE is the main experimental factor and is manipulated in an unambiguous manner with respect to its unintentionality or severity. Indeed, the 256 experimental subjects are not only aware that the shipment of defective units was unintentional but also understand that both entities consequently suffered nontrivial damages. Hence, the unintentionality or severity of the manipulated supplier error is not a perceived outcome of other antecedent factors (e.g., bilateral trust), excluded from or controlled for in our experiment.

After verifying the realistic nature of the experiment, ensuring that experimental factors are properly manipulated, and providing evidence as to the absence of Hawthorne and confounding effects, we fitted a general linear mixed-effects model to the data with appropriate controls. Our results reveal that when

a critical-component supplier with either stellar or marginally acceptable historical performance errs, its likelihood of being terminated by the manufacturer it supplies increases. This result, while expected, has not been previously reported in the literature and complements prior findings regarding supplier opportunism and ethical violations (Ganesan et al., 2010; Wang, Kayande, & Jap, 2010). A critical-component supplier must not only avoid opportunistic or unethical actions that exploit the manufacturer it supplies, but should also minimize unintentional errors that harm the manufacturer.

More importantly, our results reveal that the relationship between prior supplier performance and likelihood of relationship dissolution is positively moderated by a USE, in support of a contrast effect. For the same error, the supplier with stellar historical performance experiences a greater increase in the likelihood of termination than its counterpart with marginally acceptable historical performance. This harsher reaction, which we label the *positive supplier performance penalty effect*, is robust across conditions of prior supplier involvement (PSI) in joint product development activities and the availability of attractive substitutes in the supply market. For suppliers with stellar historical performance, prior supplier performance is a necessary but insufficient condition for relationship continuity. In this respect, the robust *positive supplier performance penalty effect* qualifies conventional wisdom to explain when, how, and why the deterrence to relationship dissolution typically engendered by stellar HSP does not hold.

Pragmatically, manufacturers should be aware of falling into a trap wherein their expectations of supplier performance are subconsciously elevated over time; this escalation can eventually bias them to prematurely terminate critical-component suppliers, regardless of prior performance. Suppliers, in general, should pay attention to escalating manufacturer expectations. Those with a history of stellar performance should be especially vigilant and proactive in managing escalating performance expectations. Equally important, when unintentional but serious errors do occur, critical-component suppliers, regardless of prior performance, should marshal mitigation resources quickly and visibly to minimize harm and demonstrate a commitment to return to normal operating conditions.

The remainder of our article is structured as follows. We begin by reviewing relevant literature from diverse disciplines on factors that influence relationship continuity. Next, we develop our hypotheses, before describing the design and validation of our scenario-based role-playing experiment. We then present our hypothesis testing results, as well as post-hoc analyses to establish robustness and to rule out alternative explanations. The theoretical contributions and managerial implications of these results, as well as future research opportunities, are then discussed.

BUYER–SUPPLIER RELATIONSHIP DISSOLUTION

In the mid- to late-1980s, manufacturers began pruning their supply base in order to benefit from building strategic relationships with a smaller set of critical-component suppliers. These efforts altered how manufacturers managed and related to these suppliers. Instead of arms-length transactional relationships with critical-component suppliers, manufacturers sought longer term, mutually

beneficial partnerships developed through conscious planning, investment, and commitment (Sriram & Mummalaneni, 1990). Bolstering these efforts were research findings (e.g., Carr & Pearson, 1999) associating improvements in operational and business performance to strategic buyer–supplier relationships.

As accumulated evidence removed doubts as to the value of strategic buyer–supplier relationships, research attention then expanded to focus on identifying factors that influence continuity of such relationship arrangements (Sriram & Mummaleneni, 1990; Abdul-Muhmin, 2005; Wang et al., 2010). Notably, interest on this topic extended beyond the supply chain management discipline (e.g., Chen, Dooley, & Rungtusanatham, 2016), with substantive insights also generated by research from management (e.g., Broschak, 2004; Broschak & Block, 2014) and marketing (e.g., Ganesan et al., 2010; Hollman, Jarvis, & Bitner, 2015), as well as such subdisciplines as marketing channels (e.g., Ping & Dwyer, 1992; Payan et al., 2010), relationship marketing (e.g., Giller & Matear, 2001; Rogan, 2014), and services marketing (Beverland et al., 2004). Moreover, while some research focused on factors contributing to relationship continuity (e.g., Anderson & Weitz, 1989), others delved into factors relating to relationship dissolution (e.g., Baker et al., 1998; Yang et al., 2012), despite the recognition that one relationship state is *de facto* the converse of the other.

Synthesizing across the diverse knowledge bases and across scientific inquiries into either relationship continuity or relationship dissolution, we discern three groupings of factors investigated as antecedents of relationship continuity/dissolution or moderators of the association between antecedents and relationship continuity/dissolution): entity-centric factors, relationship-centric factors, and environment-centric factors. Table A2 in the Appendix of Online Supplement describes the groupings and highlights exemplary research for each grouping.

Entity-centric factors signal ability and willingness of one entity to engage in developing and sustaining a strategic relationship with the other entity in the buyer–supplier dyad. For example, how satisfied or dissatisfied the buyer is with supplier performance is associated with relationship dissolution (Ping & Dwyer, 1992). Moreover, when one entity is not satisfied with the net benefits it derives compared to the other entity, the likelihood of relationship termination increases (Helm, Rolfes, & Gunter, 2006; Ritter & Geersbro, 2011). Conversely, calculative commitment, which reflects a positive cost–benefit economic justification, encourages the buyer to continue its strategic relationship with the supplier under normal supply performance and, equally important, may buffer the strategic relationship against ethical or opportunistic lapses by the supplier (Ganesan et al., 2010). Similarly, affective commitment, which reflects a positive emotional justification, significantly reduces the likelihood of relationship dissolution but may unduly amplify the negative impact of supplier opportunism on relationship dissolution (Abdul-Muhmin, 2005; Ganesan et al., 2010). Not surprisingly, other unethical behaviors, besides opportunism, influence relationship dissolution (Ganesan et al., 2010; Wang et al., 2010).

Relationship-centric factors characterize the nature of the relationship between buyer and supplier. For example, the amount of time the buyer and supplier have been in a relationship (i.e., relationship duration) exerts different influences

on relationship dissolution across stages of relationship development and evolution (Fichman & Levinthal, 1991). As relationship duration correlates positively with trust (Morgan & Hunt, 1994), the risk of relationship dissolution decreases as a consequence of increased trust (Anderson & Weitz, 1989). The amount of asset-specific investments in the relationship strengthens bilateral bonds, which reduces relationship dissolution by discouraging opportunism directly and moderates the negative effects of opportunism on relationship continuity (Ganesan et al., 2010; Wang et al., 2010).

Last, environment-centric factors pertain to dynamics outside of a buyer–supplier relationship and are beyond the control of the dyadic entities. Chen et al. (2016), for example, analyzed events tied to the Firestone tire design and manufacturing flaws and documented the influences of media attention and the U.S. government on the Ford-Firestone relationship dissolution. The availability of supply alternatives (Sriram & Mummalaneni, 1990) and market demand characteristics (Gadde & Mattsson, 1987) are other environmental dynamics shown to be associated with relationship continuity/dissolution.

Our research evaluates supplier behavior with no *a priori* intent to inflict harm on the exchange partner. By doing so, we add a USE to the grouping of entity-centric factors and seek to determine whether or not this factor exhibits similar effects on relationship dissolution as deliberate supplier actions to exploit the buyer. Our methodological approach aligns with Ganesan et al. (2010), analyzing experimental data to better understand how and why this factor not only affects relationship dissolution but also alters the association between stellar HSP and relationship dissolution.

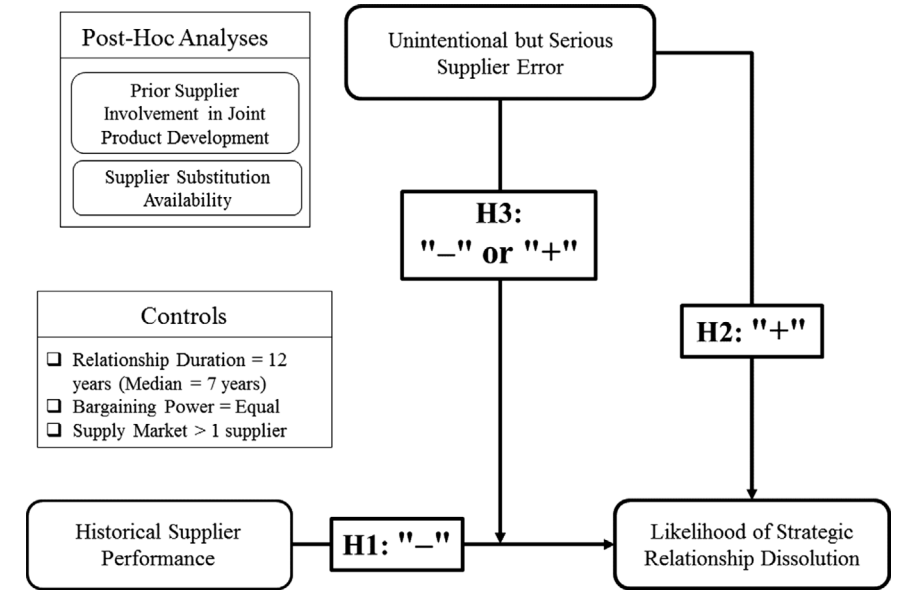
HYPOTHESES

Figure 1 depicts the research model underlying our inquiry. Below, we first articulate the baseline effect between HSP and the likelihood of strategic relationship dissolution. This baseline association, while intuitive and with theoretical and empirical support, deserves discussion because it is the foundation of our inquiry. We then hypothesize the effect of a USE on relationship dissolution before engaging a strong inference approach (Platt, 1964) to offer competing arguments as to its potential moderating effects (negative versus positive) on the baseline relationship.

