Value Creation in the Fast Fashion Supply Chain: Evidence from Brazilian Retailers

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Abstract— **The purpose of this article is to analyze the process of value creation in Fast Fashion Supply Chains. The research method is the multiple case study. The research object is a sample of Brazilian companies formed by three anchor tenants and one consultancy with wide actuation in the local market. The analysis model includes competitive elements such as strategy, product development, logistics, and technology. The main contribution and novelty of the article are the business model employed by the three anchor tenants and the competitive objectives pursued by the FFSC. The most important competitive objective is the collaboration to capturing trends and quickly develop, produce, and deliver products to customers in physical stores or online.**

Keywords—*retailing; fast fashion; value added; supply chain; logistics*

1. Introduction

Currently, customers of fast fashion (FF) interact with retailers not only at the store but also via the internet and mobile devices [1, 2]. To support this new kind of client, retailers organized fast fashion supply chains (FFSC) to respond quickly to fashion trends, update the products as fast as possible in the stores [3]. In FFSC, retailers offer a wide variety of products and use a minimal amount of price promotions in collections [4]. FFSC is a commonly and timely strategy adopted by retailers to cope with the quickly-varying fashion trends [5].

Anchor tenants of FFSC such as Zara, Mango, or H & M sell a large amount in a short period of time, without discounts during the season [4]. For example, Zara takes only two weeks between identifying the trend and selling products in stores or online, considerably increasing profitability [4]. Retailers and suppliers operate with very small order sizes [5], as they realized that a small number of innovations that make a difference in satisfaction and consumer loyalty determine growth and profitability in this market [6]. Smaller lots convey the feeling of uniqueness and positively influences the consumer behavior [6, 7].

In this scenario, FFSC) can add value, improve brand strategic positioning and price [6], combining rapid production response capacity and capture of consumer trends [8]. The intrinsic characteristics of FFSC cause uncertainty and require statistical forecast estimation methods [9].

For some time, the fashion industry has attracted the attention of researchers from the area of operations and supply chain management [9, 10, 11]. However, the value-adding process, as well as the creation of competitive advantage, need to be better understood in FFSC [12]. In addition, there is a lack of research in emerging economies, such as Brazil, that identify the characteristics of the country and the practices to be adopted in FFSC [13]. In addition to the academic shortcomings, FF has attracted attention from large fashion retailers already established in Brazil. Many companies have shifted their business strategy to become faster in trends identification and customer service [14]. This new approach has made sales and profitability grow even in an adverse economic period [13].

The purpose of this article is to analyze the process of value creation in FFSC. The research question is how FFSC create value. The research method is the multiple case study. The research object is a sample of Brazilian companies formed by three anchor tenants and one consultancy with wide actuation in the local market. The specific objectives are identifying the business model, explaining how the process of value creation occurs, and verifying the main practices adopted by the companies. The main

contribution and novelty of the article are the business model employed by the three anchor tenants and the competitive objectives pursued by the FFSC that can be helpful to other FFSC to enhance competitivity in emerging markets.

2. Value Creation in Fast Fashion

An FF environment combines rapid production responsiveness and skills to deliver fashion-responsive products [15; 8]. Very small order sizes [16], reduced deadlines, and short product life cycle characterize the FF [6; 17]. In addition, stores replace continuously their products to convey the sensation of scarcity and novelty to consumers [6; 18]. In FFSC, fashion products must be available in the shortest possible time [18]. Two elements distinguish FFSC: (i) lean distribution and production lead time, and (ii) quick response to the consumer, including the quick development of new products. Supplying traditional fashion takes about six months and comprises the identification of the needs of the market, product development, delivery, and sales. In FF fashion, the entire process takes six to eight weeks, which ensures a financial return larger than the traditional market [8].

The value creation comprises the elements that may be important in the company's view in relation to its supply chain. In this sense, value creation is the result of transactional relationships that occur along the SC. In a competitive environment, the greater the value perceived by the customer, the greater the results in the commercial relationship. Value aggregation requires value analysis, value creation, and value delivery [19].

The value creation does not occur in isolation but through exchanges derived from commercial relationships [20] between SC actors that generate value-adding opportunities for product and process improvement [21]. The value delivery requires efficient mobilization, coordination, and implementation of all the resources available throughout the SC, providing value elements like quality, low cost, and just-in-time deliveries [19]. FFSC plays a vital role in the value-aggregation process, as it provides agility, customer service, and reliable deliveries [22; 23].

