

Assortment Planning as a Strategic Tool in the South Region of the Brazilian Retail

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Abstract: Among the management practices by category, the assortment planning is one of the most used, since it allows, for example the elimination of products with low profits that occupy physical space that could be destined to the exposition of other products. The Assortment Planning (AP) helps on the decision-making about the limitation of the spaces on the gondolas and shelves, about the investment for storage, about the quantity of launchings and about the progressive increase in the number of categories. In such context, the goal of this research is to investigate the possible effects of the AP in the point of view of the supply chain management. Specifically, the study intends to analyze the consequences of the implementation of a strategic tool of reduction by assortment applied by a company acting in the retail of desserts in the market of South Brazil. It talks about an investigative and explanatory study of case almost experimental with the use of qualitative and quantitative historical data, direct observation and meetings with the sales executives. The results show that the decisions that the assortment planning assume in a leading role in the supply chain management as a whole, since the goal for the retailers and manufacturers, to get the clients loyalty when offering a balance among the variety, depth and level of service. The reduction of 35% of the used assortment generated an increase of 12.46% in the volume of sales and 12.48% in the billing between 2011 and 2012. This research contributed with an extensive bibliography about the theme and it helps a better understanding in the Brazilian retail.

Key words: Assortment planning, management by category, supply chain, retail, reduction of assortment

INTRODUCTION

The food industry developed a significant number of innovations in the decade of 90's. Among them, it stands out the management by category that seeks the distribution and disposition of the products in an efficient way on the retail (Holmstrom *et al.*, 2002). In the management perspective by category, the decisions around the assortment, prices, promotions and other variables of marketing are processed on the retail on an holistic way so the fabricants have to consider the profits in the category as a whole and not only the brands that produce (McDonald and Wilson, 2011).

This new concept, different from the management by brands, transfers the power on the supply chain from the fabricant to the retailer due the concentration on the retail sector and the detention of information about the consumer behavior. The management by category also maximizes the profits of the retail space and the profit margin obtained by the supply chain as a whole (Basuroy *et al.*, 2001; Holmstrom *et al.*, 2002) due to the

coordinated character and/or cooperative of the pricing regime to the detriment of the competitive character of the management by brands.

Among the practices of management by category, the assortment planning is one of the most used since it allows, for example the elimination of low-profitable items and that occupy the physical space could be destined to the exposition of other products. On a general way, the assortment planning helps on the decision-making (Bauer *et al.*, 2012) process about the limitation of space on the gondolas and shelves, about the investment for storage, about the quantity of launchings and about the progressive increase of the number of categories (Cadeaux, 1997). From the point of view of the consumer, the preference is for extensive assortments due to the needs for more options of choice and for the activity generated by varied assortment (Boyd and Bahn, 2009). However, the costs associated to the disposition of big assortments are elevated and the retail, increasingly aware of these costs is not willing to take responsibility for this expense (Oppewal and Koelemeijer, 2005).

The products assortment represent a prime role on the management by category, since with the location and price, it determines the preferences and fidelity of the consumers (Broniarczyk and Hoyer, 2006). However, the discussions about the effects of the assortment management are still inconclusive. The literature associated to the size and variability of the assortment influence in the perception of the consumers, on their behaviors of purchase and on the volume of sales and profits of the retail presenting contradictory results. Despite the importance on the subject, many questions have not been answered yet what shows the need of new scientific researches that focus on the balance among assortment, depth and level of service.

Seen in these terms, the current study has as a goal to investigate the possible effects of the assortment planning from the point of view of the supply chain management. On a specific way, this study will analyze the consequences of the implementation of a new strategic tool for the assortment reduction available on the retail of desserts, in the South Brazil market. Researchers intend to contribute as a process of decision-taking of the assortment planning, as well as to find possible influences of such decisions for the members of the chain, besides an extense bibliography about the theme and help for a better understanding of the Brazilian retail.

Theoretical background

Management by category: The management by category is an initiative of management of the retail that intends to increase the performance of a specific category of products through the adoption of strategies more coordinated of purchase, sales, assortment and marketing (Basuroy *et al.*, 2001). This management tool is about each category of products as a unity of strategic business and establishes for each unity, goals of profits clearly defined (Meldrum and McDonald, 2007). The management by category emerges from the concept of Efficient Customer Response (ECR) on which the emphasis in the volume of sales is substituted by the focus in the profits (McDonald and Wilson, 2011). Suppliers, distributors and the retail share information and work as a set what brings more efficacy for the chain as a whole, as well as for a better attendance to the consumer, reduction of costs and total storage.

The management by category emerged in the mid of the 90's decade as a counterpoint to the traditional management centered in brands (Meldrum and McDonald, 2007) on which the price of the product was defined and imposed to the retail in an independent way by the diverse fabricants. Contrarily, the management by

category recognizes the interdependence of the products on a same category. This new model focus on the holistic result of the category rather than the result of individual brands, therefore demands that the manager of the category defines the prices of all brands belonging to the category together which allows a global increase of the prices in a same category and the optimization of the profits of the retailer (Basuroy *et al.*, 2001).

Differently of the traditional practices of the management by brands, the management by category stops the fabricant to direct the decision-making process around the assortment offered (Holmstrom *et al.*, 2002). For this reason, some researches consider this new model as a symbol of the evolution of the retailers that migrate from passive distributors to active members of the supply chain (McDonald and Wilson, 2011). For the supplier/fabricant, this new model generates a big challenge: Promote convincing arguments so the retailer highlights the positioning of the brand and meanwhile, adapt, refines or edit the strategies and tactics of management, so it benefits the category as a whole (Johnston, 1999).