Historical Supplier Performance and Strategic Relationship Dissolution

How well a critical-component supplier performs is routinely analyzed as an ongoing part of the postsupplier selection evaluation process (Narasimhan, Talluri, & Mendez, 2001). This evaluation yields insights into the pattern of operational capabilities the incumbent supplier possesses with regard to unit cost, product quality, delivery reliability and punctuality, and responsiveness to customer-initiated changes (Prahinski & Benton, 2004). Presupplier selection, if a manufacturer knows that a critical-component supplier is only able to perform in a marginally acceptable manner relative to expectations, then the supplier under consideration is not likely to be selected at the onset (lest it is the only available option).

Figure 1: Theoretical model.



Postsupplier selection and once a strategic relationship has been established, two scenarios are possible. When the selected critical-component supplier habitually exceeds performance expectations, the manufacturer continually experiences a cognitive state of confirmation (Oliver, 1977) that develops into a high level of competence-based trust in the supplier (Das & Teng, 2001; Liu & Ngo, 2004). The manufacturer, as such, has no reason to change this sourcing relationship, ceteris paribus (Shin et al., 2000). Alternatively, when the incumbent supplier meets performance expectations but in only a marginally acceptable manner, the manufacturer develops only a modest level of competence-based trust in the supplier (Das & Teng, 2001; Liu & Ngo, 2004). Over time, the manufacturer is likely to then become dissatisfied and to consider exiting the relationship (Abdul-Muhmin, 2005). Hence, postsupplier selection, when a manufacturer is in a strategic (i.e., long-term, partnership-like) relationship with its critical-component supplier, the ceteris paribus baseline effect is as follows:

H1: Historical supplier performance and the likelihood of strategic relationship dissolution are negatively associated (i.e., inversely related).

Unintentional but Serious Supplier Error and Strategic Relationship Dissolution

A critical-component supplier, in the course of supplying the manufacturer, cannot guarantee complete avoidance of unintentional but serious errors (Hibbard et al., 2001; Craighead et al., 2007). When such an error occurs, the strategic

relationship becomes tense (Holmlun-Rytkonen & Strandvik, 2005). The manufacturer experiences stress because the supply uncertainty affects its ability to meet its performance obligations. To reduce this uncertainty, the manufacturer has to find near-term solutions to proactively buffer the supplier error from impacting downstream customers, or provide remunerations reactively to appease customers affected by the supplier error (Primo et al., 2007). These added expenses alter the cost–benefit equation justifying the initial establishment of the strategic relationship. Moreover, in mitigating the USE, the manufacturer also begins to evaluate its trust in the supplier, whether deliberately or subconsciously. Integrity-based trust in the supplier should remain unchanged because the error is unintentional, but competence-based trust should decline (Das & Teng, 2001; Liu & Ngo, 2004). The elevated stress, increased mitigation expenses, and lowered competence-based trust lead the manufacturer to question whether to stay in the strategic relationship. Hence, postsupplier selection, for a manufacturer in a strategic relationship with its critical-component supplier, we hypothesize ceteris paribus that:

H2: An unintentional but serious supplier error increases the likelihood of strategic relationship dissolution.

Unintentional but Serious Supplier Error as a Moderator

Besides a main effect, we posit that a USE also moderates the baseline effect of HSP on relationship dissolution. Assimilation-Contrast Theory (Sherif & Hovland, 1961) suggests this moderation effect is either positive or negative, depending on which effect—assimilation effect or contrast effect—dominates when a new stimulus (i.e., a USE) is juxtaposed against an established anchor (i.e., HSP). An assimilation effect is a cognitive bias that deems the new stimulus to be less discrepant from an established anchor than it really is; in our context, it manifests as a tempering of the increase in the likelihood of strategic relationship dissolution when a USE occurs. A contrast effect, on the contrary, is a cognitive bias judging a new stimulus to be more discrepant from an established anchor than it really is and manifests, in our context, in a contrary manner. Which effect dominates, therefore, reflects how manufacturer expectations about continuing supplier performance are systematically distorted when a USE is evaluated against its HSP (Herr, Serman, & Fazio, 1983; Herr, 1986).

This systematic distortion, however, does not apply when a critical-component supplier with marginally acceptable HSP errs (Figure 2). For such a supplier, neither an assimilation nor a contrast effect dominates, with the mistake exerting only a main effect on relationship dissolution as hypothesized in H2. The absence of systematic distortion is reasonable because a history of marginally acceptable performance safeguards the critical-component supplier from the manufacturer's escalating performance expectations over time. These supplier performance expectations, over time, may even settle at levels that are conducive to the forgiving of unintentional errors. Hence, when a critical-component supplier with marginally acceptable HSP errs, the manufacturer, already desensitized, deems the mistake to not be inconsistent with historical performance. The manufacturer, while sufficiently stressed by the supplier error to elevate consideration of relationship termination, therefore makes no additional adjustments to its reaction.

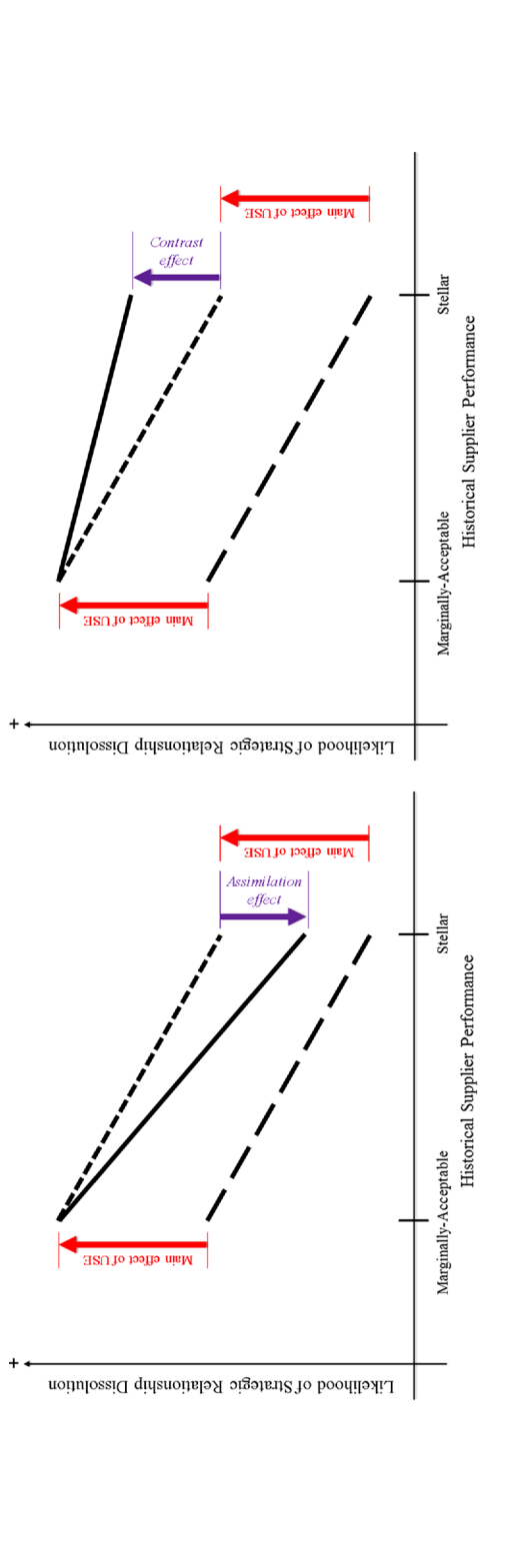


Figure 2: Moderation effects of an unintentional but serious supplier error: assimilation versus contrast effects.