In this study, the value aggregation in the FF environment requires a three-dimensional optics: (i) value analysis; (ii) value creation; and, (iii) value delivery. Figure 1 depicts the value aggregation model used in this study.

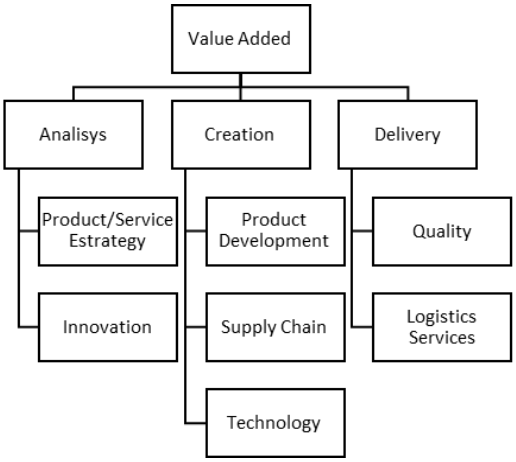

Figure 1: Conceptual Model

2.1 Product and Innovation Strategy

Fashion trends change very quickly and directly affect people's lifestyle [24]. Changes in popular culture occur anytime and anywhere, creating significant consumer demands for a fashion style or trend [25; 26]. The rapid development of new products and time of market placing are essential requirements for success in the fashion retail - while fashion remains fashionable [27].

The main reason for companies to innovate is the desire to increase their business performance and competitive advantage [28]. In an environment where the product cycle is getting shorter and consumer needs renew rapidly, innovation plays a fundamental role [13; 16]. Furthermore, innovation provides a competitive advantage through design, technology, product and process improvements [15]. Innovations in the FF focus on the ability to innovate in marketing and product, highlighting elements that create value to the customer [29]. In addition, the innovation capacity of FFSC anchor tenants should generate new solutions that add value and meet the current and future needs of consumers [30; 31]. In FFSC, companies not only use the creativity of designers but also involve the entire chain as sub-suppliers that propose new product inspirations [32].

2.2 Product Development and Quality

The development of new products is a process that facilitates the transformation of an idea into a new product [16]. In the fashion industry, the innovation process needs to be carried out in a dynamic way, that is, the product needs to be developed quickly, according to the characteristics of desire and quality sought by groups of consumers [17].

Responsivity in the development of new products and time to market is an essential requirement for success in fashion retail, along with the ability to ensure that the resulting product is manufactured and distributed [27]. The FF brought freshness to the traditional textile fashion sector, as it produces items in small lots, with short manufacturing times and proximity to consumers [33]. The fashion industry is now synonymous of rapid change, flexibility, and responsiveness of companies [34].

The scenario of internationalization can influence all participants in the fashion industry, as it opens markets and consequently makes it possible to significantly increase sales. On the other hand, internationalization means that companies have to adapt quickly to the characteristics imposed by these new markets [13]. The agility in the development of collections, cost reduction, and product differentiation are the most important trends for FF retailers [35; 36].

Quality is a decisive success factor for the fashion retail business. Suppliers follow the conduct code that provides better efficiency indices and low risk of non-compliance with standards [25]. Social and environmental issues are also important, especially with regard to labor issues, the prohibition of infant labor, human rights, and the prevention of environmental attacks [37]. Society, stakeholders, and legislation also sustain pressures related to sustainability [38], which includes reuse and recycling of useless materials [39], according to the so-called ecodesign principles [40].

Increased control in SC, coupled with the proximity of development and manufacturing, allows product quality to be improved [41]. An SC must meet its customers' requirements in terms of lead time, total costs and product quality [42]. FFSC companies should seek flexible asset allocation and high-quality, low-cost manufacturing operations simultaneously [43]. The improvements require constant reports and training, aiming at developing solutions, supplier support and a total transfer of knowledge [44].

2.3 Supply Chain and Logistics Services

SC has assumed a determining role in the competitive environment since the competition is no longer between individual companies but between companies organized in SC. All member companies must work together to reduce costs and increase performance gains [25]. In FFSC, partner companies share information and knowledge to clarify the dimensions that drive the creation of value among the participants [45; 46].

The relationship with SC partners and manufacturing processes should be flexible and collaborative [17], allowing rapid changes according to the demands [25], making it a relationship based on trust [44]. In this sense, sharing strategies with suppliers provides benefits of agility and the possibility of structuring an integrated chain of problem-solving [47]. A specific and relevant externality caused by FFSC is the last-mile problem. Anchor tenants of the FFSC must deal with the environmental and social problems caused by trucks in urban spaces and cities, causing excessive, jammed traffic [48].

