Explaining the efficacy of supply chain risk management from a perspective of fit

Carmen González-Zapatero (carmengz@usal.es)
IME-University of Salamanca, Salamanca, Spain

Javier González-Benito
IME-University of Salamanca, Salamanca, Spain

Gustavo Lannelongue
IME-University of Salamanca, Salamanca, Spain

Luis Miguel Ferreira
University of Coimbra, Coimbra, Portugal

Abstract

Research is called for to confirm the utility of a contingent approach to Supply Chain Risk Management (SCRM) analysis, including considerations on organizational structure. To fill these gaps this paper relies on two different approaches to fit analysis. Fit as a profile deviation is used to build two fit indicators: Risk Management Incoherence (RMI) and Risk Management Efficacy (RME). Fit as moderation is used to posit a negative relationship between RMI and RME, and to flag the negative moderating role that a Risk Manager (RM) plays in it. The findings obtained from a sample of 106 firms confirm the hypothesis.

Keywords: Supply Chain Risk Management, Fit Analysis.

Introduction

Research on Supply Chain Risk Management (SCRM) has been drawing increasing attention in recent decades. This research has, set out to identify the different and varied risk mitigation strategies that firms may implement (e.g., Zsidisin and Ellram, 2003; Chopra and Sodhi, 2004; Tang, 2006; Stecke and Kumar, 2009; Thun and Hoenig, 2011; Ho et al., 2015; Kilubi, 2016; Mishra et al., 2016). Some authors have highlighted the need to implement the set of strategies that aligns better with a company's specific requirements. This contingent approach to SCRM has been highlighted mainly in conceptual research (Chopra and Sodhi, 2004; Manuj and Mentzer, 2008a; Manuj and Mentzer, 2008b; Talluri et al., 2013). More empirical research is needed, including more strategies and variables, and relying on different fit analysis techniques (Venkatraman, 1989).

Additionally, there is a need to adopt also a contingent perspective regarding the objectives that companies are targeting with their SCRM. It is not a matter to achieve as many objectives as possible, but instead those that fit better with the company's requirements. Nevertheless, there are no studies controlling for this efficacy, or this

alignment between the objectives achieved and the most relevant ones, so research controlling for this efficacy is much in need.

Finally, although SCRM is drawing increasing attention, the study of the more appropriate organisational structure to manage it has been comparatively neglected. Structure has been traditionally related to performance, so studies addressing risk management in terms of organisational structure are also needed.

This study helps to fill the abovementioned gaps. The rest of the article is structured as follows: section 2 reviews the study's theoretical underpinnings; section 3 introduces the analysis hypotheses; section 4 describes the methodology used to verify them; section 5 presents and discusses the findings.

Literature Review

Supply Chain Risk Management

"Supply Chain Risk" (SCR) has been defined as the probability of the occurrence of different events that impact negatively on a company's supply chain, thereby compromising its ability to fulfil its demand commitments (e.g., Zsidisin, 2003; Ho et al., 2015). An extensive and varied list of risk mitigation strategies has been identified (e.g., Zsidisin and Ellram, 2003; Chopra and Sodhi, 2004; Tang, 2006; Stecke and Kumar, 2009; Thun and Hoenig, 2011; Ho et al., 2015; Kilubi, 2016; Mishra et al., 2016). These mitigation strategies are different practices companies implement to reduce their exposure to these events, or to decrease the negative effects these events may have. In order to summarise these strategies we will classify them according to the mechanisms they involve. Some of them increase the predictability and visibility of possible risk, a second group of mitigation strategies involves different forms of communication and cooperation with supply chain partners, a third group includes strategies of risk diversification, finally, a fourth group involves holding stock or inventory in different parts of the supply chain.

Table 1 shows a representative sample of these strategies. It includes different practices promoting the above mechanisms.