For a critical-component supplier with stellar historical performance, two scenarios are possible. On one hand, when a USE occurs, the manufacturer deems such a mistake to be an isolated, temporary, and nonrecurring anomaly (Ganesan et al., 2010) and effectively discounts its negative impact (Ganesh, Arnold, & Reynolds, 2000). By doing so, the manufacturer judges the error to be less discrepant from the anchor of stellar historical performance than it actually is (Sherif & Hovland, 1961). This assimilation of the error reduces its main effect, which manifests as a lesser-than expected increase in the likelihood of strategic relationship dissolution (see Figure 2: Panel A). Because this increase is smaller than the increase experienced by an incumbent supplier with marginally acceptable historical performance, the slope of the association between HSP and likelihood of strategic relationship dissolution becomes more negative. Hence, when an assimilation effect dominates, we hypothesize ceteris paribus that:

H3a: An unintentional but serious supplier error negatively moderates (i.e., accentuates) the inverse relationship between historical supplier performance and the likelihood of strategic relationship dissolution.

Alternatively, the manufacturer experiences incoherence because the USE contradicts prior positive appraisals of the critical-component supplier (Wang et al., 2010). Juxtaposed against escalating performance expectations, the error-triggered contrast becomes magnified, with such a mistake appearing to deviate in a more pronounced manner from the anchor of stellar historical performance than it actually is (Sherif & Hovland, 1961; Ganesan et al., 2010; Wang et al., 2010). This contrast consequently produces a greater than expected increase in the likelihood of relationship dissolution. Because this increase is greater than that experienced by an incumbent supplier with marginally acceptable historical performance, the slope of the association between HSP and likelihood of strategic relationship dissolution becomes less negative. Hence, when a contrast effect dominates, we hypothesize ceteris paribus that:

H3b: An unintentional but serious supplier error positively moderates (i.e., attenuates) the inverse relationship between historical supplier performance and the likelihood of strategic relationship dissolution.

SCENARIO-BASED ROLE-PLAYING EXPERIMENT

Data to test the hypotheses were collected using a scenario-based role-playing experiment with a repeated-measures design. Such an experiment deploys varying versions of a descriptive vignette to convey scripted information about manipulated levels of one or more factors of interest and about factors to be controlled for (Alexander & Becker, 1978). The method is ideally suited for studying human judgments, preferences, and decisions within complex phenomena (e.g., relationship dissolution) that are difficult to observe in real time (Rungtusanatham, Wallin, & Eckerd, 2011).

A scenario-based role-playing experiment offers two specific methodological strengths over survey and case-based research designs. First, it circumvents having to obtain confidential firm-level information, making it easier to collect

a sufficiently larger sample of cases for case-based research or larger number of survey responses for statistical inferences. Second, relative to other research designs, experiments enable more precise isolation and assessment of causal effects attributed to factors of interest (Campbell & Stanley, 1963), while controlling for other potential explanations.

Design Matrix

Table 1 depicts the design matrix for our "four-factors, repeated-on-two-factors" experiment in which subject responses are recorded thrice (hence, response 1, response 2, and response 3). This mixed design combines two between-subject factors (i.e., HSP and PSI) and two within-subject factors (USE and supplier substitution availability [SSA]) into a single experiment. With each factor manipulated at two levels, our experiment, therefore, involves only eight versions of a descriptive vignette (i.e., I_{GS}, I_{SG}, J_{GS}, J_{SG}, K_{GS}, K_{SG}, L_{GS}, and L_{SG}) and, yet, allows for statistical modeling of all possible main and interaction effects of the four factors.

We label the eight versions as I_{GS} through L_{SG} to avoid signaling a socially preferred or ordering effect between USE and SSA. The subscripts, S and G, denote the sequence in which the two repeated factors of USE and SSA are presented. For SG-subscripted versions, USE is introduced first followed by SSA. Conversely, for GS-subscripted versions, the sequence between USE and SSA is reversed. Comparing the means of the response variable, likelihood of strategic relationship dissolution, from the SG-subscripted versions (I_{SG}, J_{SG}, K_{SG}, and L_{SG}) to those from the GS-subscripted versions (I_{GS}, J_{GS}, K_{GS}, and L_{GS}) for treatments 1, 2, and 3, we find no significant differences ($p = .62$, $p = .16$, $p = .69$, respectively) to indicate a sequencing effect with respect to USE and SSA.

Note that we did not implement a 2^4 full-factorial, complete between-subjects design nor a complete repeated measure, within-subjects design for legitimate reasons. First, with four factors, a complete between-subjects design requires the creation of $2 \times 2 \times 2 \times 2 = 16$ versions of the descriptive vignette. A complete within-subjects design that counterbalances against order effects (i.e., guards against the order in which subjects are exposed to the levels of the four factors) requires creating 40,320 (i.e., 8! permutations) versions of the descriptive vignette. The mixed design we implemented, by comparison, requires only eight versions, each representing a different sequence of the four factors. Second, a within-subjects design has a sample size advantage over a between-subjects design and is better able to control for individual differences in isolating the effects of experimental factors on the response variable (Greenwald, 1976). In terms of sample size, our "four-factors, repeated-on-two-factors" mixed design, therefore, requires more subjects than a complete within-subjects design but fewer subjects than a complete between-subjects design. Third, for a given number of experimental factors, a within-subjects design requires greater time commitment than a between-subjects design. In the case of the latter, subjects receive one treatment, regardless of the number of experimental factors. In the former, subjects receive as many treatments as the number of factors multiplied by the number of levels of each factor, which lengthens the time to complete the experiment. Moreover, as the duration of the experiment increases, subject attrition due to fatigue and potential threats to internal

Table 1: Design matrix[a,b,c].

		Treatment 1					Treatment 2					Treatment 3				
		FACTOR Levels					FACTOR Levels					FACTOR Levels				
		HSP	PSI	USE	SSA	Response 1	HSP	PSI	USE	SSA	Response 2	HSP	PSI	USE	SSA	Response 3
Version	I_{GS}	+	+	−	−	$Y_{1,++--}$	+	+	−	+	$Y_{1,++-+}$	+	+	+	+	$Y_{1,++++}$
	I_{SG}	+	+	−	−	$Y_{2,++--}$	+	+	+	−	$Y_{2,+++-}$	+	+	+	+	$Y_{2,++++}$
	J_{GS}	+	−	−	−	$Y_{3,+---}$	+	−	−	+	$Y_{3,+--+}$	+	−	+	+	$Y_{3,+-++}$
	J_{SG}	+	−	−	−	$Y_{4,+---}$	+	−	+	−	$Y_{4,+-+-}$	+	−	+	+	$Y_{4,+-++}$
	K_{GS}	−	+	−	−	$Y_{5,-+--}$	−	+	−	+	$Y_{5,-+-+}$	−	+	+	+	$Y_{5,-+++}$
	K_{SG}	−	+	−	−	$Y_{6,-+--}$	−	+	+	−	$Y_{6,-++-}$	−	+	+	+	$Y_{6,-+++}$
	L_{GS}	−	−	−	−	$Y_{7,----}$	−	−	−	+	$Y_{7,---+}$	−	−	+	+	$Y_{7,--++}$
	L_{SG}	−	−	−	−	$Y_{8,----}$	−	−	+	−	$Y_{8,--+-}$	−	−	+	+	$Y_{8,--++}$
Version	I_{GS}	+	+	−	−	$Y_{9,++--}$	+	+	−	+	$Y_{9,++-+}$	+	+	+	+	$Y_{9,++++}$
	I_{SG}	+	+	−	−	$Y_{10,++--}$	+	+	+	−	$Y_{10,+++-}$	+	+	+	+	$Y_{10,++++}$
	J_{GS}	+	−	−	−	$Y_{11,+---}$	+	−	−	+	$Y_{11,+--+}$	+	−	+	+	$Y_{11,+-++}$
	J_{SG}	+	−	−	−	$Y_{12,+---}$	+	−	+	−	$Y_{12,+-+-}$	+	−	+	+	$Y_{12,+-++}$
	K_{GS}	−	+	−	−	$Y_{13,-+--}$	−	+	−	+	$Y_{13,-+-+}$	−	+	+	+	$Y_{13,-+++}$
	K_{SG}	−	+	−	−	$Y_{14,-+--}$	−	+	+	−	$Y_{15,-++-}$	−	+	+	+	$Y_{14,-+++}$
	L_{GS}	−	−	−	−	$Y_{15,----}$	−	−	−	+	$Y_{16,---+}$	−	−	+	+	$Y_{15,--++}$
	L_{SG}	−	−	−	−	$Y_{16,----}$	−	−	+	−	$Y_{16,--+-}$	−	−	+	+	$Y_{16,--++}$
Version	I_{GS}	+	+	−	−	$Y_{17,++--}$	+	+	−	+	$Y_{17,++-+}$	+	+	+	+	$Y_{17,++++}$
	I_{SG}	+	+	−	−	$Y_{18,++--}$	+	+	+	−	$Y_{18,+++-}$	+	+	+	+	$Y_{18,++++}$
	J_{GS}	+	−	−	−	$Y_{19,+---}$	+	−	−	+	$Y_{19,+--+}$	+	−	+	+	$Y_{19,+-++}$
	J_{SG}	+	−	−	−	$Y_{20,+---}$	+	−	+	−	$Y_{20,+-+-}$	+	−	+	+	$Y_{20,+-++}$
	K_{GS}	−	+	−	−	$Y_{21,-+--}$	−	+	−	+	$Y_{21,-+-+}$	−	+	+	+	$Y_{21,-+++}$
	K_{SG}	−	+	−	−	$Y_{22,-+--}$	−	+	+	−	$Y_{22,-++-}$	−	+	+	+	$Y_{22,-+++}$
	L_{GS}	−	−	−	−	$Y_{23,----}$	−	−	−	+	$Y_{23,---+}$	−	−	+	+	$Y_{23,--++}$
	L_{SG}	−	−	−	−	$Y_{24,----}$	−	−	+	−	$Y_{24,--+-}$	−	−	+	+	$Y_{24,--++}$

