6
Empirical Study on SCRM

This section presents the empirical findings that address the real-life manifested risks (risk events) that affected end customers obtained the three Brazilian automotive SCs and offers an initial risk profile for this industry. To better analyze the findings the identified risks were grouped as volume and mix mismatches between customers' demand and dealers' supply, which from a flexibility perspective are external flexibility types ("what the customer sees"- i.e. Upton, 1994) and from a risk perspective are manifested risks. In this sense the empirical studies on SCF presented in Chapter 5 of this Thesis are rewritten in this Chapter under a risk perspective. The result analysis is organized according to the main constructs that compose SCRM, as identified by Jüttner et al. (2003) and Gaonkar and Viswanadham (2007): risk drivers, risk sources, risk consequences, and risk-mitigation strategies.

6.1.
Volume mismatch between end customers' demand and dealers' supply

During the interviews in the distribution channel of SCs A and B, the volume mismatch between end customers' demand and dealers' supply was indicated as a significant result of manifested risks along the SC as dealers could not entirely meet the market demand for some vehicle models. There was a significant and unexpected increase in the demand for new cars in Brazil, especially for the vehicle models of SCs A and B and the production capacities of some important suppliers could not adequately meet this demand growth, such as the engine supplier for SC A and the alloy wheels supplier for SC B.

Even though the engine supplier could enhance its overall output by implementing flexible labour force journeys and flexible contracts (using flexibility as a mitigation strategy), the increase was not sufficient to meet the end

customers' demand. This outcome resulted in a loss of sales and in a negative corporate image impression for end customers because they did not receive what they had desired (an issue that was strongly emphasised by the dealers). This first-tier supplier invested in increasing its daily production to meet the new demand requirements. This capacity increase should take one year to be implemented, which reinforces the presence of inertia as a risk source in the network. Once this first-tier capacity is resolved, the lack of response in SC A is transferred to the second-tier supplier responsible for the engine blocks and crankshafts due to its difficulty in adequately increase its production capacity to meet the new demand (an inertia characteristic). This phenomenon is a result of the large investment in tools for machining crankshafts needed to increase volume capacity and the time to start new production (up to two years). Another problem is that these second-tier suppliers are afraid of a future demand decrease that would make them idle again as a result of an environmental risk source (macroeconomic uncertainty), such as the one manifested in the late 1990s after a boom in demand and large investments in capacity in the Brazilian automotive industry. Additionally these suppliers are concerned to new government economic reforms and constant changes in government regulations (government policy uncertainty), which affect their operations in Brazil and inhibit new investments to increase their capacity.

The main drivers that trigger inertia-related risk sources are supply dependence and supplier concentration, where the suppliers of engine and engine blocks and crankshafts are single-source examples.

The limitation posed by the production capacity of alloy wheels offers another interesting case. There was a shortage of this component as this supplier could increase its production capacity to that of the VM beyond the agreed level in the contract after only six months (with no flexibility before that) and the VM could not find available capacity from other suppliers. This situation represents network inertia in responding to the market demand change and a supply dependence on this single-source supplier. Whenever possible, the different vehicle models were configured with steel wheels instead of alloy wheels, but this approach only worked with the inexpensive subcompact vehicle models. However, the highly valued compact model produced by SC B could not be pushed downstream with steel wheels. Consequently, the VM had to reduce this vehicle model's production at the vehicle assembly plant. The potential end

customers were disappointed because the number of units of this model delivered to dealers was insufficient to meet the demand, resulting in loss of sales. Table 14 summarizes the main constructs founded in this empirical study.

Risk Driver	Risk Source	Risk mitigation strategy	Risk Consequences
Supply dependence Supplier concentration	Industry Source Network- related risk source Environmental Source	Flexibility	Loss of sales Negative corporation image

