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**FLEXIBILITIES AND MARKETING: COMPARING BRAZILIAN AND CHINESE  
FASHION COMPONENT SUPPLY CHAINS**

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## **Abstract**

This paper investigates the relationship between flexibility and performance in the target market of the Brazilian and Chinese fashion component industry. This multiple case study was based on the hierarchy of flexibilities presented by Stevenson and Spring (2007). Managers of 24 companies were interviewed in both countries to set the variables of the study. Operational flexibility seems to be heavily influenced by labor and equipment costs in each production chain. Investigation suggests that operational flexibility tier directly influences the other tiers, namely: tactical, strategic, and supply chain flexibility. Deficiencies in one flexibility tier or dimension seem to be compensated by better performance in other tiers and dimensions. Said compensation is related to the company's target market. This is the first study, to the knowledge of the researchers, which compares production chains of similar products in different countries, as well as flexibility in response to market demand.

**Keywords:** Flexibility, Supply Chain, Purchasing & Industrial Marketing

## 1 INTRODUCTION

Initially, flexibility studies focused on internal aspects of manufacturing operations (Slack, 1983 and 1987; Gerwin, 1987 and 1993; and Upton, 1995). Later studies focused on the importance of flexibility in the production chain tier and the need to manage and integrate the entire supply chain (Fisher, 1997; Lambert et al., 1998; Croom et al., 2000; Jack and Raturi, 2002). Stevenson and Spring (2007) proposed four flexibility tiers: operational, tactical, strategic, and supply-chain flexibility. Stevenson and Spring further divided each tier into various dimensions. Other researchers attribute strategic value to flexibility (Lau, 1996; de Toni and Tonchia, 2005; Krajewski et al., 2005), specifically with regard to client demand (Fisher et al., 1994; Vickery et al., 1999; Olhager and West, 2002).

On the subject of client demand, the literature describes a set of benchmarks used to assess the level of service provided to clients by providers: price, delivery, quality (Cavusgil and Yavas, 1987; Katsikeas and Al-Khalifa, 1993; Deng and Wortzel, 1995; Mummalaneni et al., 1996; Katsikeas and Leonidas, 1996; Lye and Hamilton, 2000), packaging (Ghymn and Jacobs, 1993; Katsikeas and Leonidas, 1996; Piercy et al., 1997; Ghymn et al., 1999), as well as payment service and conditions (Katsikeas and Leonidas, 1996; Piercy et al., 1997; Lye and Hamilton, 2000). Hsu, Kannan, Leong, and Tan (2006, p. 217) propose three constructs for assessing how attractive a particular provider is to potential clients: quality, service, strategic/process adaptability.

The association between flexibility and market orientation is especially marked in the fashion industry, which is subject to more sudden and drastic changes than other industries (ABECASSIS-MOEDAS, 2006). The following reasons are cited as contributing to this context: the subjectivity and impulse that characterize purchasing of fashion products; the instability owing to the seasonal nature of the fashion market; and the extensive interdependence of all of the links in the value chain – from thread producers to retails (JIN, 2004). This final feature is found in other production chains.

Since competition exists not only between companies but also between production chains (O'MARAH, 2001), alternate flexibility strategies employed by different fashion production chains to meet the demands of their clients (manufacturer of high-end fashion product: clothing, shoes, etc.) have become a new field of research. With this field in mind, the research question of this article is the following: *How do companies with similar production chains but located in different countries use different tiers and dimensions of flexibility to meet the demands of their international clients?* The research method select was exploratory multiple case study. According to Yin (2009), “how” type questions can be answered using case studies. 24 material providers from the fashion industry located in China and Brazil were studied. The results of this study can be used as a basis for further research on this topic as well as to create or refine theories regarding supply chains. This article initially presents a revision of the theory on flexibility constructs and the orientation of providers toward market demand. Based on said revision, the theoretical gaps were identified and investigated. Subsequently, the research method and a discussion of the findings are presented (in accordance with the constructs derived from the theory). At the end, the conclusions and the administrative implications are presented.

## **2 THEORETICAL FRAMEWORK**

### **2.1 Flexibility: Degree and Type**

Efforts to increase manufacturing flexibility to gain advantages in an ever more competitive market can influence how production resources are allocated. (CHASE et al., 2004). However, energies focused on one competition factor can collaterally cause either a positive or negative impact on other factors. (Slack, 1983; Easton and Rothschild, 1987; Carlsson, 1989).