[a]HSP (historical supplier performance) and PSI (prior supplier involvement in joint product development) are between-subject factors; USE (unintentional but serious supplier error) and SSA (supplier substitution availability) are within-subject factors. "+" denotes "stellar" (for HSP), "high" (for PSI), or "present" (for USE and SSA); "–" denotes "marginally acceptable" (for HSP), "low" (for PSI), or "absent" (for USE and SSA).

[b]$Y_{i,jklm}$ is the response for the likelihood of strategic relationship dissolution from the ith subject at the jth, kth, lth, and mth levels (+ or –) of the HSP, PSI, USE, and SSA factors.

[c]Comparing the means of the response variable from the SG-subscripted versions to those from the GS-subscripted versions for treatments 1, 2, and 3, we find no significant differences ($p = .62$, $p = .16$, $p = .69$, respectively) to indicate a sequencing effect with respect to USE and SSA.

validity due to, for example, sensitization and learning also increase (Greenwald, 1976). Hence, with four factors, each at two levels, subjects would receive $4 \times 2 = 8$ treatments. Comparatively, for the mixed design we implemented, subjects received only three treatments to provide adequate data for hypothesis testing.

Between-subjects versus within-subjects experimental factors

For our experiment, only HSP and USE are relevant for hypothesis testing. We designate HSP to be a between-subject factor to anchor buyer expectations regarding future supplier performance on prior supplier performance in treatment 1. As the buyer (i.e., subject in the role of the buyer) receives new information about a supplier error (i.e., USE), buyer expectations about supplier performance are consequently adjusted. This adjustment is determined by examining how the negative slope corresponding to the effect of HSP on strategic relationship dissolution changes with the new information. We treat USE as a within-subject factor because the random assignment of subjects to versions isolates the main and moderation effects of USE without these effects being confounded with varying subject attributes (Greenwald, 1976; Howitt & Cramer, 2011). Moreover, because the manipulated level of USE always progresses from "absent" to "present," detectable effects of USE satisfy the temporal precedence and covariation conditions of causality and, hence, allow for stronger conclusions to be drawn as to its causal nature.

Though not hypothesized, we also manipulate PSI and SSA because both are known to affect relationship dissolution (e.g., Sriram & Mummalaneni, 1990; Abdul-Muhmin, 2005; Chen et al., 2013). Doing so allows their effects to be partialed out when statistically isolating the effects of HSP, USE, and the HSP $\times$ USE interaction on relationship dissolution and permits post-hoc analyses to assess the robustness of our results. Note that we treat PSI as a between-subject factor and SSA as a within-subject factor to maximize the benefits of a mixed design.

Experimental factor levels across treatments

The level of HSP is manipulated in treatment 1 to be either "stellar" or "marginally acceptable," with its level varying across the eight vignette versions (i.e., between subjects) but fixed beyond the first treatment within each version (i.e., within subject). PSI is similarly manipulated to cue either "high" or "low" between subjects. The effects of HSP and PSI are determined by comparing responses across subjects.

USE and SSA are manipulated to both cue "absent" in treatment 1 and "present" in treatment 3. In treatment 2, either USE or SSA is manipulated to denote "present," while the other remains cued as "absent." The effects of USE and SSA are determined by comparing responses across treatments by subject.

Descriptive Vignette Design and Version Generation

To avoid writing a nonbelievable, unrealistic, and inadequately constructed descriptive vignette (Wason, Polonsky, & Hyman, 2002), we enlisted four sourcing professionals from the intended target population to help develop the descriptive vignette. These sourcing professionals were employed, respectively, in food manufacturing, information technology hardware, logistics services, and consulting.

They worked iteratively with the research team over a period of three months to review and critique the descriptive vignette to ensure it reflected external reality.

We pretested the eight versions of the descriptive vignette for clarity of instructions and wording with five university professors from a private Midwest university, a public university in the Midwest, and a public university in the Southeast and with 12 advanced doctoral students from a public Midwest university. The five professors and 12 doctoral students had research and/or practical expertise pertaining to strategic buyer–supplier relationships; were randomly assigned to one of the eight versions; were asked to complete their assigned version; and met with the research team to verify their understanding of instructions and experimental cues.

Baseline context and controls

The baseline context of a descriptive vignette provides ". . . contextual information that is intended to be invariant across varying versions of the vignette, as well as . . . information about control variables . . . ." (Rungtusanatham et al., 2011, p. 12). Our scenario-based role-playing experiment references a hypothetical Fortune 500 technology firm with global presence (ELECTRONICS Inc.), whose Image Output Division designs, manufactures, and sells laser printers. The Image Output Division sole-sources the Engine Control Module, a critical component, from ZENGINE. We model ELECTRONICS Inc. and the sole-sourcing policy after a real global manufacturer of laser printers that formerly employed one of the authors. Subjects, when asked about the relationship in the descriptive vignette, affirm that they understand ZENGINE to be a sole supplier of a critical component to ELECTRONICS Inc.

The baseline context also includes statements to control for three salient issues (relationship duration, bargaining power, and supply market size) that affect how strategic buyer–supplier relationships evolve. Relationship duration affects relationship continuity in a nonlinear manner, with the likelihood of relationship termination decreasing in the early stages of a relationship due to a "honeymoon effect," increasing beyond this honeymoon period before leveling off, and decreasing afterward (Fichman & Levinthal, 1991). Relationship duration also impacts the degree of trust and commitment in relationships (Morgan & Hunt, 1994), which in turn affects relationship continuity. To make relationship duration (and, indirectly, the degree of trust) invariant across experimental versions and treatments and remove its effects on the response variable, the baseline context fixes the length of the relationship between ZENGINE and ELECTRONICS Inc. to be 12 years, which is longer than the 7-year industry median. This information reinforces the long-term nature of the strategic relationship between ELECTRONICS Inc. and ZENGINE.

The relative bargaining power between two parties relates to the level of relative dependency in the dyad; the entity with more bargaining power is less dependent on a given relationship and, therefore, more likely to exit (Gulati & Sytch, 2007). To remove this potential effect, the baseline context states that ELECTRONICS Inc. and ZENGINE have equal bargaining power in the marketplace and, in this regard, are equally dependent on one another (Crook & Combs, 2007).

Finally, the size of the supply market affects relationship continuity (Sriram, Krapfel, & Spekman, 1992). In a monopolistic situation, the buyer is unable to switch its supply source, becomes completely dependent on the incumbent supplier, and is more willing to continue its relationship with the incumbent supplier (Sriram et al., 1992). To avoid this potential effect, the baseline context specifies that there is more than one possible supplier for the Engine Control Module and compares the performance of ZENGINE to the industry. ZENGINE, as such, is not a monopoly in supplying the Engine Control Module.

We asked subjects several questions to affirm their understanding of the strategic relationship depicted in the descriptive vignette. Subject responses reveal that they understand that ZENGINE and ELECTRONICS Inc. have equal bargaining power and how well ZENGINE performs relative to other potential suppliers in the industry.

Experimental cues

Table A3 in the Appendix of Online Supplement summarizes the experimental cues used to manipulate the factor levels in the experiment. HSP is cued as either "marginally acceptable" or "stellar," using statements relating the operational performance of ZENGINE (i.e., unit cost, product quality, delivery punctuality, and flexibility) to that of the industry. USE is cued as either "absent" or "present," using statements about a recent and major laser printer failure attributed to defective Engine Control modules that had been inadvertently supplied by ZENGINE. PSI is cued to be "high" with statements indicating previous and recent efforts, as well as financial and engineering investments, by ZENGINE to jointly design laser printers with ELECTRONICS Inc.; PSI is cued to be "low" with one statement indicating that ZENGINE had never worked with ELECTRONICS Inc. on joint product development activities. Finally, SSA is cued either as "present" or "absent," with statements regarding the market entry of an attractive substitute supplier (GAMMA) offering better operational performance than ZENGINE and expressing interest in supplying ELECTRONICS Inc.