The coordination models of SC actors must also be highlighted. From the product point of view, the FF retail is better suited to vertical chains, in which the focal company relates to a restricted number of suppliers [49]. However, given that fashion demand is unpredictable and volatile, requiring rapid response to market changes, a strategic outsourcing partnership can also be an option [17]. On the other hand, the coordination of SC practices in mass production models (traditional fashion models) orient their practices towards the search for efficiency among links [49], and articulate their relations with the actors similarly to the horizontal chains (the focal company is related to an extensive number of suppliers) [44]. Thus, SC coordination encompasses all efforts to exchange and integrate information at the various levels, from developing and producing, to delivering the products to the final market. Usually, a focal company centralizes the sharing and alignment of goals in the FF [49].

Companies involved in the fashion market usually operate in different countries, supplying their stores from different production and distribution centers, with adequate lead time [50]. In this way, they seek

to minimize possible interruptions in their supply chain, which may affect their competitiveness [17].

2.4 Technology

The use of technologies and the sharing of information allow the improvement of communication between FFSC participants [30]. Technology assists in the increase and qualification of the offer of products, from the strategies, shared between the chain links. In addition, it provides a reduction of operating costs, better efficiency and quality indices, and an environment conducive to innovation [6]. Technological innovations in retail can be found in three main areas: supply chain management, customer management, and customer satisfaction [51].

Formal and informal means such as websites reduce distorted information and the need to manage exchanged products [6]. In addition, communication facilitates financial transactions and e-commerce operations of finished products [52].

The use of Radio Frequency Identification (RFID) technology is an example used in environments where the decision-making process must occur rapidly. This technology allows the information to be sent to databases and then automatically redirected to the managerial decision-making support modules. The authors argue that RFID technology can be used to monitor production operations and be integrated with other management techniques [53]. The main contributions are in process innovation, where manual activities such as bar code reading and item typing are replaced by automated procedures. The use of RFID reduces the lead time of internal processes and increases reliability [54]. The Brazilian semiconductors supply chain provides local technological solutions for the RFID communication problem faced by members of the Brazilian FFSC [55].

Rapid changes in consumer buying behavior - coupled with supply chain redesign - have motivated existing and new retailers to adopt a variety of inventory management strategies. These include a multi-channel retail mix that combines discount stores, physical stores, and e-commerce [56].

3. Methodology

This research analyzes the process of value aggregation in Brazilian FFSC. The research method is a multiple case study with a qualitative approach. Data collection took place by in-depth interviews (semi-structured, open questions) with product managers, analysis of documents (files and reports) and direct observation in a guided tour. The unit of analysis is the Brazilian FF market. Three of the main companies in the Brazilian FF market were analyzed and a consultant of one of the largest retail consultancies in the world was also interviewed. The selection of the companies relies on the potential contribution to the research, their representativeness in the Brazilian fashion market, and the ease in data collection. Companies A, B, and C are multinational large retailers. A and C are anchor tenants of horizontal supply chains and operate with owned manufacturers. B is the anchor tenant of a vertical supply chain and operates only with externalized manufacturers. The research items rely on topics that allow unveiling relevant themes not yet explored in depth in previous studies.

The review, the structured model, the triangulation with three anchor tenants and the feedback from the managers ensure construct and internal validity as well as reliability to the findings. The presence of a consultancy company, with wide external action, ensures external validity to the findings, even if external validity is not a key issue in case studies. The interviews relied on semi-structured questions derived from the elements retrieved in the review. Table 1 summarizes and grounds with references the elements considered in the interviews.