This study parts from the premise of the four flexibility tiers mentioned by Stevenson and Spring (2007): operational, tactical, strategic, and supply chain.

Studies on operational flexibility deal with alternatives that enable production of the greatest possible number of items – whether simultaneously or not – at a single industrial plant. These studies focus on the productive resources present on the factory floor (Slack, 1983; Upton, 1995; Koste et al.; 2004). Stevenson and Spring (2007) propose eight dimensions of operational flexibility: equipment, material movement, operations, automation, work, processing, routing, scheduling, and output.

Analysis of tactical flexibility emerged as a result of changes in operational flexibility studies. (Stevenson, 2007). Various tactical flexibility dimensions have been proposed by Slack (1983), Gerwin (1987), Koste and Malhotra (1999), and Narasimhan and Das (2000), and Vokurka and O'Leary-Kelly (2000). Stevenson and Spring (2007) streamlined these proposal into the following dimensions: product/modification, volume, delivery, and production. Stevenson and Spring also put forth the strategic flexibility tier which is made up of the following dimensions: design, expansion, and market.

Extrapolated limits of a company's reach appear in paper such as Lau (1994, 1996), Fawcett et al. (1996), Narasimhan and Das (1999, 2000), Koste (1999), Das (2001), and Olhager and West (2002). That extrapolation led to the concept of supply chain flexibility, which, according to Das and Abdel-Malek (2003), can be defined as the elasticity of the purchaser-seller relationship under changeable supply conditions. The notion of chain flexibility was expanded by Duclos et al. (2003), who proposed a concept model involving six dimensions, which Lummus et al. (2003) later reduced to five, namely: operational system, logistic processes, supply network, organizational design, and information system flexibility. Incorporating non-manufacture factors expanding the understanding of flexibility, which led Stevenson and Spring (2007) to postulate that production chain flexibility was highest in the hierarchy of flexibility tiers, since the value of the whole is greater than the value of the sum of its constituting parts. Analysis shows that Stevenson and Spring (2007) streamlined chain flexibility into the following dimensions: robustness (range of events the chain is capable of addressing), reconfiguration (ease with which the chain can be reconfigured), active (the chain's capacity to respond to or anticipate events), potential (contingency resources), and network alignment (the entities prioritizing the demands that benefit the chain as a whole). These tiers are an adaptation of the manufacturing flexibilities presented by Narasimhan and Das (2000), and Vokurka and O'Leary-Kelly (2000), and the supply chain flexibilities presented by Duclos et al. (2003) and Lummus et al. (2003).

## **2.2 Influence of Flexibility**

Narasimhan and Das (1999, 2000) identified a positive relationship between the supply and the operational flexibility of a company. The important impact of volume flexibility on company performance is described by Vickery et al. (1999), Jack and Raturi (2002), Sánchez and Pérez (2005), and Zhang et al. (2003). Vickery et al. (1999) further relate the influence of launch flexibility on company performance, whereas Zhang et al. (2003) highlight the influence of mix flexibility on client satisfaction.

## **2.3 Market Orientation**

The important impact of flexibility on meeting client demand is acknowledged by various authors (Fisher et al., 1994; Vickery et al., 1999; Olhager and West, 2002). This effect is considered “strategic” by various authors (Lau, 1996; de Toni and Tonchia, 2005; Krajewski et al., 2005). Along another line of research Waller, Dabholkar, and Gentry (2000) postulate that market orientation is one of the factors that influence supply chain performance. The greater the market orientation, the more attractive the provider will be to its clients.

Various papers have analyzed the factors that influence market attractiveness of local providers and concluded that price, delivery and quality are the factors most commonly considered by purchasers (Cavusgil and Yavas, 1987; Katsikeas and Al-Khalifa, 1993; Deng and Wortzel, 1995; Mummalaneni et al., 1996; Katsikeas and Leonidas, 1996; Lye and Hamilton, 2000). Choosing international providers implies the additional factor of packaging (Ghymn and Jacobs, 1993; Katsikeas and Leonidas, 1996; Piercy et al., 1997; Ghymn et al., 1999). Also mentioned were provider service and payment conditions (Katsikeas and Leonidas, 1996; Piercy et al., 1997; Lye and Hamilton, 2000). Hsu, Kannan, Leong, and Tan (2006) propose three constructs for provider selection: quality, service, and strategic/process adaptability (p. 217). The strategic adaptability proposed by the authors implies a shift of focus from price alone (merely transactional) to a set of benefits for purchasers and sellers (p. 216).