Because our research question centers on the unintentionality of a serious supplier error, we conducted an in-class exercise with five male and four female graduate students pursuing a degree in supply chain management at a public university in the Midwest. The nine graduate students, at least 24 years of age with prior work experience, were provided with the same textual information about ZENGINE and asked whether or not the shipment of defective Engine Control modules was intentional. Eight answered "No" that the shipment was unintentional; one answered "Yes" erroneously because the individual had misread the question. The unintentionality of USE as manipulated, as such, is not ambiguous.

Response variable

The response variable in our experiment, likelihood of strategic relationship dissolution, is operationalized with a three-question measurement scale. The questions ask how likely (1 = very unlikely, 5 = very likely) subjects are to recommend that ELECTRONICS Inc.: (i) replace ZENGINE with another sole supplier for the Engine Control module, (ii) continue with ZENGINE as the sole supply source for

the Engine Control module (reverse coded), and (iii) source the Engine Control module from another vendor, besides ZENGINE. Subjects are asked to provide a recommendation rather than make a decision because the decision to dissolve a strategic relationship often involves personnel across various functions within a firm. The measurement scale is reliable, with Cronbach's α (Cronbach, 1951) of .80 (treatment 1), .74 (treatment 2), and .79 (treatment 3). Factor analysis via the principal components method also reveals the measurement scale to be unidimensional across treatments, with factor loadings exceeding the .30 threshold suggested by Hair et al. (1979).

Procedure

We contacted U.S.-based affiliates of the Institute for Supply Management for permission to collect data from attendees at regularly scheduled, monthly dinner meetings. The following nine affiliates (number of attendees) agreed: Boston, MA (78); Cincinnati, OH (25); Cleveland, OH (22); Des Moines, IA (19); Indianapolis, IN (31); Louisville, KY (11); Milwaukee, WI (11); San Diego, CA (26); and the Twin Cities, MN (33). Because of sociopolitical, socioeconomic, and legal system differences across countries, we confined data collection to U.S. sites.

At each location, the meeting began with a factual recounting of the strategic relationship termination between Ford Motor Company and Bridgestone/Firestone Inc. This recounting ensured understanding as to what a strategic relationship is and what strategic buyer–supplier relationship dissolution means. To assess whether the recounting influenced subject responses, an additional experiment using only the SG-subscripted versions was conducted at a tenth location (i.e., Detroit, MI). The Detroit meeting involved 17 attendees and began without mentioning the Ford-Firestone breakup. Comparing responses from the Detroit attendees to those from the original nine locations finds no differences in mean scores of the response variable for treatment 1 ($p = .14$), treatment 2 ($p = .32$), or treatment 3 ($p = .42$); recounting the Ford-Firestone breakup at the start of the meetings, as such, does not appear to influence subject responses in our experiment. Note that subsequent analyses do not include the experimental data from Detroit because of a one-year time lapse in data collection.

Each subject is randomly assigned to one version as follows: $I_{GS} = 33$, $I_{SG} = 36$, $J_{GS} = 27$, $J_{SG} = 36$, $K_{GS} = 29$, $K_{SG} = 31$, $L_{GS} = 32$, and $L_{SG} = 32$. Subjects are instructed to: (i) assume the role of an experienced purchasing manager tasked with responsibility for, and formal assessment of, sourcing the Engine Control module, (ii) review the information provided in each treatment, (iii) answer questions regarding experimental checks, (iv) indicate their recommendation for the response variable, and (v) respond to demographic questions.

Subjects

Sourcing professionals are ideal subjects for our scenario-based role-playing experiment because of their expertise and familiarity regarding strategic relationships between manufacturers and critical-component suppliers. In total, 256 subjects completed treatment 1; 237 completed treatments 1 and 2; 202 competed treatments 1, 2, and 3; and 146 completed all three treatments and answered all demographic

questions. The 146 subjects who provided demographic data have an average of 14.7 years of sourcing experience ($\sigma = 9.6$) and control an annual average spend of \$13.3 million ($\sigma =$ \$.16 million). Most (81%) have prior experience in a decision to dissolve a strategic supplier relationship, 66% work for manufacturing firms, and 31% are females.

Experimental Checks

Checks for realism, manipulation, confounding effects, and Hawthorne effects were conducted to evaluate the integrity of the experimental design and data (Bachrach & Bendoly, 2011; Rungtusanatham et al., 2011).

Realism check

A realism check assesses the extent to which the descriptive vignette reflects a realistic situation to which subjects can relate (Louviere et al., 2000). Responding to four questions from Pilling, Crosby, and Jackson (1994) using a 5-point Likert response scale (1 = strongly disagree, 5 = strongly agree), subjects report that they find the scenarios to be realistic ($\mu = 4.06$, $\sigma = .82$), take their roles in the experiment seriously ($\mu = 4.51$, $\sigma = .61$), have previously encountered issues underlying this research ($\mu = 3.35$, $\sigma = 1.40$), and are highly aware of the issues being investigated in this research ($\mu = 3.95$, $\sigma = 1.03$).

Manipulation checks for HSP, PSI, USE, and SSA

Manipulation checks determine whether subjects accurately perceive the cued levels of the experimental factors (Wetzel, 1977). The detailed statistical results and their interpretations are documented in Tables A4 and A5 in the Appendix of Online Supplement.

For HSP and PSI, one-way ANOVA test results in the shaded cells of Table A4 in the Online Supplement reveal that subjects assigned to versions in which HSP is cued to be "stellar" report statistically higher average scores for the manipulation questions than those assigned to versions in which HSP is cued to be "marginally acceptable" ($p < .001$). Likewise, subjects assigned to versions in which PSI is cued to be "high" report higher average scores for the manipulation questions than those assigned to versions in which PSI is cued to be "low" ($p < .001$). Subjects, therefore, perceive the levels of these two between-subject factors as cued.

For USE and SSA, "true"/"false" questions were asked and assessments were conducted using two separate Fisher's exact tests. When USE is cued to be "absent," the shaded cells in Table A5 in the Online Supplement reveal that 229 of 256 subjects or 89% indicate as "true" that the relationship between ELECTRONICS Inc. and ZENGINE has been free of critical incidents of a negative nature, but when USE is cued to be "present," this percentage decreases to 39% (54 of 137 subjects). The distribution of "true" and "false" responses is statistically different (Fisher's exact test: $p < .001$). Subjects, therefore, perceive the presence (absence) of USE as cued. When SSA is manipulated from "absent" to "present," the distribution of "true" and "false" responses changes from 0% "true" (0 of 256 subjects) to 93% "true" (112 of 121 subjects) that GAMMA outperforms ZENGINE, with this distribution being statistically different (Fisher's exact test: $p < .001$). Examining

the distribution of "true"–"false" responses for SSA = "present" only, we also find that more subjects indicate as "true" that GAMMA outperforms ZENGINE (Fisher's exact test: $p < .001$). Subjects, therefore, perceive the presence (absence) of SSA as cued.

Checks for confounding effects

Checks for confounding effects determine whether or not subject perceptions about nonmanipulated factors are affected by experimentally manipulated factors (Wetzel, 1977). The detailed statistical results in the nonshaded cells of Table A4 in the Online Supplement reveal that the "marginally acceptable" and "stellar" cued-levels of HSP do not produce significantly different (i) subject responses to the PSI manipulation check questions (one-way ANOVA test: $p = .64$, $p = .34$), (ii) subject answers of "true" or "false" to the manipulation check question for USE (Fisher's exact test: $p = .49$), or (iii) subject answers of "true" or "false" to the manipulation check question for SSA (Fisher's exact test: $p = .24$). Similarly, the "low" and "high" cued-levels of PSI do not produce significantly different (i) subject responses to the manipulation check questions for HSP (one-way ANOVA test: $p = .14$, $p = .55$, $p = .74$), (ii) subject answers of "true" or "false" to the manipulation check question for USE (Fisher's exact test: $p = .65$), or (iii) subject answers of "true" or "false" to the manipulation check question for SSA (Fisher's exact test: $p = .73$). These results, therefore, affirm the absence of confounding effects between HSP (or PSI) and the remaining three experimental factors.

The nonshaded cells in Table A5 in the Online Supplement show that subject responses of "true" or "false" to the manipulation check question for SSA are not distributed differently between the "present" and "absent" cued-levels of USE (Fisher's exact test: $p = .46$). Similarly, subject responses of "true" or "false" to the manipulation check question for USE are not distributed differently between the "present" and the "absent" cued-levels for SSA (Fisher's exact test: $p = .05$, not significant with the Bonferroni correction). These results, therefore, affirm an absence of confounding effects between USE and SSA.

Checks for Hawthorne effects

Checks for Hawthorne effects assess whether extraneous factors related to the baseline context affect how subjects perceive and react to the experiment (Adair, 1984). Table A6 in the Appendix of Online Supplement documents the statistical results for the two extraneous factors of (i) prior experience that subjects have with situations involving the termination of strategic suppliers and (ii) location where the experiment was conducted.

