Supply chain disruptions due to a climate of crime and violence

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Abstract

Since North American Free Trade Agreement was signed, there has been an increment in the industrial activity in Mexico and in the levels of crime and violence which may hinder the capacity of companies to move goods efficiently. This article describes a framework for the phenomenon and provides first cases.

Keywords: supply chain disruption, crime & violence, prevention & mitigation strategies

Introduction

According to data from the Mexican Bureau of Statistics (INEGI), there has been an increment of occurrences in federal crime since late 1990's up to now. Although federal crimes are substantially diverse in causes and effects, most public attention and mass media opinions are given to the violence related to drug cartels. The phenomenon of violence in Mexico has two edges; on one hand, business environment is seen undermined by news that emphasize the problem of violence and on the other, the deterioration in operations due to violence that occurs in specific places or along companies' value chain. It is clear that both edges have a negative impact on direct investment in Mexico, however, the effects of the second are directly related to operations management as the existing investment would be at risk if disruptions occur frequently or for long periods. Therefore, the study of supply chain disruptions has focused its attention to prevent, assess the risk and mitigate physical, financial, informational, relational and innovative activities (Cavinato, 2004); authors have pointed out supply chain structural and infrastructural issues such as: complexity, interdependence and coupling as major causes of disruptions (Habermann, 2009) should therefore examine the methods and prevention strategies of multinational corporations in a climate of violence. The purpose of this article is to analyse the impact of high levels of violence on multinationals competitiveness, the potential risk of divestment and future commitment of multinationals with its operations in Mexico. The article describes a framework for the phenomenon and provides first cases.

The phenomenon of crime & violence in relation to business investment

The levels of violence in Mexico due to federal crimes such the ones produced by drug cartels may hinder the stability of business operations in Mexico (Ceniceros, 2011). Country managers indicate that although the operations of multinationals in the country are not the target of criminals, the current violence undermines operations substantially by secondary effects such as: being in the middle of a crossfire situation or even common crime produced by petty criminals who take advantage of the increasing levels of violence (Katz, 2010), while federal forces are busy with controlling drug flows into North America. Workers in problem areas like villages along the main drug routes are the most affected, especially poor women who migrated from the countryside to cities to work in the maquiladoras, where police corruption and unethical work practices contribute to crime (Panther, 2007). Figure 1 shows an upward trend in the percentage change in the number of federal crimes prosecuted nationally during 1998 – 2011 period; rising levels of crime triggered social protest and regional disturbances as a sign of public dissatisfaction upon learning that the future outlook on crime will not improve (Business Monitor International, 2012), (Business Monitor International, 2011). Moreover, the international community is wondering whether or not Mexico is a failed state because of the lack of federal government's ability to control the situation and provide stability at least for commercial operations (Kan, 2011), (OxResearch Daily Brief Service, 2007). This problem has pushed Mexico's trading partners to develop the 'Alliance for the Prosperity and Security of North America' which includes Mexico and Central America in a field of common fight against crime (Cockcroft, 2010), emphasizing the importance of crime control to protect the trading routes in North America.

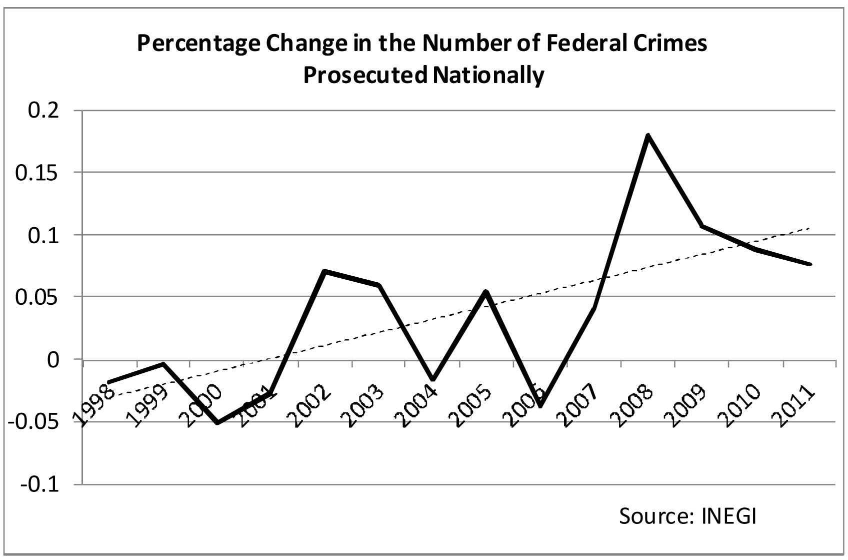

Figure 1: Percentage Change in the Number of Federal Crimes Prosecuted Nationally