Construct	Element	Investigation	Authors
Analysis	Product/ Service Strategy	Unveil how the structure of the supply chain influences the outcome of the company. Understand how the fast fashion chain differs from the traditional size lots	[6; 25; 30; 45; 47; 57]
	Innovation	Understand how suppliers' innovation capability supports the development of new collections, especially in understanding the market, market aspects and structural aspects of the company and chain. Understand how companies exploit the suppliers' innovation capacity of supporting product development as well as the analysis of the life cycle impact of products in the company's outcomes.	[15; 29; 30; 38; 30]
Designing	Product Development	Describe the importance of the internationalization of suppliers in the fast fashion environment, in order to understand if it influences products and collections development.	[16; 13; 17; 27; 33; 34)
	Supply Chain	To analyze how the creation of value in the supply chain is analyzed considering the understanding of the chain key processes and the exchange of information among the actors in the development of new collections and/or trends understanding. Analyzing the criteria for selection/evaluation of suppliers, as well as structuring elements for supplier developments – these are preponderant elements to be understood in this fast fashion chain model.	[49; 45; 44; 46 25; 17]
	Technology	Understand the role of information and communication technology in data sharing and in the efficiency of the fast fashion chain.	[6; 52; 53; 54]
Delivery	Quality	Understand how the development of relationships and/or quality of relationships (lead time, productive capacity, technology) can be considered as a preponderant factor in the choice of suppliers.	[56; 25; 44; 37]
	Logistic Services Provision	Describe how the value delivery, under the perspective of logistics services provider, is explored considering fast fashion environment.	[17; 50; 49]

Table 1 – Description of the topics investigated

4. Results

Regarding the data collection, one of the companies conducted a pilot test that was useful to improve the research protocol. After the corrections, the interviews were conducted with the main Product Manager of each of the companies involved in the study. All interviewees have 10 years of experience or more in the fashion market. The research questionnaire separated the questions in groups that meet the theoretical structure of Figure 1. The interviews with the managers lasted an average of 80 minutes. The researchers recorded and transcribed the interviews for analysis and feedback from the managers.

4.1 Data Analysis

In order to better structure the research results, the analyzes were conducted aiming to detail each construct (analysis, creation and value delivery) of the research based on the understanding of the answers obtained for each of its elements (Table 1). In order to fully exploit the collected information and extract the important features on the topic value aggregation in the FF environment, the findings for each of the important elements for value aggregation were analyzed and cross-referenced with the literature, including interviews and documentary analysis. These analyzes allowed to identify the convergent, divergent and aggregating points of the research in relation to the theoretical basis. Finally, the technique used to evaluate the data was the content analysis, describing in an objective, systematic and qualitative way, the content collected in the field.

4.2 Value Analysis: Product and Service Strategy

Regarding the Product and Service Strategy, the companies agree that the automation and speed of information flow between the partners of the chain directly affect the outcome of the FF business. This strategy is aligned with [6] that advocates the importance of sharing information and strategies among the different links in the chain. In addition, another element considered as strategic by company B in the FF environment refers to proximity to strategic suppliers. Proximity to the suppliers and beneficiating companies, guarantees more quality due to the possibility of following production stages, and provides greater speed in the development of new products, rapid exchange of information through the automation of processes, and sharing of aggregation of value strategies, which is corroborated by [49]. The authors

understand that the verticalization of the chain propitiates a narrowing of relations, orienting its practices to the search of the chain's efficiency. However, companies A and C have a relationship strategy more horizontal and their own production, dissimilar from company B that has a verticalized strategy and outsourced production.

Among the FF strategies of the companies surveyed, the small size of the lots is also highlighted. Company B emphasizes that it works with smaller lots (about two or three pieces per size), which is in accordance with (T. M. Choi, Hui, and Liu 2014) understanding. Company C also informed that the strategy of smaller lots is characteristic of the FF market, being an elementary factor to boost sales and to obtain higher profit margins. The idea of "product scarcity" is present in the customer's vision, that is, a need and/or sense of product uniqueness is generated [7]. Therefore, smaller order sizes result in sales with a higher average price.

4.3 Innovation

The companies analyzed understand that the cooperation and interaction with the suppliers stimulate innovation in the FF environment, which is in accordance with [49]. Although companies emphasize agility as a key factor in capturing the trend until the product becomes available to customers, there is no uniformity in the relationship level (information/strategy sharing) with the supplier regarding innovation. Company A mentions that the supplier´s innovation capacity influences the development of new products and collections (international level company). Moreover, they finance innovation actions with suppliers of fashion items and offers support actions in management, as well as knowledge exchanges regarding technology. On the other hand, companies B and C believe that the innovation issue is strategic to the business, so they choose to centralize it internally, prioritize investments in research and development, training and trips for their own employees. It should be noted that companies B and C have suppliers predominantly national. In theory, it is believed that the greater the interaction with the supplier, the greater the innovation capacity of the company. Company D emphasizes that innovation along the supply chain contributes to the reduction of costs and a greater diversity of new product launches, which is in accordance with the authors' understanding [15].