## 2.4 Gaps in the Literature

Analysis of the literature presented herein revealed the following gaps:

- With the exception of Stevenson and Spring (2009), researchers have given little attention to small and medium-sized enterprises (SMEs) despite the importance of such organizations to production chain flexibility.
- There were no examples found in the previous literature of studies on exploiting flexibility in similar production chains located in different countries, specifically in newly industrialized countries (NICs).
- The literature on flexibility supposes that the more flexible the production chain, the better. Said premise ignores the possibility of a given company focusing on only a few flexibility dimensions, wherein the remaining flexibility dimensions are delegated to another organization in the production chain. Given this possibility, this article investigates the different alternatives used by companies in a particular production chain to meet their clients' demands.
- Another gap in the research is the relationship between client demand and the flexibility tiers and dimensions to which companies in the production chain give priority.

### **3 RESEARCH METHODS**

#### **3.1 Research Question**

The following was the research question for this article:

*How do companies with similar production chains but located in different countries use different tiers and dimensions of flexibility to meet the demands of their international clients?*

This investigation is based on theoretical gaps that have been identified, adopts the ambivalent posture of Stevenson and Spring (2009), and focuses on the SMEs that make up the fashion industry supply chains in China and Brazil. The fact that Brazil and China compete over a similar market justifies the choice of these two countries, especially since orders originally made to Brazilian companies are currently being redirected to companies in China.

#### **3.2 Methodology**

A multiple case study research method was used. The absence of previous studies on the flexibility-attractiveness of provider makes this an exploratory study, as recommended by Voss et al. (2002). This choice is reinforced by the absence of extensive knowledge regarding the variables and phenomena involved (Benbasat et al., 1987; Meredith, 1998). Exploratory case studies can therefore contribute to new theoretical constructs (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). Multiple case studies are indicated for exploring new theories since they increase external validity, prevent observer bias (Handfield and Melnyk, 1998; Meredith, 1998; Voss et al., 2002), enable triangulation, and increase the general applicability of the findings (Voss et al., 2002; Yin, 2009).

The following was the methodology used in this study: (i) selection of companies in China and Brazil (analysis units) to participate in the study, (ii) develop a protocol (control variables) to be applied during the Chinese and Brazilian phases of this investigation, and (iii) organize the data collected, comparative analysis, deduction of findings and discussion.

### 3.3 Selection of Companies

SMEs that provide material to clothing and shoe manufacturers were chosen in such a way as to make the study more generally applicable and to ensure the validity of the conclusions, as proposed by Voss et al. (2002). All the providers selected provide materials to companies that produce final products and fall into one of the following profiles as defined by Abecassis-Moedas (2006):

- **Traditional Manufacturing Companies (TMC)**: companies that design and produce products which they sell to retail networks or to designer labels that outsource production.
- **Non-Industrial Manufacturers (NIM)**: companies that design products, outsource production, and sell their products to retail networks or to designer labels that outsource production.
- **Brand Name Companies (BNC)**: companies that design products, outsource production, then sell their products to department stores or sell them in their own stores.

The provider were divided into four groups based on the type of material they provide (cloth, metal, soles, and non-metallic decoration). Each group comprises six providers – three from China, three from Brazil – for a total of 24 companies. Six months and the aid of American and European importation agents active in China and Brazil were required to select and confirm acceptance of the companies participating in the study.

### **3.4 Data Collection and Analysis**

In the first stage of the study, conducted in 2008, the variables to be considered in the study were discussed with administrative personnel from both countries. The variables for analysis of constructs selected by these administrators are presented in Chart 1. The flexibility variables were based on the hierarchy proposed by Stevenson and Spring (2007) and market orientation took into consideration the work of Hsu, Kannan, Leong, and Tan (2006). The second stage of the study was conducted in 2009 and investigated the variables defined in the first stage.

In the China phase of the investigation, administrators were interviewed from companies in the Dongguan area that manufacture materials for fashion products. This area was chosen due to the similarity of its products to those manufactured in or near Franca and Novo Hamburgo in Brazil, the locations of the Brazil phase of data collection. Visits to clothing and shoe component malls in Dongguan as well as the personal observations of manufacturing facilities made by the researchers were used as sources of evidence. Identical research protocols were used in China and Brazil.

Chart 1 also presents constructs derived from the theory, variables for evaluating said constructs, and the means for verifying said variables.