For prior subject experience, one-way ANOVA test results are nonsignificant at $\alpha = .05$ for the HSP and PSI between-subject factors; Fisher's exact test results are nonsignificant at $\alpha = .05$ for the USE and SSA within-subject factors. One-way ANOVA test results are also nonsignificant at $\alpha = .05$ with respect to the response variable. Prior subject experience, therefore, does not appear to have Hawthorne effects on the experimental factors or on the response variable. For the location where the experiment was conducted, one-way ANOVA test results reveal no differences at $\alpha = .05$ with regard to the mean scores for likelihood of strategic

relationship dissolution across locations. Location, therefore, does not appear to have Hawthorne effects on the response variable.

HYPOTHESIS TESTING

Model Estimation

Model [1] specifies the general linear mixed-effects model for the response variable, likelihood of strategic relationship dissolution ($Y_{i,\ jklm}$) as shown below:

$Y_{i,\ jklm}$ = Intercept [1]
$+\beta_{1_i}(HSP)_j + \beta_{2_i}(PSI)_k$
$+\beta_{3_i}(USE)_l + \beta_{4_i}(SSA)_m$
$+\beta_{5_i}(\text{HSP} \times \text{PSI})_{jl} + \beta_{6_i}(\text{HSP} \times \text{USE})_{jk} + \beta_{7_i}(\text{HSP} \times \text{SSA})_{jm} + \beta_{8_i}(\text{PSI} \times \text{USE})_{kl} +$ $\beta_{9_i}(\text{USE} \times \text{SSA})_{lm}$
$+ \beta_{10_i}(\text{HSP} \times \text{USE} \times \text{PSI})_{jkl} + \beta_{11_i}(\text{HSP} \times \text{USE} \times \text{SSA})_{jlm}$
$+ b_{0_i} + b_{1_{i(jk)}}(\text{USE})_l + b_{2_{i(jk)}}(\text{SSA})_m + e_{i,\ jklm}$

where

$Y_{i,\ jklm}$	Average score of the responses to the three-item measurement scale for likelihood of strategic relationship dissolution by the *i*th subject for the *j*th *k*th, *l*th, and *m*th levels of the HSP, PSI, USE, and SSA factors, respectively
$(\text{HSP})_j$	*j*th level ("marginally acceptable" or "stellar") of the HSP factor
$(\text{PSI})_k$	*k*th level ("low" or "high") of the PSI factor
$(\text{USE})_l$	*l*th level ("absent" or "present") of the USE factor
$(\text{SSA})_m$	*m*th level ("absent" or "present") of the SSA factor
$b_{0_i}, b_{1_{i(jk)}}, b_{2_{i(jk)}}$	Random effects
$e_{i,\ jklm}$	Random error

Note that model [1] treats the four experimental factors as fixed effects; differences between subject and group means of SG-versions and GS-versions as the random effects, $b_{1_{i(jk)}}$ and $b_{2_{i(jk)}}$, respectively; and the remaining differences across subjects as the random effect, b_{0_i}. Model [1] includes two three-way interaction terms (HSP × USE × PSI and HSP × USE × SSA) to allow for post-hoc robustness tests of the invariance of the USE moderating effect as PSI and SSA vary. To comply with the hierarchy principle (Peixoto, 1987), model [1] also includes the four corresponding two-way interaction terms (HSP × PSI, USE × PSI, HSP× SSA, and USE × SSA), in addition to the hypothesized HSP × USE interaction term (i.e., H3). Also, a one-way ANOVA test, prior to estimating model [1], finds no significant effects for years of subject sourcing experience, subject control of spend, employment segment, and gender on the response variable across treatments 1, 2, and 3 (at $\alpha = .05$). Table A7 in the Appendix of Online Supplement summarizes these results. Model [1] is, therefore, estimated without these demographic variables.

Results

Table 2 summarizes the estimation results for model [1], as well as those for a full model that includes four nonhypothesized interaction terms: PSI × SSA, HSP × PSI × SSA, PSI × USE × SSA, and HSP × PSI × USE × SSA. The estimation results are obtained using the "lme4" (linear mixed-effects models) package in R (Bates & Sarkar, 2007).

Because the four nonhypothesized interactions in the full model are not significant, we interpreted the model [1] estimation results to draw conclusions regarding our hypotheses. For H1, $\beta_1 = 1.42$ ($p < .001$) indicates that when the cued level of HSP is "marginally acceptable," the predicted value of the likelihood of strategic relationship dissolution is 1.42 higher than when the cued level of HSP is "stellar." A critical-component supplier whose historical performance is "marginally acceptable" is, therefore, more likely to be terminated than one whose historical performance is "stellar." This result suggests that HSP and the dissolution likelihood of the strategic relationship is inversely related and supports H1. For H2, $\beta_3 = -.83$ ($p < .001$) indicates that when the cued level of USE is "absent," the predicted value of the likelihood of strategic relationship dissolution is .83 lower than when the cued level of USE is "present." A strategic relationship with a critical-component supplier who does not commit an unintentional but serious error is, therefore, less likely to be terminated than a strategic relationship in which a supplier commits such an error. This result suggests that the occurrence of an unintentional but serious error increases the dissolution likelihood of a strategic relationship and supports H2.

Finally, given statistical results for H1, the HSP × USE interaction term ($\beta_6 = .49$, $p < .001$) indicates a positive USE moderation effect. H3b is therefore supported over H3a. The conditional effects plot in Figure 3 corroborates this conclusion. The nonparallel lines suggest an interaction effect, with the slope of the line corresponding to USE = "present" being less negative than the slope of the line corresponding to USE = "absent." In other words, when strategic critical-component suppliers with either stellar or marginally acceptable historical performance commit an unintentional but serious error, their likelihood of being terminated increases. However, the penalty (i.e., increased termination likelihood) for suppliers with stellar historical performance is significantly greater than for suppliers with marginally acceptable historical performance. We label this result the *positive supplier performance penalty effect*. Indeed, as one subject noted, postexperimentation, "Disappointment is a relative term. If performance had been good and suddenly turns poor, the contrast is more disappointing than if a poor supplier commits 'another' error."

Post-Hoc Analyses: Robustness Check and Alternative Explanations

Joint product development efforts (Petersen et al., 2005) and lack of attractive alternative suppliers (Ping, 1994) are known to strengthen the dependence of a manufacturer on its critical-component supplier and, therefore, guard against a positive USE moderation effect. As a robustness check, model [1] estimation results for HSP × PSI × USE and HSP × USE × SSA are examined to determine the extent to which the positive USE moderation effect changes as PSI or SSA

Table 2: Model estimation results[a,b,c].

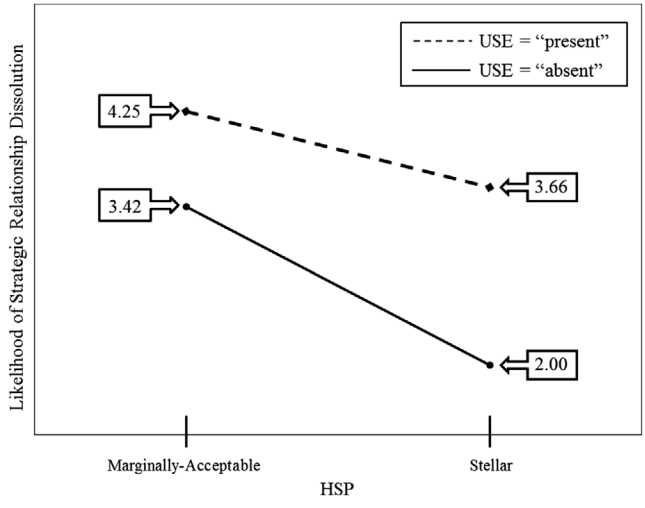
	Model [1]			Full Model		
Source	Estimate	S.E.	*p*	Estimate	S.E.	*p*
Fixed Effects						
Intercept	2.00	.10	<.001	2.01	.10	<.001
HSP (H1)	1.42	.15	<.001	1.42	.15	<.001
PSI	–.11	.14	.42	–.12	.15	.38
USE (H2)	–.83	.14	<.001	–.81	.14	<.001
SSA	–.78	.12	<.001	–.76	.16	<.001
HSP × PSI	–.08	.20	.71	–.07	.22	.76.
HSP × USE (H3)	.49	.11	<.001	.61	.20	<.01
HSP × SSA	.26	.17	.12	.25	.23	.28
PSI × USE	.13	.16	.42	.08	.19	.67
PSI × SSA	Not Applicable			–.06	.23	.79
USE × SSA	–.38	.16	.08	–.33	.19	.08
HSP × PSI × USE	.15	.22	.49	.04	.28	.89
HSP × PSI × SSA	Not Applicable			.06	.33	.86
HSP × USE × SSA	.31	.23	.17	.17	.28	.41
PSI × USE × SSA	Not Applicable			–.10	.27	.71
HSP × PSI × USE × SSA	Not Applicable			.34	.39	.38
Random Effects						
Variance: Subjects	.49			.49		
Variance: GS version	.23			.23		
Variance: SG version	.49			.51		
Residuals (Error)	.26			.25		
Model Fit						
AIC	1757			1768		
BIC	1843			1872		
–2 Log Likelihood	1719			1722		
χ^2 difference test	$\chi^2\,(4) = 3, p = .558$					

[a]The full model adds four additional, nonhypothesized interaction terms to those already in model [1]: PSI × SSA, HSP × PSI × SSA, PSI × USE × SSA, and HSP × PSI × USE × SSA. Because the four nonhypothesized interactions in the full model are not significant, conclusions about hypotheses can be drawn from interpreting the model [1] estimation results.