Figure 2 shows the relationship between crime and productivity; the chart is a score plot built base on the following data: (1) accumulated federal prosecuted crime during 1998 – 2011 period, (2) accumulated value added activities in the manufacturing sector, (3) average percentage change in crime during 1998 – 2011 period, and (4) average percentage variation of value added activities in the manufacturing sector during 1998 – 2011 period. Four quadrants are shown from which Q1 and Q2 are the leading manufacturing locations to which states right at the US border belong, apart from central states such as: Mexico City, Mexico state, Veracruz, Guanajuato, Puebla and western locations such as Jalisco state. In general terms violence is higher in central states than in those right at the border. This is the case of Nuevo León (Nvl) right at the border with Texas where Monterrey City is located at barely 140 miles from the border. Monterrey has been one of the most promising business cities in Mexico in recent decades; but now, the city experiences an annual increase in crime over 10% on average (see: Figure 3).

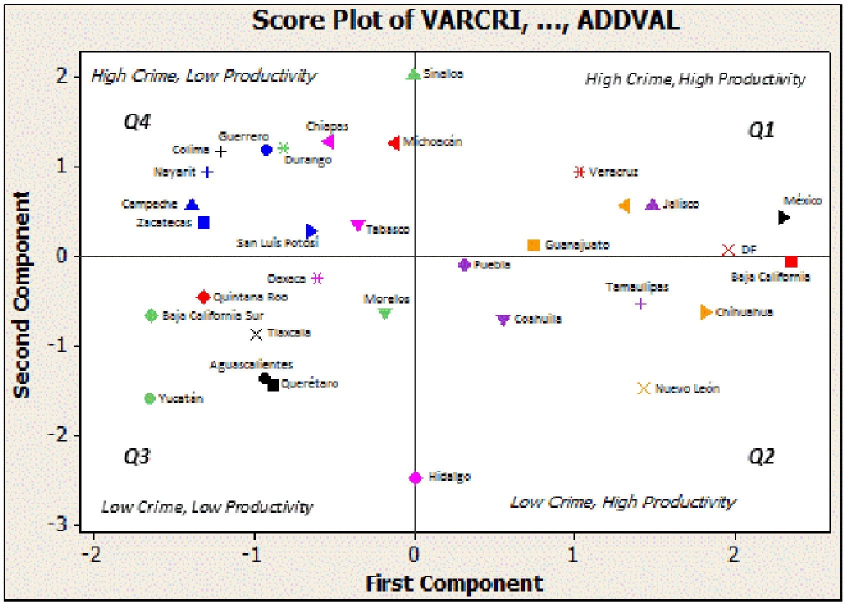

Figure 2: Relationship between Crime and Productivity

Although authors have already mention that high levels of crime and violence affects the flows of direct investment into Mexico (Madrazo-Rojas, 2009), it is important to research how this affects to the already established operations of multinationals. Consequently, it is possible to make the following hypothesis:

H1: the higher the level of crime and violence, the higher the risk of investment