4.4 Value Creation: Product Development

The trend capture happens quickly and goes straight to the sample development process, which is in line with [16]. All companies have a trend research area that includes designers who capture world trends. In addition, it was observed that there are in company meetings where the suppliers bring the samples and suggestions of future products to the buyers. Regarding the product development, the contact with the suppliers is formal, includes a product datasheet (containing all the necessary information for the correct manufacture). All companies have a sample approval process and quality control tests that take place when a lot of goods is received, which is in line with [25]. In FF the agility in communication and problem solving could be observed – for instance, company B has high-resolution imaging equipment to approve samples coming from Asia. It was also possible to observe in loco that all products have a history of approval, price, quality, lead time, etc. Websites maintain and support communications, information exchanges, and supplier data history.

4.5 Supply Chain

In relation to the supply chain management, all the surveyed companies consider that the supply chain design plays a key role in the success of the FF. By analyzing the answers to this question as well as documents such as key performance indicators (KPIs), several strategic positions were observed. In the case of company A, the planning and development phase of new products was highlighted as the most important phase. The company explores the capacity to have suppliers and stores in various parts of the world, horizontal chain strategy and own production, in order to have a competitive differential. In addition, it stimulates the coordination and interaction of the actors in the chain in order to obtain a competitive advantage in the market, which is aligned with [49]. In turn, company B prioritizes the agility in the development flow and samples approval, as well as supply logistics.

In addition, all companies highlight their efforts in meeting customer needs. Company B is

characterized by having an outsourced production structure. Company C, for incorporating the industrial processes, reinforced the importance of speed in this chain link, aiming at the improvement of production processes and product development, which is in line with [15]. Finally, company D described the need for good product life cycle management, quoting that products that do not sell in a particular store are passed on to another store. If the sale difficulty persists, the product is marketed with a price reduction.

Regarding the selection, development and evaluation processes of suppliers for FF, the companies chose different paths. Company A reported that the supplier selection process is based on the attributes of easy access to raw materials, product development capacity and productive capacity. In addition, they point out that the main suppliers of their chain are about thirty companies, which are controlled through a general index that monitors a series of aspects, especially quality and production standards. Company B responded that their suppliers are selected and controlled by specialty, ease, and speed of delivery. Due to size, the company regulates and the suppliers meet the terms. Company C, which has its own production, inform that there is little interaction with suppliers, they only negotiate prices for the acquisition of raw materials. Company D highlights issues such as lead time, flexibility and productive capacity. Besides, supplier evaluation occurs with each new interaction. In general, companies are in line with [44]. They mention the following elements to be analyzed in the FF environment: quality, lead time, level of dependency and flexibility. All companies are members of the Brazilian Association of Textile Retail [14], with the purpose of consolidating good practices in the supply chain, creating compliance and sustainable environment with decent work conditions.

4.6 Technology

The presence of portals to share information and strategies with the different links in the supply chain has become clear, which is in agreement with [6], who suggests the use of a single standard channel for sharing information and strategies.

Significant adherence was noted by the companies on the importance of information technology in the FF environment, especially product tracking, RFID (Radio Frequency Identification) and apps for information sharing and interaction with suppliers. This technology can support the reduction of operational activities, such as product conference via bar code and, in addition, feed management strategies, which is defended by [54]. The interviews highlight the use of forecast management and product development software since in FF there is a requirement to monitor collections and quantities of products in execution, which is aligned with [49]. Another point worth mentioning is the use of e-commerce as a mechanism to capture and test fashion trends. This resource is used by all the companies interviewed and also defended by [56; 52].

4.7 Value Delivery: Quality

In relation to the existence of the influence of the supplier's records in the decision-making process for the purchase of products, all companies mention the importance of the supplier's positive record in the purchasing process. Company A alludes to the capacity, which can be translated by quality, innovation, and trust, that is, less risk in the purchase relations. It was verified that all respondents seek to minimize the risks of non-attendance, tranquility, and confidence, which is argued by many authors [44; 37; 57].

4.8 Logistics Services

The logistics service provider in the FF environment stands out for the value-added strategy with the service, in which aspects such as lead time, speed and logistics capacity are present in the delivery of these services. The provision of logistics services is seen as strategic by all companies. All respondents stated that in the FF environment there is a necessity for quick product delivery because with reduced quantities in stores, any deficiency may affect profitability. Company D emphasizes that good logistics operations planning for this environment are vital, highlighting the necessity for fast service providers, which must be reliable and vigorous in carrying out their activities.