[b]HSP is coded as either "marginally acceptable" (base group) or "stellar"; PSI is coded as "low" (base group) or "high"; USE is coded as "absent" (base group) or "present"; and SSA is coded as "absent" (base group) or "present." To interpret the results for H1 and H2, the signs of the corresponding regression coefficients indicate the level of the predicted value of the likelihood of strategic relationship dissolution for the base group. For example, with HSP, a $\beta_1 = 1.42$ reveals that when the level of HSP is cued to be "marginally acceptable," the predicted value for the likelihood of strategic relationship dissolution is 1.42 higher than when the level of HSP is cued to be "stellar." Conversely, for USE, a $\beta_3 = –.83$ reveals that when the level of USE is cued to be "absent," the predicted value for the likelihood of strategic relationship dissolution is .83 lower than when the level of USE is cued to be "present." For H3a versus H3b, $\beta_6 = .49$ indicates the moderation effect of USE to be positive in support of H3b.

[c]Estimation results are based on average scores for the three-question measurement scale operationalizing likelihood of strategic relationship dissolution. Using factor scores in lieu of average scores produces similar and consistent results; these estimation results are available upon request.

Figure 3: HSP × US conditional effects (interactions) plot[a].



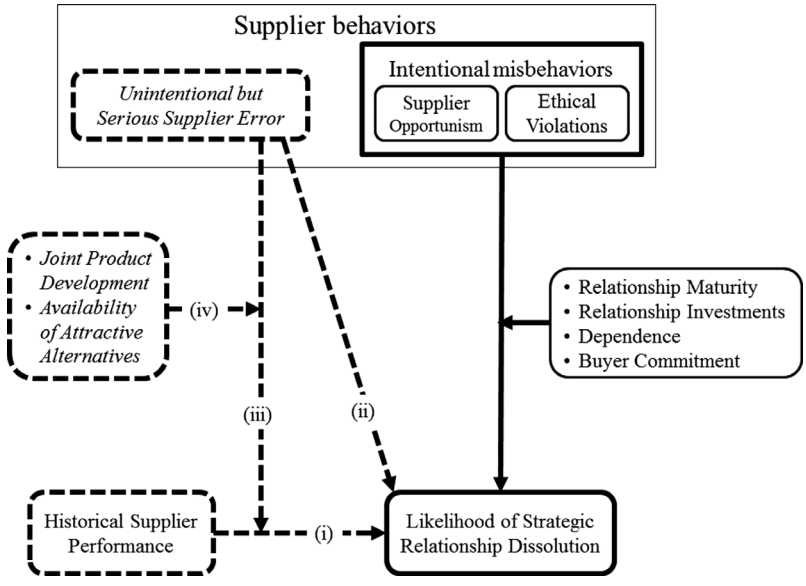
[a]The nonparallel lines suggest the existence of an HSP × USE interaction effect. Because the HSP × USE interaction term is positive and significant ($\beta_6 = .49, p < .001$) per model [1] results in Table 3, we conclude in favor of a positive USE moderation effect.

varies. Both HSP × PSI × USE ($\beta_{10} = .15$, $p = .22$) and HSP × USE × SSA ($\beta_{11} = .31$, $p = .23$) are nonsignificant; these statistical results suggest that the observed positive USE moderation effect is not affected by either prior involvement of the critical-component supplier in joint product development efforts with the manufacturer or the entry into the supply market of a replacement for the incumbent critical-component supplier.

A recency effect (Deese & Kaufman, 1957) is present when the most recent event (i.e., USE) is recalled more readily than less recent events (i.e., HSP) and, hence, more salient in influencing subject responses. To investigate this possibility, we asked the 17 subjects participating in the experiment at the Detroit location to reveal how much weight they gave to recent versus HSP information. Eight placed a greater weight on recent performance, five gave equal weights to historical and recent performance, and four placed a greater weight on historical performance. A one-way ANOVA test detects no differences in the mean scores for likelihood of strategic relationship dissolution across these three groupings for treatment 1 ($p = .65$), treatment 2 ($p = .10$), or treatment 3 ($p = .31$). These results suggest an absence of the recency effect, with this absence likely to also hold beyond the Detroit location, given the statistical similarity in subject responses between Detroit and the original nine locations. Hence, our hypothesis testing results do not appear to be explained by the recency effect.

Finally, subject risk aversion is unlikely to bias our hypothesis testing results for two reasons. First, the random assignment of subjects to different versions in our experiment guards against risk-averse subjects being systematically exposed

Figure 4: Findings juxtaposed against literature[a].



[a]The literature has documented the effects of intentional supplier misbehaviors (i.e., supplier opportunism and ethical violations) on relationship continuity, taking into consideration relationship-specific attributes (e.g., relationship maturity); these are shown as solid ovals and arrows. The effects that have not been theoretically and/or empirically established in prior literature and uncovered in our research findings are shown as dashed shaded ovals and dashed arrows. For example, (i) the inverse association between historical supplier performance and likelihood of strategic relationship dissolution, while intuitive, has not been empirically established in prior literature and (ii) the association between unintentional but serious supplier error and likelihood of strategic relationship dissolution, while intuitive, has likewise not been theoretically and empirically established in prior literature. Moreover, (iii) the positive moderation effect of an unintentional but serious supplier error on the inverse association between historical supplier performance and likelihood of strategic relationship dissolution and (iv) the robustness of this positive moderation to other conditions like joint relationship activities and supplier alternatives are not only theoretically and empirically novel but also highlight, more importantly, the boundary conditions as to when, why, and how stellar historical supplier performance fails to guard against relationship termination.

to only certain manipulations, while risk-taking subjects being exposed to others. Second, prior research shows that gender, age, and industry sector relate to risk aversion propensity (Weber, Blais, & Betz, 2002; Nicholson et al., 2005). Given the nonsignificant ANOVA results regarding gender, years of sourcing experience (which correlates to subject age), and industry sector, our results, therefore, do not appear to be explained by risk aversion propensity.

DISCUSSION

Table 3 and Figure 4 summarize our findings relative to existing literature and explain why these findings constitute theoretical contributions based on arguments from the philosophy of science and management as articulated by Davis (1971),

Table 3: Findings, juxtaposition in literature, and theoretical contributions.

Finding		Juxtaposition in Literature	Why is the Finding a Theoretical Contribution?
(i)	Inverse association between historical supplier performance and likelihood of strategic relationship dissolution	Effect is intuitively accepted in the operations management/supply chain management literature but missing empirical verification.	Incremental theoretical contribution that provides, to the best of our knowledge, the first empirical evidence of how prior supplier performance relates to relationship continuity. In this regard, the finding aligns with explanations by Corley and Gioia (2011) that a ". . . contribution arises when theory [and findings] reveals what we otherwise had not seen, known, or conceived . . ." (p. 17) and by Kohli (2011) that a contribution ". . . can be summarized in a single sentence such as 'In this research, we show (for the first time ever) that [key finding].' . . ." (p. 2).
(ii)	Positive association between an unintentional but serious supplier error and likelihood of strategic relationship dissolution	Effect is intuitively accepted but neither currently discussed nor established (either theoretically or empirically) in the operations management/supply chain management literature.	Incremental theoretical contribution arising from the addition and justification (both theoretical and empirical) of a new factor to complement an existing set of factors associated with relationship continuity. In this regard, the finding aligns with explanations by Corley and Gioia (2011) that a ". . . contribution arises when theory [and findings] reveals what we otherwise had not seen, known, or conceived . . ." (p. 17) and by Whetten (1989) that ". . . it is possible to make an important theoretical contribution by simply adding or subtracting factors (Whats) from an existing model . . ." (p. 492).

Continued

Table 3: Continued.