### **3.5 Information Analysis**

In order to assure validity and reliability of the analysis of findings referred to by Yin (2009), the researchers took the following measures: transcription of notes taken during interviews, analysis and compilation of the findings made to facilitate later comparison. All interviews were conducted by the researchers themselves. The analysis of the findings initially sought to identify common patterns between the two contexts, then individual analysis of the two countries. Finally, the two cases were compared and contrasted in accordance with the sources of evidence. Triangulations among the different sources of evidence were made wherever possible.

**Chart 1 – Variables researched**

<b>CONSTRUCT</b>	<b>VARIABLE</b>	<b>DESCRIPTION</b>	<b>VERIFICATION*</b>
Operational flexibility	Machine	Range of operations that a piece of equipment can perform without resulting in a major setup.	E / O
	Process	The range of parts that can be produced without resulting in major setup.	E / O
	Output	Ease with which short-term capacity adjustments can be made to the shop.	E
Tactical flexibility	Delivery	Ability of the system to respond to changes in delivery requests.	E / O
	Product	Ability to add or substitute new parts into the System.	E / O
	Volume	Range of output levels at which the system can cost effectively produce products.	E
Strategic flexibility	Design	Speed (and cost effectiveness) at which the firm can design and introduce new products into the system.	E
	Market	In-house ability to adapt to changes in the market environment.	E / O
Supply chain flexibility	Robustness	Range of market change with which the existing supply chain configuration is able to cope.	E
	Relationship	Ability to build collaborative relationships both up and downstream, including for new product development.	E / O
	Logistics	Potential to rapidly send and receive products cost effectively as customers and sources of supply change.	E
Orientação ao mercado	Qualidade	Nível de qualidade dos produtos fornecidos.	E / O
	Pontualidade	Pontualidade na entrega de materiais.	E / O
	Preços	Comparativo do preço dos materiais vendidos.	E / O / D

\* I – Interview / O – Researchers' Observations / D – Document Analysis

## **4 INFORMATION COLLECTED**

The following subsections present the findings of this study, which are organized in accordance with the flexibility hierarchical levels proposed by Stevenson and Spring (2007).

### **4.1 Operational Flexibility**

The Chinese companies make use of simple, inexpensive equipment. These factors facilitate increased capacity by adding new machines, whether purchased or leased for a certain period of time. Said equipment is limited in its ability to perform new operations or processes without substantial set-up considerations. According to the interviews, Chinese companies increase their operational flexibility by increasing their number of machines and workers. The interviewees said that said measures had little negative effect on the final price of the material produced, since equipment and labor costs are low in China.

Though a newly industrialized country like China, labor costs in Brazil are greater than in China (though less than in the United States or Europe). Furthermore, employment benefit cost in Brazil is greater than in China. The factors contribute to the fact that Brazilian companies tend to purchase equipment that is more automated (and more expensive) in order to reduce the need for labor in their production lines and to increase the processing dimension of operational flexibility.

The best example of the difference in operational flexibility was seen in companies that produce soles for footwear. In the Chinese company, there was one operator for each machine which injected either the left or right sole of a pair of shoes. The other sole was injected on a different machine. At the Brazilian companies, one operator ran four or five machines at a time with each machine producing one or several pairs of soles (i.e. right and left soles).

## **4.2 Tactical Flexibility**

The manufacturing structure of the Brazilian companies enables them to compete in the low-volume fashion product market with its high level of model variability and reduced life cycle (also known as the fast fashion market). In this market, the provider must be able to adjust the production plan and modify products in order to quickly meet new client demands.

Nevertheless, greater tactical flexibility in terms of product and delivery dimensions of the Brazilian companies has major cost implications, especially when the volume dimension is analyzed. As observed, greater volume had only a minor impact of price discount in the case of Brazilian providers (between 5% and 10%). In contrast, the production structure of Chinese companies enables them to offer their clients substantial volume discounts. Data provided by the Chinese companies indicate that the price of their products can be discounted up to 60% of the price of Brazilian products when the volume of the order is multiplied by 10.

### **4.3 Strategic Flexibility**

The combination of improved performance of Brazilian companies in terms of operational and tactical flexibility enables them to offer their clients improved strategic flexibility. As observed, Brazilian companies are able to respond to their clients' design and market needs more quickly (within 30 days), whereas Chinese companies – focused on providing large volumes at low cost – can request up to six months to meet the new demands of their clients (while maintaining the original price quoted).

