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Research Method

The current research was conducted through a multi-tier case study approach. A case study was performed to examine contemporary phenomena within their real-life contexts, particularly when the boundaries between them are not clearly defined. Therefore, the results provide guidelines for studying current themes and situations in which the researcher observes facts and attempts to understand, systematize, and analyze his or her observations (Voss et al., 2002; Yin 2008). Yin (2008) states that case study research should be used when “how” or “why” research question is being asked about a contemporary event, over which the researcher has no control. The multi-tier approach is in line with the argument made by Choi & Liker (2002, p. 202) that “it is certainly easier to get data on dyadic relationships, but the more challenging and perhaps more interesting questions involve longer SCs. This is where the key system dynamics will be revealed.”

This study considered the Brazilian automotive industry, using the data of three SCs that are responsible for producing vehicle models with high sales in Brazil in recent years. The choice of Brazil was motivated by the fact that emerging countries have been playing important roles in this industry’s SCs and have become relevant object of study by many researchers (Pires, 1998, Scavarda et al., 2010; Sorte Junior, 2011).

The choice of the automotive industry was motivated by the fact that main advances in SCM have been done within this industry (Thun & Hoenig, 2011; Wagner & Camargo, 2012; Grötsch et al., 2013), what makes it an interesting and motivating field for research and also due to the importance of this industry in Brazilian economy (Mesquita & Castro, 2008; Jabbour et al. 2013)

As any finding or conclusion in a case study is likely to be much more convincing and accurate if it is based on several different sources of information, following a corroboratory mode (Yin 2008), this research used multitude of data

sources. Combining sources of evidence, while shifting between analysis and interpretation, usually denotes triangulation (Denzin, 1978; Yin 2008), which is often thought of as a way of guarding against researcher bias (Taylor & Bogdan, 1984). Data were gathered utilizing interviews and *in loco* visits for direct observation. Triangulation was sought both within firms, by comparing the interview responses and observations from *in loco* visits, and between firms, by comparing the responses of inter-related firms, similarly to Stevenson & Spring (2009) in their multi-tier study. The thesis author conducted the interviews and plant visits aided by two additional researchers, providing another form of triangulation (Taylor & Bogdan, 1984). Interviews were conducted with 18 senior executives from three SCs, covering three or four of their tiers and followed the demand direction. Figure 1 guided the data collection and analysis

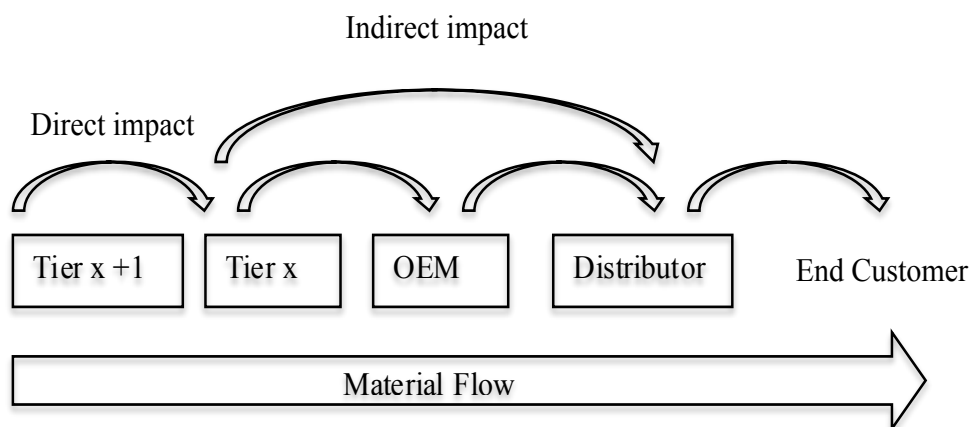


Figure 1- Research Framework

The three SCs included two regional sales executives from their distribution channels (Car Mega-Dealer group and vehicle manufacturer's (VM's) regional office), for a total of six executives. Additionally, SC A included two executives from the VM's assembly plant (logistics general manager and production planning manager), one from a first-tier supplier (general manager of an engine plant), and two from second-tier suppliers (director of the electronic injection supplier and director of an engine blocks and crankshafts supplier). SC B included two executives from the VM's assembly plant (production planning manager and procurement manager) and two from first-tier suppliers (general manager of a power-steering supplier and general manager of an alloy wheel supplier). SC C included two executives from the VM's assembly plant (production planning

manager and logistics general manager) and one from a first-tier supplier (production manager of the seat supplier). The interviews were based on a semi-structured questionnaire designed for this purpose (Yin 2008) by considering an interview protocol adapted from Manuj & Sahin (2011), which is presented in Table 12.