In this scenario, company A mentions that logistics services account for 1/3 of the operations in the FF market, having significant participation in the chain, due to the fact that the companies work with smaller lots. Therefore, logistics services need to be structured in terms of processes and technology in order to ensure their efficient service. In addition,

the shorter the time required to meet the demands, the more agile the process of consolidating the sale will be. Due to this view, the company consistently invests in improving store supply operations.

5. Discussion

In companies that fit the national horizontal model, suppliers have the capacity to innovate in their own way, supporting the development of new collections. In addition, the monitoring of new trends is guided by the analysis of the national and international markets. In all companies, there was a concern to keep control of the development process of new collections and innovation, since it is considered a critical factor to ensure agility. In this sense, the process of developing new collections is supported by the chain model in which the company is inserted. Another aspect observed is that the vertical company prioritizes investments in innovation and also takes advantage of the innovation generated by the suppliers to launch new collections.

Selection and development of suppliers are linked to the company's business strategy: (i) centralizing company - selection of suppliers by specialty and imposition of product and delivery requirements; (ii) partner company - partnership development, with the purpose of long-term relationship and reduction of the number of suppliers, which can lead to cost reduction and quality increase.

In both cases, continuous assessment is fundamental for supplying evolution. Among the evaluation topics are costs, responsiveness, and flexibility to meet the demands of the focal company. The evaluation mechanisms identified in the survey were: (a) Global Suppliers Development Index (IDGF), which evaluates product, quality, logistics and commercial development issues; (b) the suppliers that work for fashion retail are classified according to their importance and are strictly audited, according to the sectoral rules [14]. Details of these evaluations were evidenced by the authors through documents and at the companies. For instance, any involvement with slave labor or non-compliance with environmental issues will negatively impact the brand and, consequently, sales. Issues such as transparency, partnerships, agility, reciprocity, equality, quality and responsibility are keys in the relationship between the focal company and its suppliers in the FF market. These issues are explicit in formal contracts and need to be present in the current market.

Shared management is vital to provide speed to the creative, production, distribution, and service processes. In addition to RFID used in some companies in the market, other technologies such as demand management systems stand out, which are used to develop more assertive actions regarding the replacement lots organization with suppliers and product development management software. Moreover, cloud administration and synchronization of the entire FFSC, as well as the use of e-commerce as a test of new products can be taken into account [57].

Finally, the logistics service in the FF market needs to be differentiated, since the service time can influence the financial result of the operation. The logistics structure directly impacts the market result. Thus, this structure needs to be vigorous, with a planned and structured service process, based on total quality in relation to the resources employed in service, reliability, and promptness.

6. Conclusion

The study presented a comprehensive view of how FF retail companies relate to the other supply chain links, considering the elements of value added in supplier relations, and how these interactions reflect the competitiveness of each of the target companies researched. Furthermore, the study was applied in the Brazilian FF fashion market, considered an emerging, multicultural and continental economy. In-depth interviews were conducted with managers of companies impacting Brazilian fashion retail as well as with consultants from one of the largest retail consulting firms in the world. All interviews were held in person and with managers who hold managerial positions and accumulated experience in worldwide fashion management.

The results demonstrated a collaborative environment in the FFSC, aiming at capturing trends and rapidly delivering products to customers. Results confirm the conceptual model considering as (i) value analysis the proximity to strategic partners of the chain; agile trend capture; fast information flow; production and distribution of lots with reduced quantities of products, generating the sensation of product shortage; (ii) creation of value, highlighting the planning and development of new products; collaborative work across the

supply chain to meet customer needs; focus on agility, flexibility and productive capacity; (iii) value delivery involves product quality and delivery, lead time, speed and logistics capacity. Regarding the managerial aspects, the authors suggest some actions to be taken into accounts, such as the approximation and collaboration of the supply chain agents, the use of demand management systems and capture of trends; evaluation and vendor audit to minimize chain risks.

The research limits to examining the existing value-adding process among companies in the FF fashion retail supply chain in an emerging economy. Three of the largest companies in the market were considered, as well as an international consultancy. The sample is significant to the case. It does not reflect the entire market though. Along these lines, further research with a greater representation of companies could identify other relevant issues as well. Also, other studies focused on innovation processes, with the involvement of suppliers seeking alternative forms of value-added, could be carried out. Other countries and sectors with value-added similar to the FF could be studied. Another suggestion is analyzing the main competition criteria of the sector through a modelling method.

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