Table 1: Risk Mitigation Strategies

Risk Mitigation Strategy	References
Selecting high quality suppliers	Thun and Hoening, 2011
Selecting suppliers with a high on-time delivery ratio	Thun and Hoening, 2011
Prioritize products with constant demand	Stecke and Kumar, 2009
Prioritize products with low variability	Tang, 2006
Avoid selecting suppliers located in countries with a high geopolitical risk	Stecke and Kumar, 2009
Vertical Integration	Lavastre et al., 2014
Developing strategic suppliers	Thun and Hoening, 2011
Developing priority communication channels with the main partners in the supply chain	Stecke and Kumar, 2009; Kiluby, 2016
Implementing communication systems	Stecke and Kumar, 2009; Kiluby, 2017
Implementing Radio-frequency identification (RFID) technology	Chopra y Shodi, 2004; Stecke and Kumar, 2009
Arranging insurance	Stecke and Kumar, 2009

Providing for contractual penalties on delivery failures	Lavastre et al., 2014
Promoting information sharing with supply chain partner's risk managers	Stecke and Kumar, 2009
Promoting stable supply by avoiding discount policies	Tang, 2006
Forecast sharing	Stecke and Kumar, 2009; Kiluby, 2016
Significantly reducing delivery times	Chopra y Shodi, 2004
Reducing transport costs to avoid high volume orders	Tang; 2006
Holding high backup-inventory levels	Chopra y Shodi, 2004; Stecke and Kumar, 2009; Thun and Hoening, 2011; Kiluby 2016
Requiring suppliers to hold high backup-inventory levels	Stecke and Kumar, 2009
Holding excess production-capacity	Chopra y Shodi, 2004; Tang; 2006
Holding excess storage-capacity	Tang; 2006
Multiple sourcing	Chopra y Shodi; 2004; Stecke and Kumar, 2009; Thun and Hoening, 2011; Kiluby, 2016
Redundant sourcing	Stecke and Kumar, 2009
Developing IT Systems	Thun and Hoening, 2011
Delaying product differentiation as long as possible. Postponement	Tang; 2006; Stecke and Kumar, 2009; Kilubi; 2016
Logistics Postponement. Delaying logistics operations as long as possible	Tang, 2006; Kilubi, 2016
Local sourcing	Steck and Kumar, 2009; Thun and Hoening, 2009
Flexible logistics (using several means of transport and alternative routes)	Tang, 2006; Stecke and Kumar, 2009
Promoting flexible production processes	Chopra y Shodi, 2004; Tang, 2006
Establishing flexible contracts with main customers and suppliers	Chopra y Shodi, 2004; Tang, 2006
Promote the development of contigency plans in order to ensure uninterrupted deliveries in the event of a disruption	Tang, 2006
Promoting incident response training and simulation	Lavastre et al. 2014
Documenting past incidents/disruptions	Lavastre et al., 2014

SCRM therefore requires identifying the events that pose a threat to the supply chain, assessing the level of risk they may involve in terms of probability and severity, and subsequently implementing risk mitigation strategies (Ho et al., 2015; Giannakis and Papadopoulos, 2016). This requires decision-making related to organisational structure. This study provides an empirical study of a possible SCRM decision related to organisational structure, namely, assigning more time to the RM and how this time assignment interacts with incoherence and efficacy in SCRM.

Supply Chain Risk Management Objectives

As commented in the introduction, scholars have considered different supply chain performance indicators to be SCRM objectives. For instance, some scholars use the reduction of the two dimensions of risk (probability and severity) as performance indicators (Lavastre et al., 2014). Supply chain disruptions have also been considered an

SCRM objective (e.g., Chopra and Sodhi, 2004); Zsidisin (2003) explains that SCRM aims to satisfy demand, while some scholars use financial performance indicators (Li et al., 2015). Finally, some studies propose an aggregated indicator that includes different economic and operational objectives (Zsidisin and Ellram, 2003, Manuj and Mentzer, 2008b; Stecke and Kumar, 2009; Lavastre et al., 2014).