Finding		Juxtaposition in Literature	Why is the Finding a Theoretical Contribution?
(iii) and (iv)	Positive moderation of an unintentional but serious supplier error on the inverse association between historical supplier performance and likelihood of strategic relationship dissolution	Effect and its robustness to factors known to protect relationship continuity are not currently discussed nor established (either theoretically or empirically) in the operations management/supply chain management literature.	"Interesting" theoretical contributions arising from the increased precision regarding the inverse association between historical supplier performance and likelihood of strategic relationship dissolution and the specification of a specific condition for which this inverse association is less negative. In this regard, the finding aligns with explanations by Davis (1971) that ". . . it denies an old truth . . . denies the truth of some part of . . . routinely-held assumption ground. . . ." (p. 311), by Whetten (1989) that impactful theoretical contributions ". . . come from demonstrating how [a newly added factor] significantly alters our understanding of the phenomena by reorganizing our causal maps. . . ." (pp. 492–493), and by Busse et al. (2017) that a new moderator decreases the simplicity of a theoretical statement in exchange for greater precision as to its boundary conditions.

Whetten (1989), Corley and Gioia (2011), Kohli (2011), and Busse, Kach, and Wagner (2017). We discuss in greater detail below the theoretical contributions in regard to the direct and moderating effects of a USE on relationship continuity, as well as the two associated managerial implications.

Theoretical Contributions

Why minimize unintentional but serious supplier errors

Prior research has focused on intentional supplier misbehaviors benefitting the supplier at the expense of the buyer (Abdul-Muhmin, 2005; Ganesan et al., 2010; Wang et al., 2010). Our inquiry complements these efforts by focusing on USEs that are not intended to harm either the manufacturer or the supplier; their occurrence, however, results in operational and financial harm to both parties. These errors constitute a previously uninvestigated type of supplier misbehavior that has been neglected in the literature; they differ from supplier opportunism and ethical violations with respect to the intentionality to cause harm. In this regard, our finding that a USE increases the likelihood of strategic relationship dissolution, regardless of HSP levels, adds a novel, albeit relatively intuitive, insight.

Why stellar historical supplier performance is necessary but not sufficient

Critical-component suppliers are expected to perform well, with positive assessments of performance deterring dismissal by the manufacturer (e.g., Shin et al., 2000; Abdul-Muhmin, 2005). Our inquiry affirms this baseline relationship (i.e., support for H1) and, more importantly, contributes novel and nuanced insights regarding a previously uninvestigated and robust *positive supplier performance penalty effect* (i.e., support for H3b). Suppliers, regardless of historical performance levels, experience a penalty effect from commission of unintentional but serious errors. The penalty effect, however, is harsher for those with a history of stellar performance than for those with a history of marginally acceptable performance, paralleling the more pronounced negative market reactions to product recalls faced by automotive firms with good (versus marginal) reputations (Rhee & Haunschild, 2006).

This penalty is, moreover, not tempered by the extent to which an incumbent supplier had been involved in prior joint product development efforts with the manufacturer or by the unavailability of attractive supplier alternatives in the marketplace. The former increases the level of commitment that the manufacturer has to the critical-component supplier (Petersen et al., 2008); the latter reduces the incentives for the manufacturer to switch (Dwyer et al., 1987; Sriram & Mummalaneni, 1990; Abdul-Muhmin, 2005). Theoretically, these two factors should buffer an incumbent supplier who errs against relationship dissolution. As such, stellar HSP, given the robust *positive supplier performance penalty effect*, appears to be a necessary but insufficient condition for sustaining a strategic relationship.

Managerial Implications for Buyers and Suppliers

Our findings point to two pieces of practical advice to safeguard against premature termination of critical-components suppliers—one for manufacturers and another for critical-component suppliers. We urge manufacturers to be aware that they may,

over time and subconsciously, elevate their expectations of supply performance. This escalation increases a tendency to overreact to USEs. The overreaction, in turn, overrates alternative supplier options (Ganesh et al., 2000) and biases manufacturers to prematurely terminate critical-component suppliers. This is more concerning for critical-component suppliers who are, otherwise, capable and have historically performed well. Manufacturers should avoid this trap by enacting response plans to cope with historically capable critical-component suppliers that explicitly reject the option of immediately switching to a new supply source.

For critical-component suppliers, an impeccable performance record is necessary but not enough to protect against dismissals when they commit unintentional but serious errors. Because manufacturers expect increasing returns from their critical-component suppliers over time (Autry & Golicic, 2010), supplier performance complacency can jeopardize relationships with manufacturers (Beverland et al., 2004). Critical-component suppliers with a history of stellar performance should be especially vigilant and proactive in managing escalating performance expectations that manufacturers develop over time. To this end, they should habitualize regular sit-downs with customers to review contractual performance obligations and surface implicit performance expectations that may expose them to greater chances of committing unintentional but serious errors. When USEs occur, they must, moreover, marshal mitigation resources quickly and visibly to minimize harm and to return to normal operating conditions.

LIMITATIONS AND FUTURE RESEARCH

Our investigation suggests several research opportunities related to the dissolution of strategic buyer–supplier relationships. First, our scenario-based role-playing experiment adopted the perspective of the manufacturer as it forms a judgment regarding relationship continuity with a critical-component supplier based on new information. A complementary effort to overcome this limitation may be to consider the "flip side" of the dyad and take the perspective of the critical-component supplier. For example, in the event of an unintentional but serious manufacturer error, will the effects on the likelihood of strategic relationship dissolution mirror those detected in this research? More appropriately, considering both perspectives and the bilateral interactions that occur postdiscovery of a USE, how do the manner and timing of actions taken by the critical-component supplier, whether independent of or jointly with the manufacturer, influence the judgment the manufacturer forms regarding relationship continuity?

Second, our inquiry assumes that (i) blame for an unintentional but serious error can be clearly attributed to the critical-component supplier, (ii) the buyer is able to verify that the supplier error is indeed unintentional, and (iii) this verification does not vary due to personality attributes like locus of control. These assumptions simplified the experimental task but may limit the applicability of the findings to practical situations wherein these assumptions hold. To overcome this limitation, we encourage research efforts to examine relationship continuity while relaxing these assumptions. For example, when the critical-component supplier is only partially responsible or when the buyer is unable to validate absence of malicious intent, does the *positive supplier performance penalty effect* hold and, if so, to

what extent? Does the extent to which the critical-component supplier is at fault, real or perceived, alter the positive moderation effect observed here and, if so, in what manner?

Third, in designing our scenario-based role-playing experiment, we had specified the level of bargaining power to be equal between the manufacturer and critical-component supplier and the supply market size to be four available suppliers. Making these attributes invariant precludes drawing insights as to the potential interactions between these controls and the detected direct and interaction effects of USEs. Overcoming this limitation requires replication efforts in which these constraints are designed to be manipulated. For example, how do differences in power imbalances or supply market size alter either the direct effect of a USE on relationship dissolution or its indirect effect through trust and commitment? Moreover, does varying these controls temper the positive moderation effect of such an error (again, either directly or indirectly through trust and commitment)?

Finally, our post-hoc analysis finds the *positive supplier performance penalty effect* to be robust (i) to prior involvement of the critical-component supplier in joint product development efforts with the manufacturer and (ii) to the entry of a capable replacement into the market place. Intuitively, the penalty effect should have been tempered by joint product development efforts and amplified by the availability of attractive substitutes. Why then is this penalty effect robust to these attributes? Do joint development efforts not automatically connote joint responsibility? Does "fear of the unknown" exert a stronger influence than "fear of the known" when considering attractive potential substitutes? These are additional research questions for future pursuits.

CONCLUSIONS

The strategic relationship between a manufacturer and its critical-component supplier is ideally intended to last many years. This is particularly true when the supplier has performed well over time. Performing well, however, is a double-edged sword. Stellar supplier performance, on one hand, is necessary to maintain strategic relationships over time. On the other hand, it may elevate manufacturer expectations about supplier performance such that not meeting them shocks the manufacturer into possibly exiting the strategic relationship.

Our research reveals that a critical-component supplier with stellar historical performance is subject to a *positive supplier performance penalty effect*. This finding reinforces advice for critical-component suppliers to work closely with manufacturers to: (i) set initial supply performance expectations, (ii) evolve supply performance expectations over time, and (iii) proactively manage manufacturer reactions when USEs occur. Manufacturers sourcing from critical-component suppliers who have historically performed well must likewise be aware that they may be conditioning themselves to inadvertently levy harsher penalties following such errors.

In the parlance of scientific progress, the *positive supplier performance penalty effect* qualifies conventional wisdom that stellar HSP is always desirable in terms of strategic buyer–supplier relationship continuity. This robust penalty effect increases the precision of our understanding of relationship continuity by revealing

a specific condition for which the magnitude of this association is altered (Busse, Kach, & Wagner, 2017). What makes this finding interesting is that it essentially ". . . denies an old truth . . . [and] . . . constitute[s] an attack on the taken-for-granted world . . . ." (Davis, 1971, p. 311). In doing so, it becomes a legitimate, value-added theoretical contribution because it ". . . affects the accepted relationships between variables . . . [and] significantly alters our understanding [about a phenomenon] by reorganizing our causal maps" (Whetten, 1989, pp. 492–493).

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix

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