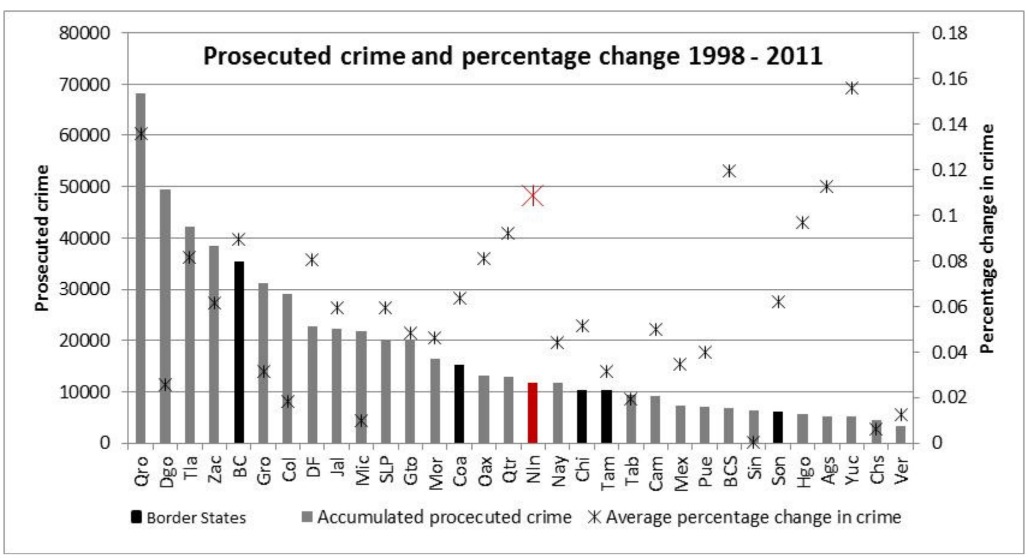

Figure 3: Prosecuted federal crime and average percentage change

The phenomenon of crime and violence in relation to Supply Chain

Literature on supply chain disruptions points out major components. Table 1 shows a summary of such review; the topics are classified for a better comprehension of the phenomenon, with the aim to answer the following questions:

(1) *'what activated the disruption'*
(2) *'why the disruption occurred'*

(3) *'how the disruption was mitigated'*

Table 1: Supply Chain Disruption topics as an interview guide

Question	Concept	Choices	Source
What	Disruption type (activator)	Physical, Financial, Informational, Relational, Innovational Other (supplied by interviewee)	(Cavinato, 2004)
Why	Evaluation & Mitigation of disruptions	Info systems, what if scenarios, Continuous Improvement, KPI, Redundancy, Diversification Other (supplied by interviewee)	(Zsidisin & Wagner, 2010) (Tomlin, 2006)
How	Solution applied	Financial, Operational, Configuration Other (supplied by interviewee)	(Zsidisin & Wagner, 2010) (Tomlin, 2006) (Pickett, 2006) (Kleindorfer & Saad, 2005)

In relation to 'what activated the disruption', authors mention the lack of five possible means (Cavinato, 2004): (1) Physical, (2) Financial, (3) Informational, (4) Relational, and (5) Innovational. During disruptions physical and financial means can go missing; however, multinationals are able to use information and network relations to go around the problem. Thus, the lack of physical and financial means can be considered as a ***low disruption risk***. However if companies lack of informational and relational means, they would need to relay on their own internal resources to go ahead therefore, the lack of information and network relations is considered as ***medium disruption risk*** and consequently the lack of using own companies' resources for crafting an innovative solution would be considered as ***high disruption risk***. According to what has been mentioned above, it is possible to make the following hypothesis:

H2: the higher is the level of crime and violence, the higher is the risk of disruption

H3: the higher is the risk of disruptions in the value chain due to the lack of means, the lower the competitiveness of multinational operations in the host country

In relation to 'why the disruption occurred', authors points to the lack of tools to prevent and mitigate disruptions such as: information systems, what if scenarios, continuous improvement, key performance indicators, redundancy and diversification (Zsidisin & Wagner, 2010), (Tomlin, 2006). The implementation of these tools requires certain cost for companies; in consequence, information systems and what if scenarios are the ones ranked ***low cost***. In contrast, continuous improvement and key performance indicators requires ***medium cost*** because a system to design, maintain and track indicators is needed and then, they are ranked medium. Finally, Redundancy and diversification are ranked ***high cost*** because all what is involve to in developing such tools. According to what it has been said above, it is possible to make the following hypothesis:

H4: the higher is the level of crime and violence, the higher is the cost of prevention and mitigation of disruptions

H5: the more expensive are the tools to prevent and mitigate disruptions, the lower the competitiveness of multinational operations in the host country