As this paper's purpose is to analyse SCRM efficacy, and thus SCRM's ability to achieve a company's main objectives, this last approach seems the most suitable one. It would allow differentiating between sundry objectives according to their importance for a company.

Table 2: Risk Management Objectives

Supply Chain Risk Management Objectives	**References**
Increasing flexibility	Stecke and Kumar, 2009
Reducing disruptions in the internal supply chain	Lavastre et al., (2014)
Reducing vulnerability to external events	Stecke and Kumar, 2009
Reducing error levels	Stecke and Kumar, 2009
Raising quality levels	Zsidisin y Ellram, 2003; Lee and Billington, 1936
Increasing customer satisfaction	Zsidisin, 2003
Increasing timeliness	Lavastre et al., 2014; Stecke and Kumar, 2009; Zsidin y Ellram, 2003;Lee and Billington, 1993; Noordewier et al., 1990
Increasing response capability	Stecke and Kumar, 2009
Reducing costs	Lavastre et al., 2014; Zsidisin y Ellram, 2003; Steele and Court, 1996; Yahya-Zadeh, 1998
Reducing "Bullwhip Effect"	Zsidin y Ellram, 2003; Walker and Weber, 1984; Noordewier et al., 1990; Leet et al., 1997
Reducing stock level	Stecke and Kumar, 2009
Guaranteeing compliance with rules and regulations	Stecke and Kumar, 2009

Fit Analysis and Supply Chain Risk Management

Contingent SCRM analysis poses a challenge. Not only is the list of possible risk mitigation strategies extensive, but so is the list of contextual variables that these strategies should be coherent with. To give an idea of all the possible variables to be taken into account in this analysis, and based on the well-known paradigm of strategy-structure-environment (e.g., Child, 1972; Engdahl et al., 2000; Chandler, 1962; Andrews, 1971), we can classify these variables precisely into three categories: those related to corporate strategy, those related to corporate structure, and those related to the environment. This extension has led researchers to include in their contingent analysis only a few of those variables.

However, contingent analyses can be approached from different perspectives (Venkatraman, 1989; Roca Puig and Bou Llusar, 2006). Each one of them has different advantages. We rely here on two different analyses of fit. Firstly, we will rely on the concept of fit as a profile deviation to define two concepts: Risk Management Incoherence (RMI). RMI reflects the lack of fit between the perceived utility of different mitigation strategies and their degree of implementation. Risk Management Efficacy (RME) reflects the fit between the importance of different business objectives and the degree to which

risk management achieves them. Relying on the concept of fit as a profile deviation will allow us to include more variables in our analysis and provide a more general perspective of SCRM contingency.

Secondly, this paper relies on the concept of fit as a moderator for explaining the relationship between RMI, RME, and the more time assigned to the Supply Chain RM. This second analysis would allow us to specify the nature of the relationship between these three variables.

Hypotheses

As detailed in previous sections: Strategy Literature, Supply Chain Literature and Supply Chain Risk Literature have posited that strategies that more closely fit a firm's specific requirements and capabilities are more likely to succeed (e.g., Porter, 1991; Fisher, 1997; Chopra and Sodhi, 2004; Manuj and Mentzer, 2008b; Mishra et al., 2016). Building on this argument of fit, we have formulated the concepts of RMI and RME. Companies presenting greater incoherence in risk management are the ones that either implement risk management strategies that are not considered useful or do not implement those considered more useful. Companies achieving less efficacy in risk management are the ones that either achieve objectives that are not the most important ones for a company or fail to achieve the more relevant ones. Based also on the arguments in the literature on fit, this paper does not contend that reducing RMI will ensure the achievement of different performance indicators, but instead those that are more important for a company. The following hypothesis reflects this argument:

H1: The higher the incoherence in risk management the lower its efficacy.