### **4.4 Supply Chain Flexibility**

Though Chinese companies are less flexible in most dimensions or operational, tactical and strategic flexibility, they are unbeatable in the supply chain tier. As observed, the low labor and machine costs associated with the wide network of providers in China enable the Chinese production chain to have a much greater degree of flexibility. Due to large number of providers with similar skills, many companies in China specialize in a very narrow range of products. This large structure of specialized providers enables Chinese fashion manufacturers to have a high degree of supply chain flexibility, since these companies can easily find various specialized providers for a given item.

#### **4.5 Market Orientation**

Market orientation was assessed using a comparative method. When the researchers visited companies in one country, they brought along samples of material from providers based in the other country (and vice-versa). In addition to the samples, the researchers also brought along the knowledge of the price of the material as well as a description of the target market for the final product containing the sample material. This approach was agreed upon with the interviewees from both countries to ensure a more reliable comparison of the price and quality variables. The punctuality variable was only evaluated by means of interviews with provider in each country.

The data collected from the providers was then compared to the perceptions of their clients. Each of the companies interviewed provided the researchers with a list of ten of its clients. The researchers then conducted phone interviews with three of the ten clients provided for each company (random selection), asking about the performance of the company in terms of price, quality and punctuality. Many of the client companies listed by the providers were clients of more than one of the material providers being researched, which made verification easier for the researchers. The information collected in the interviews with clients regarding the market orientation of the providers were consistent with the statements the providers made themselves regarding their performance in terms of price, punctuality and quality.

Analysis of the collected data indicates that the providers from each country perform well enough in terms of quality and punctuality to meet the demands of their target markets (according to the interviewees and their clients). However, in terms of the price variable, the prices offered by Chinese companies were found to be much less than those of Brazilian companies for high volumes (in some cases as much as 60% less). On the other hand, when clients have more stringent requirements in terms of operational, tactical and strategic flexibility, the Brazilian price scale is more attractive to fashion product manufacturers.

#### 4.6 Performance Analysis

Chart 2 presents the best-performing country of each of the flexibility tiers and dimensions being studied.

**Chart 2 – Summary of the Findings**

Construct	Variable	Benchmark
Operational Flexibility	Machine	Brazil
	Process	Brazil
	Output	China
Tactical Flexibility	Delivery	Brazil
	Product	Brazil
	Volume	China
Strategic Flexibility	Design	Brazil
	Market	Brazil
Supply Chain Flexibility	Robustness	China
	Relationship	China
	Logistics	China
Market Orientation	Quality	Brazil/China
	Punctuality	Brazil/China
	Price	China – big volumes Brazil – small lots

The researchers prepared Chart 3 based on the benchmarks presented in Chart 2. Chart 3 associates the type of flexibility prioritized in each country in order to meet the need of their respective target markets.

**Chart 3 – Flexibility & Market Orientation**

Benchmark Country	Construct	Variável	Market Orientation
Brazil	Operational flexibility	Machine	Price (for small lots), Quality and Punctuality
		Process	
	Strategic flexibility	Design	
		Market	
	Tactical flexibility	Delivery	
		Product	
China	Operational flexibility	Output	Price (for big volumes), quality and punctuality
	<b>Tactical flexibility</b>	Volume	
	<b>Supply chain flexibility</b>	Logistics	
		Relationship	
		Robustness	

## 5 DISCUSSION OF THE FINDINGS

Analysis of the previously presented literature revealed the need for a more extensive scientific study on flexibility in production chains. A need for studies involving SMEs also seems to exist given their relevance to production chain flexibility. In order to contribute to a better understanding of the aforesaid topics, this study has sought to answer the following research question:

*How do companies with similar production chains but located in different countries use different tiers and dimensions of flexibility to meet the demands of their international clients?*

The previous section presented the findings of this study. The following subsections discuss said findings in the light of the constructs derived from the literature.

### 5.1 Operational Flexibility

Equipment and labor costs seem to influence the operational flexibility tier of the companies that were studied. In Brazil, said costs cause companies to focus their efforts on the machine and processing dimensions, whereas lower labor and equipment costs in China induce companies there to prioritize the output dimension.

This conclusion in no way implies that Chinese companies consider operational flexibility as unimportant. On the contrary, this conclusion actually suggests that the flexibility necessary for meeting the demands of the market in which the Chinese companies operate is provided by the supply chain as a whole, not by individual companies. In such a context, each manufacturing unit is expected to focus on improving the output dimension.