Multinationals are expected to seek alternatives to deal with the wave of crime and violence before considering divesting; these alternatives are usually network relationships with companies, industry chambers or any other local institution. Authors have coined the term of '***embeddedness***' to explain how multinationals create local networks and collect distinguished knowledge and impact positively on the subsidiary's expected performance (Andersson, et al., 2005), (Garcia-Pont, et al., 2009), (Andersson, et al., 2007). Consequently, it is possible to make the following hypothesis:

H6: the higher is the level of crime and violence, the higher is the need of embeddeness in the host location

In relation to 'how the disruption was mitigated', authors state three main types of mitigation: Financial, Operational and Configuration (Zsidisin & Wagner, 2010) (Tomlin, 2006), (Pickett, 2006), (Kleindorfer & Saad, 2005). As for the case of tools to prevent and mitigate disruptions, mitigation types are also ranked according to the effort they imply; therefore, financial mitigation refers to the increase in the cost of operations due to the use of other carriers or transport modes not considered before the disruption. This type is mitigation is ranked ***low effort*** because with little effort the company could have quick responses. Operational mitigation ranked ***medium effort*** because it implies the development of processes which were not needed before disruption and that are not part of the core business. Finally, configuration is ranked ***high effort*** because it implies a change in companies' configuration and coordination mechanisms (new plants, new distribution channels, supplier development, etc.) to overcome the disruption. According to what has been said above, it is possible to make the following hypothesis:

H7: the higher is the level of crime and violence, the higher is companies effort to prevent and mitigate disruptions

H8: the more effort is needed to prevent and mitigate disruptions, the higher is companies' embeddedness

Finally, the amount of subsidiary embeddednes and reduction of competitiveness are two factors that have a direct but contrary implication on the risk of divestment; while subsidiary embeddedness would strengthen companies' ability to cope with high levels of crime and violence, the reduction of competitiveness would increase the chances of divestment. The following hypotheses explain this behaviour:

H9: the higher is the level of embeddednes, the lower is the risk of divestment

H10: the lower is the companies' competitiveness, the higher is the risk of investment

Figure 4 shows the hypothesized model.

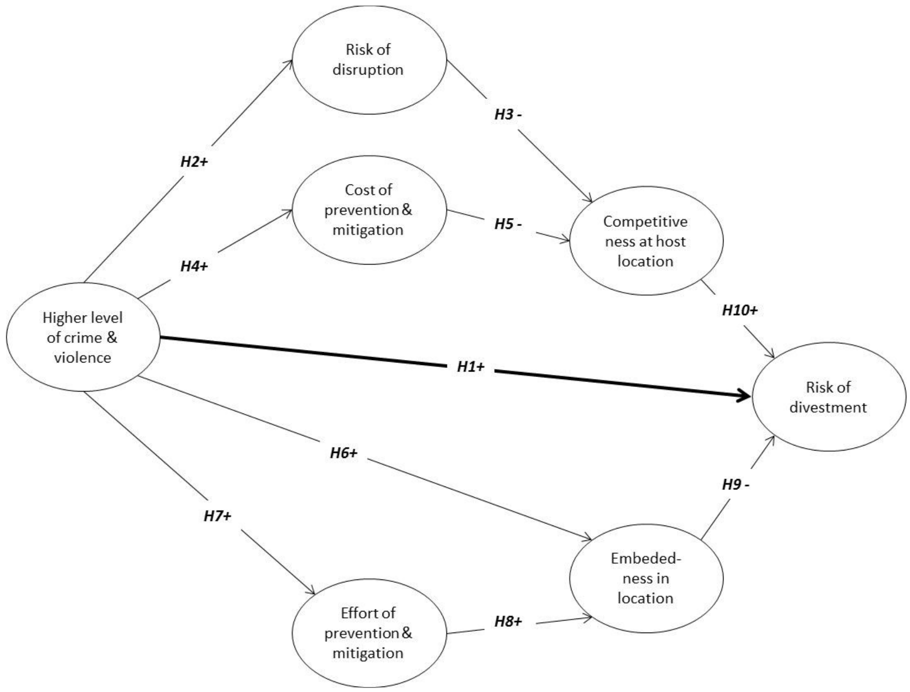

Figure 4: The hypothesized model

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