SCRM includes the following activities: risk identification, risk assessment, and evaluating and implementing risk mitigation strategies (e.g., Ho et al., 2015). Increasing the time assigned to a RM for performing such activities will obviously reduce RMI and increase RME. However, this paper focuses on explaining other relationships between these variables. It draws attention to the fact that if more time has been assigned to a RM and risk management is still inconsistent, the effect on RME will worsen. The following arguments explain this relationship: if more time has been assigned to a RM and there is still inconsistency or a lack of coherence between the strategies implemented and the ones considered useful, the problem is not a lack of attention to the problem. In this situation, the problem will be either an incorrect assessment of the usefulness of the different mitigation strategies or the presence of internal barriers preventing the implementation of the correct strategies. Based on this premise, we formulate the following hypothesis:

H2: More time assigned to the supply chain RM will negatively moderate the relationship between risk management incoherence (RMI) and risk management efficacy (RME). More time assigned to the supply chain RM will worsen the effect of RMI on RME.

Methodology

Metrics

The hypotheses were tested using a population of 652 firms belonging to the Portuguese Procurement Association 'Associação Portuguesa de Compras e Aprovisionamento' (APCADEC). A survey was designed to obtain the data. 130 answers were obtained. The ones with missing data were discarded. Finally, 106 valid answers, were obtained, which meant a response rate of 16.25%. A non-response bias test (Armstrong and Overton, 1977) was conducted to confirm the sample's representativeness.

Metrics

Independent Variable: Risk Management Incoherence (RMI): Respondents were asked to use a five-point Likert scale (1-very low, 5-very high) to rate the usefulness of each one of the 34 risk mitigation strategies in Table 1.These strategies were adapted from the previous studies detailed in Table 1. As the definitions of the different strategies varied from one study to another, a specific phrasing was used for this paper. Respondents were also asked to use a five- point Likert scale (1-not implemented, 5-always implemented) to rate the degree of implementation of each one of those strategies in their companies.

RMI was measured using the difference between both scales, and thus the difference between the usefulness of a particular strategy and its implementation. Based on these reasonings, the following RMI Index was calculated:

$$\text{Risk Management Incoherence (RMI)} = (1/n) \sum_{i=1}^{n} |U_i - I_i|$$

Where Ui represents the degree of usefulness of strategy i; Ii represents the degree of implementation of strategy I; and n the number of strategies assessed. As a general rule, n is 34. However, some respondents did not assess one or more particular strategies. In those cases, n records a lower number. To guarantee that in all cases the value ranged between 0 (minimum incoherence) and 4 (maximum) the sum was divided by n.

Dependent Variable: Risk Management Efficacy (RME): Respondents were asked to use a five-point Likert scale (1- not at all relevant, 5- extremely relevant) to rate the extent to which their risk management pursued each one of the 12 objectives in Table 2. These items were adapted from previous works, as referenced in the table. Respondents were also asked to use a five-point Likert scale (1-not at all, 5-strongly) to rate the extent to which their risk management actually contributed to the achievement of each one of those objectives. Both scales can be understood, respectively, as pursued objectives (PO) and achieved objectives (AO); RME was therefore measured by calculating the fit between both these scales:

$$\text{Risk Management Efficacy (RME)} = 6 - (1/m) \sum_{i=1}^{m} |PO_i - AO_i|$$

Where POi and AOi, respectively, represent the degree to which objective i is pursued and achieved, and m is the number of objectives assessed. The summation reflects the lack of fit between the two scales, so it was subtracted from 4, the highest score on the scale. The index was thus transformed into a measure of fit. The maximum value of this new index is 4 (maximum efficacy) and the minimum value is 0 (minimum efficacy).

Moderator Variable: Supply Chain Risk Manager (RM): Companies were asked to indicate whether there was someone in their organization in charge of SCRM. They were asked to choose one of the following options: No one, part-time position, or full-time position. These three options were coded as 0, 1, and 2, respectively, and the answers were treated as an ordinal variable.

Analysis

A moderated multiple regression was conducted to test the hypotheses (Aguinis, 2004).