There were no examples found in the previous literature of studies on the influence of labor and equipment costs on companies' operational flexibility.

## **5.2 Tactical Flexibility**

The type of operational flexibility of material providers directly influences their tactical flexibility. As observed, Brazilian companies favor the product and delivery dimensions and generally provide a low-volume of products with high model variability and short life cycle (typical fast fashion market). On the other hand, low equipment and labor costs in China lead companies to focus more on markets that require greater volume elasticity.

## **5.3 Strategic Flexibility**

Greater flexibility in the operational and tactical tiers seems to lead Brazilian companies to perform better in the strategic tier. The findings regarding the strategic flexibility tier point to an alignment between flexibility tiers and dimensions which providers focus on in each country and the demands placed on them by their target markets.

## **5.4 Supply Chain Flexibility**

As observed, Chinese companies have greater flexibility in terms of the supply chain tier. Given the fact that China is currently one of the top fashion product providers in the world, we are justified in speculating about the importance of that dimension to competition among nations.

Analysis of determining factors for competition also points to low labor and machine costs. These factors seem to have contributed to the rapid growth of a large network of providers in the country, thus giving the Chinese production chain an exceptional degree of flexibility. Increased flexibility in turn attracts more new international purchasers from the sector, which finally increases the demand for materials. Increased demand for materials leads to the opening of new businesses, thus creating a cycle of increasing flexibility in the production chain as a whole.

There were no examples found in the previous literature of alternatives leading to an increase in supply chain flexibility.

## **5.5 Market Orientation**

As shown, material providers from both countries meet the expectations in terms of delivery punctuality and quality. These expectations are influenced by a number of factors, including the target market, provider options in the target market, etc.

In terms of the price dimension, Chinese companies were found to perform better, despite the fact that they cannot keep prices as low for lots that are smaller, have a greater number of models, and require more fragmented delivery. When these requirements are a must, clients prefer to purchase the products they need from Brazilian providers.

## 5.6 Final Consideration

Chart 3 presents indications that SMEs that provide materials and are active in the production chains of Brazil and China exploit different flexibility tiers and dimensions in order to meet their clients' expectations. The chart also suggests that flexibility is a complex matter and cannot be assessed in a superficial analysis. As shown, the fact that Chinese companies perform poorly in many flexibility tiers and dimensions is compensated by their excellent performance in the production chain flexibility tier. The growing encroachment of Chinese companies on to markets formally exploited by Brazilian companies and their unbeatable performance in terms of price confirm such a position.

Future studies should focus on the following important questions: What other compensations can exist among flexibility tiers in a production chain with the goal of meeting client demand? Are the influences of labor and equipment costs identified herein restricted to the sector that was studied or to the countries being studied? Besides labor and equipment costs, what other factors influence flexibility options adopted by companies and/or production chains? What are the limitations of the influence of operational flexibility on the other flexibility tiers proposed by Stevenson and Spring (2007)? What influence do the dimensions not analyzed in this study have on other production chains (some dimensions were not analyzed because the administrators who participated in the study thought they did not apply to the fashion material industry)?

## **6 CONCLUSIONS AND IMPLICATIONS**

### **6.1 Contributions**

This is the first study, to the knowledge of the researchers, which compares the flexibility tiers and dimensions proposed by Stevenson and Spring (2007) in production chains of similar products in different countries. The results obtained suggest that the operational flexibility tier of these companies is strongly influenced by labor and equipment costs. Indications were also found that the operational flexibility tier directly influences the remaining flexibility tiers, i.e. tactical, strategic, and supply chain.

Regarding supply chain flexibility, the results obtained point to the possibility that the supply chain might compensate any deficiencies in the remaining flexibility tiers, despite the limitations of lot size, delivery frequency, and price demanded by the purchasing market.

### **6.2 Relevance to Businesses**

This study helps business administrators understand the flexibility tiers and dimensions that characterize the units under their control. Furthermore, this study encourages business administrators to consider the possibility of compensation any deficiencies by improving other flexibility tiers or dimensions.

### 6.3 Limitations

This study focused on material providers for the fashion industry in Brazil and China. The possibilities and contributions identified in the aforementioned context must be validated by new studies in the sector, given the qualitative and exploratory nature of this study. The conclusions of this study regarding the various tiers and dimensions of flexibility cannot be applied in principle to other production chains or regions.

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