| | |
|--|--|
| Opening | Introductions of the interviewer and the interviewee; Overview of the research's scope; Confidentiality assurance. |
| Demographic data | Title of the interview participants; Job history; Background of the organization, SC and industry. |
| Questions for dealers and OEMs' Regional sales offices | Could you indicate a significant case involving your SC that limited the ability to fulfil end-customers' needs? Could you provide the main reasons / sources and SC members involved? What were the main consequences for the SC? How did you deal with this fact? What makes it easy (or difficult) for you to deal with flexibility and risk within a SC perspective? What may help you in dealing with flexibility and risk? |
| Questions for OEMs and suppliers | Do you agree with the case identified by your downstream partner? Could you provide its main reasons and SC members involved? What were the main consequences for the SC? How did you deal with this fact? What makes it easy (or difficult) for you to deal with flexibility and risk within a SC perspective? What may help you in dealing with flexibility and risk? |
| Additional unplanned/ floating prompts | Will you describe that? Could you tell me more about that? Will you explain that in more detail? Can you give me examples or tell me about a related case? Could you provide the contacts of the executives involved companies so we could try to include them in the research? |

Table 12- Interview Protocol

The investigated tiers (companies) are connected and maintain client-supplier relationships (or vice-versa) in the SC. Data collection began at the distribution channel (car dealerships and VMs' regional sales offices) of each SC with the goal of identifying the main cases that limited the ability to fulfil end-customers' needs. All dealers included in this research are members of megadealer groups that account for significant sales volumes in Brazil. The interviews followed the demand (upstream) direction in the SC. The respondents of the VMs helped the researchers during the interviews by identifying key first-

tier suppliers that could also participate in the research. This procedure was also conducted with these first-tier suppliers to determine whether any second-tier suppliers should be included. The main goal was to assemble a representative picture of actors across the main tiers of the SCs, the main flexibility restrictions and risk events to which the three SCs were exposed as well. Concerning SCRM purpose, the objective was to start the risk identification by creating an initial risk profile for the Brazilian automotive industry. Face-to-face interviews were conducted with all selected SC members and lasted between two and four hours and were followed by *in loco* visits to the plants for direct observation. A member-checking process was also conducted with the same executives to validate the results of the researchers' findings and analyzes (Bloor, 1997). This was accomplished by showing the data analysis to the participants to allow them to evaluate and provide feedback about the accuracy of the researchers' understanding. This validation process was done face to face with the executives' offices. Table 13 summarizes the number of interviews and position of interviewee in the studied companies.

| Supply Chain | Interviews conducted with | | | |
|--------------|---|--|---|---|
| | Distribution (Dealer) | OEM / Vehicle Assembly Plant | Tier 1 Supplier | Tier 2 Supplier |
| A | -Sales Manager / Car Dealer -Sales Manager / OEMs' Regional Office | -Logistics General Manager -Production Planning Manager | -General Manager / Engine Plant | -Director / Electronic Injection Supplier -Director / Engine Blocks and Crankshafts Supplier |
| B | -Sales Manager / Car Dealer -Sales Manager / OEMs' Regional Office | -Production Planning Manager -Procurement Manager | -General Manager / Power Steering Supplier Plant -General Manager / Alloy Wheel Supplier | |
| C | -Sales Manager / Car Dealer -Sales Manager / OEMs' Regional Office | -Logistics General Manager -Production Planning Manager | -Production Manager / Seat Supplier | |

Table 13- Interviews and position of interviewee in the studied companies