Table 3. Correlations between variables: mean and standard deviation

	Mean (S.D.)	1	2	3	4	5
1. Number of Suppliers	4.93 (1.74)					
2. Volume of Purchases	6.30 (2.13)	.759***				
3. Geographical Dispersion	3.41 (1.11)	.020	.046			
4. Risk Manager (RM)	0.57 (0.81)	.014	.109	.050		
5. Risk Management Incoherence (RMI)	0.65 (0.46)	.191**	.128*	-.164**	-.299***	
6. Risk Management Efficacy (RME)	3.64 (0.33)	-.114	-.068	.054	.175**	-.321***

*** $p < .01$; ** $p < .05$; * $p < .10$ (two-tailed) Pearson correlation coefficients

Results and discussion

As expected (see Table 3), assigning more time to a supply chain RM presents a negative correlation with RM) (-2.999***), and a positive correlation with RME (.175**). However, our study's purpose is to uncover other relationships between these three variables.

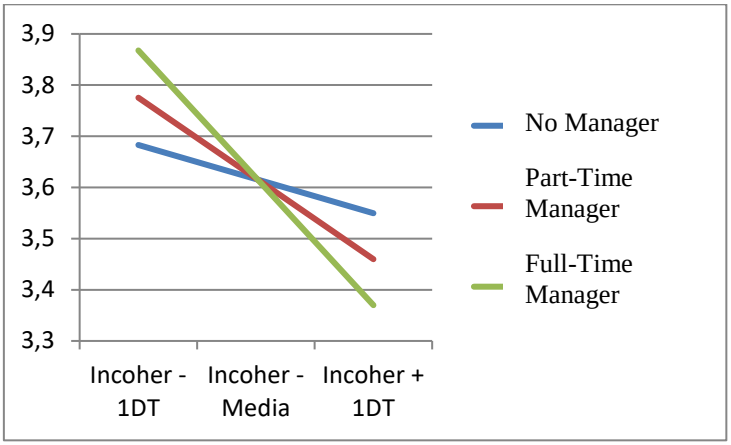
This study's results (Table 4) show that RMI has a significant and negative effect on RME. This result confirms our first hypothesis (H1). Additionally, the interaction between RMI and more time assigned to a supply chain RM also has a significant and negative effect on RME. This second result confirms our second hypothesis (H2), and therefore the negative moderator effect that an RM has on the relationship between incoherence and efficacy in SCRM.

Table 4: Moderated Regression Results

	Risk Management Efficacy (RME)		
	Model 1	Model 2	Model 3
Constant	3.680*** (0.145)	3.799*** (0.149)	3.738*** (0.151)
Number of Suppliers	-0.028 (0.029)	-0.013 (0.028)	-0.018 (0.028)
Volume of Purchases	0.006 (0.024)	0.001 (0.023)	0.008 (0.023)
Geographical Dispersion	0.017 (0.030)	-0.001 (0.029)	0.003 (0.029)
Risk Manager (RM)	-	0.037 (0.042)	0.129* (0.067)
Risk Management Incoherence (RMI)	-	**-0.204***** (0.075)	-0.145* (0.081)
Interaction (RMI x RM)	-	-	**-0.198*** (0.113)
R^2	.017	.114	.141
F	.569	2.512**	2.649**
ΔF		5,352***	3,068*

*** p < 0.01 ** p < 0.05 * p < 0.10 (Standard Error)

Graphic 1 presents the interaction plot for these three variables revealing the relationship between RMI, RME and RM in greater detail. The graph shows the interaction between incoherence and efficacy in SCRM in three different situations: when there is no manager in charge, when there is a part-time manager, and when there is a full-time manager.



Graphic 1: Plotting the interaction between Risk Management Incoherence and Efficacy.