Table 14- Volume mismatch: main risk constructs

6.2. Mix mismatch between end customers' demand and dealers' supply

Within the volume mismatch observed at the distribution channel of SC A, a second result of manifested risks along the SC emerged. There was a mix mismatch between demand and supply because the model versions requested by the market were those with a 1.0-litre engine, and those in greatest supply were the versions with a 1.6-litre engine. This did not originate from the engine plant's capacity but from the capacity of a VM second-tier electronic injection supplier. This second-tier supplier could not meet the engine plant's demand for the 1.0-litre engine because its exceeded production capacity was designated for another customer. This customer was a rival VM that was also the supplier's owner, which is part of the industry risk source referred to as competitive uncertainty. This engine component was a 'black box' developed under an early supplier involvement (ESI) approach following the supplier concentration and the supplier base reduction strategies, and the development of a new supplier required time and investment (network inertia). As a result, the engine plant increased the production of the 1.6-litre engines as they acquired another electronic injection supplier that could increase its volume sales. The availability of more 1.6-litre engines allowed the VM to produce more vehicles using these engines. Consequently, these versions were pushed to dealers, resulting in a mix supply restriction to end-customers that absorbed the 1.6-litre-engine vehicles with

discounts. However, there were end customers who were not satisfied and thus bought cars from other VMs, which resulted in a loss of sales and a negative corporate image for the analyzed VM (this outcome was strongly emphasized during the interviews at dealers and sales offices).

Macroeconomic and governmental policies uncertainties played important roles in SCs A and C resulting in a mix mismatches between end customers' demand and dealers' supply as a result of manifested risks along the SC embracing. For SC C, the significant devaluation of the local market currency associated to the government interference in trade regulations played important roles in the mix mismatches between end customers' demand and dealers' supply. Because many of the vehicle model components were imported based on the VM global sourcing strategy, the purchase cost of these components (i.e., engines and transmission) increased significantly. This result increased the vehicle model's overall price, and consequently, there was a significant decrease in the model's sales from the forecasted sales. The vehicle assembly production efforts were concentrated in just two of the four original versions, dropping the other two versions to avoid risk as a desperate reactive mitigation strategy. Moreover, these two versions had to use components that were already in the pipeline, which further reduced the options available and impacted the quality perceived by end customers and the image of the company (additional risk consequences). For instance, vehicles were produced with the doors and seat trims that were in stock or with VM orders that were already placed. This consequence prevented end customers from being able to order available trims from the catalogue, restricting their choices to the trim available in the SC pipeline.

For SC A, the problem was at the second-tier supplier level, which resulted in the interruption of supply to the end customers. One second-tier supplier located in another Latin-American Country and responsible for two key components of the diesel engines had to stop production due to financial problems (it was bankrupted) aggravated by changes in government regulations and monetary reforms occurred in this country. Because it was a single-source operation (a risk driver based on supplier concentration and supplier dependence), no diesel engines could be produced and delivered to the VM assembly plant in Brazil. This situation led to cancellations of sales by the VM of its model versions with this type of engine for several months. A new second-tier supplier was

developed, but in the short term, beyond losses in sales there were also financial losses and cost increases due to a large inventory of diesel engine components that could not be used in gasoline engines.

In SC B, the product market uncertainty was also a risk source that resulted in a mix mismatch. The VM had to consider the capacity volume restrictions of air-conditioning and power-steering suppliers in the production plan for its vehicle assembly plant. These suppliers could not increase their supply to the VM to align vehicle production to the new demand pattern for new cars in the Brazilian domestic market. Thus, the VM sales department could not offer dealers many vehicle models with these components, resulting in a forced "push" to dealers with a mix that was not ordered (cars without these components). This issue was particularly significant for one highly valued compact model, where only 60% of dealer orders for cars with air-conditioning were delivered with this component by the VM. The end customers of the low-cost subcompact model were not completely disappointed because dealers were able to fit some of the vehicles with these missing components at their points of sales. However, this postponement mitigation strategy did not work accordingly for the highly valued compact model because their end customers were concerned with the product quality obtained from late-configuration services performed at the dealerships rather than at the vehicle assembly plant. This situation resulted not only in sales losses but also in product quality losses according to the end customers, which was highlighted by the dealers as damage to the corporate image of the VM. It took two months to develop a new contract with the power-steering supplier that involved a larger procurement volume so that this first-tier supplier could hire and train new employees. Meanwhile, flexible labor force journeys were used to increase the production level. A second air-conditioning supplier was selected because the current supplier could not cover the gap in the demand for this component, which also required two months. Table 15 summarizes the main constructs founded in this empirical study.

Risk Driver	Risk Source	Risk mitigation strategy	Risk Consequences
Supply dependence Supplier concentration Global Sourcing	Industry Source Network-related risk source Environmental Source	Flexibility Avoidance Postponement	Loss of sales Negative corporation image Reduction of the quality perceived Cost increase

Table 15- Mix mismatch: main risk constructs