The negative slope of the relationship between incoherence and efficacy in SCRM steepens when more time is assigned to the RM. Moreover, the lines representing this relationship in the three circumstances described above intersect at a given point. This

means that when the level of incoherence is low, more time assigned to the RM position for the same level of incoherence will lead to higher levels of efficacy, and more time invested in risk management at this level of incoherence will help to better identify those strategies that are more useful, and better adjust to them. This will allow improving efficacy.

However, the situation changes when the level of incoherence in risk management is high. In this second situation, more time assigned to an RM will lead to lower levels of efficacy for a given level of incoherence. High rates of incoherence imply that either the analysis for identifying the more useful strategies is very complex or that the useful strategies are so different to the ones implemented that it is very challenging to change them. In this situation, assigning more time and responsibility to an RM seems to be counterproductive. A single RM may not be enough to improve the analysis if it is very complex, so a cross-functional team providing different perspectives may be more useful, or more implication and resources would be needed from top management. A single RM may not be enough either to implement the strategies needed if they are very different to the ones required. A global corporate approach or top management engagement may be called for.

However, in this situation of considerable incoherence, which may require the support of the rest of the organization, assigning more time to a supply chain RM seems to cause a moral hazard problem (Arrow, 1970; Eisenhardt, 1989). Assigning more time, and consequently more responsibility, to the supply chain RM may reduce the rest of the organisation's involvement in risk management, as they will not be the ones rewarded or punished for its consequences. When incoherence is higher, the incentives to avoid responsibility are bigger because the analysis of usefulness in these situations is more difficult and/or changes in mitigation strategies bigger, so the risks of making wrong decisions and in some way being punished for them are greater.

These results have different implications for the academic world. Firstly, they invite researchers to keep proposing models that explain the circumstances in which certain risk mitigation strategies are more appropriate. Secondly, this analysis also prompts academics to control for the importance of different performance indicators. Thirdly, this paper invites scholars to study the relationship between organizational structure and SCRM. Our results also have major implications for the professional world. Firstly, it invites supply chain RMs to focus on identifying those strategies that are more useful for their particular company. To do so may require designing mechanisms for monitoring the incoherence in their risk management systems, which would involve assessing their utility and controlling their implementation. Secondly, it alerts managers to the need to evaluate what the underlying problems are when a high RMI exists despite having an RM.

References

Aguinis, H. (2004), *Regression Analysis for Categorical Moderators*, The Guilford Press.

Andrews, K. (1971), *The concept of corporate strategy*, Irwin, Homewood, Il.

Armstrong, J. S., Overton, T. S. (1977), "Estimating non-response bias in mail surveys", *Journal of Marketing Research*, Vol. 14, No. 3, pp. 96–402.

Arnold, H. J. (1982), "Moderator variables: A clarification of conceptual, analytic, and psychometric issues", *Organizational Behavior and Human Performance*, Vol. 29 No. 2, pp. 143-174.

Arrow, K. J. K. J. (1970), *Essays in the theory of risk-bearing* (No. 04; HB615, A7.).

Chandler, A. D. (1962), *Strategy and structure: Chapters in the history of the American industrial enterprise*, MIT Press, Cambridge, Mass.
Child, J. (1972), "Organizational structure, environment and performance: The role of strategic choice", *Sociology*, Vol. 6, No.1, pp. 11-22.
Chopra, S., and Sodhi, M. S. (2004), "Managing risk to avoid supply-chain breakdown", *MIT Sloan Management Review*, Vol. 46, No. 1, pp. 53.
Djelic, M. L., Ainamo, A. (1999), "The coevolution of new organizational forms in the fashion industry: A historical and comparative study of France, Italy and the United States", *Organization Science*, Vol. 10, No. 5, pp. 622-637.
Eisenhardt, K. (1989), "Agency Theory: An Assessment and Review", *Academy of Management Review*, Vol. 14, No.1, pp. 57-74.
Engdahl, R. A., Keating, R. J., Aupperle, K. E. (2000), "Strategy and structure: Chicken or egg? (Reconsideration of Chandler's Paradigm for Economic Success)", *Organizational Development Journal*, Vol. 18, No. 4, pp. 21-32.
Fisher, M. L. (1997), "What is the right supply chain for your product", *Harvard Business Review*, Vol. 75, pp. 105-117.
Fredrickson, J. W. (1986), "The strategic decision process and organizational structure", *Academy of Management Review*, Vol. 11, No. 2, pp. 280-297.
Giannakis, M., and Papadopoulos, T. (2016), "Supply chain sustainability: A risk management approach", *International Journal of Production Economics*, Vol. 171, pp. 455-470.
Ho, W., Zheng, T., Yildiz, H., and Talluri, S. (2015), "Supply chain risk management: a literature review", *International Journal of Production Research*, Vol. 53, No. 16, pp. 5031-5069.
Kilubi, I. (2016), "The strategies of supply chain risk management–a synthesis and classification", *International Journal of Logistics Research and Applications*, Vol. 19, No. 6, pp. 604-629.
Lavastre, O., Gunasekaran, A., and Spalanzani, A. (2014), "Effect of firm characteristics, supplier relationships and techniques used on supply chain risk management (SCRM)", *International Journal of Production Research*, Vol. 52, No. 11, pp. 3381-3403.
Li, G., Fan, H., Lee, P. K., and Cheng, T. C. E. (2015), "Joint supply chain risk management: an agency and collaboration perspective", *International Journal of Production Economics*, Vol. 164, pp. 83-94.
Manuj, I., and Mentzer, J. T. (2008), "Global supply chain risk management", *Journal of Business Logistics*, Vol. 29, No. 1, pp. 133-155.
Manuj, I., and Mentzer, J. T. (2008), "Global supply chain risk management strategies", *International Journal of Physical Distribution and Logistics Management*, Vol. 38, No. 3, pp. 192-223.
Mishra, D., Sharma, R. R. K., Kumar, S., and Dubey, R. (2016), "Bridging and buffering: Strategies for mitigating supply risk and improving supply chain performance", *International Journal of Production Economics*, Vol. 180, pp. 183-197.
Porter, M. E. (1991), "Towards a dynamic theory of strategy", *Strategic Management Journal*, Vol. 12, No. S2, pp. 95-117.
Roca Puig, V., and Bou Llusar, J. C. (2006), "El concepto de ajuste en dirección de empresas: definición, metodología e hipótesis", *Investigaciones Europeas de Dirección y Economía de la Empresa*, Vol. 12, No. 3.
Stecke, K. E., and Kumar, S. (2009), "Sources of supply chain disruptions, factors that breed vulnerability, and mitigating strategies", *Journal of Marketing Channels*, Vol. 16, No. 3, pp. 193-226.
Talluri, S. S., Kull, T. J., Yildiz, H., and Yoon, J. (2013), "Assessing the efficiency of risk mitigation strategies in supply chains", *Journal of Business Logistics*, Vol. 34, No. 4, pp. 253-269.
Tang, C. S. (2006), "Robust strategies for mitigating supply chain disruptions", *International Journal of Logistics: Research and Applications*, Vol. 9, No. 1, pp. 33-45.
Tang, O., and Musa, S. N. (2011), "Identifying risk issues and research advancements in supply chain risk management", *International Journal of Production Economics*, Vol. 133, No. 1, pp. 25-34.
Thun, J. H., and Hoenig, D. (2011), "An empirical analysis of supply chain risk management in the German automotive industry", *International Journal of Production Economics*, Vol. 131, No. 1, pp. 242-249.
Venkatraman, N. (1989), "The concept of fit in strategy research: Toward verbal and statistical correspondence", *Academy of Management Review*, Vol. 14, No. 3, pp. 423-444.
Zsidisin, G. A., and Ellram, L. M. (2003), "An agency theory investigation of supply risk management", *Journal of Supply Chain Management*, Vol. 39, No. 2, pp. 15-27.