In practical terms, the management by category involves activities front-end, for the increasing of demand and activities back-office, for the development of the management of supplies and the logistic coordination (Dhar *et al.*, 2001). This way, the following subsection details the scientific studies that consider the assortment planning.

Assortment planning: On the literature, the assortment planning is well explored from the point of view of the retail (Broniarczyk *et al.*, 1998; Iyengar and Lepper, 2000; Boatwright and Nunes, 2001; Rajaram, 2001; Agrawal and Smith, 2003; Amine and Cadenat, 2003; Oppewal and Koelmeijer, 2005; Campo and Gijsbrechts, 2005; Kok *et al.*, 2006; Yucel *et al.*, 2009; Mantrala *et al.*, 2009; Veiga *et al.*, 2011; Bauer *et al.*, 2012; Cadeaux and Dubelaar, 2012). That occurs possibly because the exposition of the products and the decision moment for the purchase of the final consumer happens in the retail environment. It is a complex environment for negotiation with the need of collaboration of all the links of the chain (Veiga *et al.*, 2011).

The assortment is defined as a number of SKUs (Stock Keeping Units) offered in a unique category of products (Broniarczyk and Hoyer, 2006). Usually, they are typified by two components: The width and the depth that refers to the average number of SKUs offered by a brand in a determined category (Dhar *et al.*, 2001). Besides these 2 main components, other variables also belong to the assortment planning, such as the symmetry, the

strategy of organization, the level of organization, the disposal, compatibility of structures (Broniarczyk and Hoyer, 2006; Rodriguez and Aydin, 2011) and the market-share (Dhar *et al.*, 2001). All these components and variables have direct influence on the perception of the client regarding the offered assortment and therefore impact significantly on the volume of sales, on the gross margins and on the profits of the retailer and other members of the supply chain (Kok *et al.*, 2006; Mantrala *et al.*, 2009).

Despite the assortment be defined as quantity of SKUs offered, the perception of the consumer front to the assortment frequently distinguishes the objective reality. This way, the perception of the consumer can be influenced:

- By the number of SKUs offered
- The heuristic space available for the category of products
- By the availability of the client's favorite product client (Broniarczyk *et al.*, 1998)

This way, the reduction of the assortment can present null or positive results in the perception of the consumer if the distribution of distinctive attributes of the SKUs to continue constant or the distinction becoming more apparent (Hoch *et al.*, 1999; Van Herpen and Pieters 2002).

The goal of the assortment planning is to specify an assortment that maximizes the sales and profits that counterbalance the offer of products based on the decisions of purchase of the consumer (Saure and Zeevi, 2013; Dekimpe *et al.*, 2011) and that increase the probability of the consumer to find the favorite product without the increase of costs of storage or risk of stockout (Broniarczyk and Hoyer, 2006; Sloot *et al.*, 2006). Seen this, researchers can say that the goal of the assortment planning is to achieve a great assortment besides the limitations on the budget for the purchase, on the physical space on the shelf and in the storage (Lotfi and Torabi, 2011). A great assortment, invariably, involves the trade-off among the benefits to include certain product on the assortment and the costs of this inclusion (Cachon *et al.*, 2005; Yucel *et al.*, 2009; Pentico, 2008). The analysis of the factors, variables and components present on the assortment management require synergy between art (i.e., intuition) and science (i.e., analytic models), although the concentration of effort on the science can be more effective in the control of the unproductive variety (Fisher *et al.*, 2000). This way, the following subsection details the scientific studies that consider the reduction of the assortment and the consequences on the retail.

Reduction of assortment: Given the importance of the assortment on the management by category, the literature around the dimensioning of the assortment is significantly large. However, investigating the existing literature, it is possible to observe the divergent results, defending the reduction of the assortment (Dreze *et al.*, 1994; Broniarczyk *et al.*, 1998; Hoch *et al.*, 1999; Iyengar and Lepper, 2000; Boatwright and Nunes, 2001; Dhar *et al.*, 2001; Chernev, 2003; Botti, 2004; Borle *et al.*, 2005; Cachon *et al.*, 2005; Gourville and Soman, 2005; Gaur and Honhon, 2006; Yucel *et al.*, 2009; Veiga *et al.*, 2011) or the extension of the same (Zinn and Liu, 2001; Gruen *et al.*, 2002; Oppewal and Koelemeijer, 2005; Sloot *et al.*, 2005; Broniarczyk and Hoyer, 2006) or even demonstrating the advantages and disadvantages of each slope vertente (Dhar *et al.*, 2001; Chernev, 2003; Borle *et al.*, 2005; Sloot *et al.*, 2006). Table 1 synthesizes the bibliography research of this subject.

The obtained results through the reduction of assortment are dependent and can vary according to series of variables associated to the consumer's profile, the product and/or the category. Despite this limitation, a broad set of benefits coming from the diminution of SKUs can be shimmered on the literature. The reduction of assortment is seen as a tool for the liberation of space on the shelf for SKUs with the high volume of sales (FMI, 1993; Dreze *et al.*, 1994), as well as for the reduction of costs through the elimination of items of low participation (Borle *et al.*, 2005). This factors influence directly on the reduction of costs of storage but can increase the probability of unavailability of the desired products by the consumer (Broniarczyk and Hoyer, 2006; Brun and Pero, 2012). In this case, the consumer can exchange the retailer, substitute the SKU for a product of other brand, substitute for products of the same brand and delay the purchase or to give up (Zinn and Liu, 2001; Gruen *et al.*, 2002). Due to the unavailability of the desired product, the retail loses sales with consequent oscillation of the cash-flow, storage and demand (Gruen *et al.*, 2002; Yucel *et al.*, 2009). The fabricant has the product substituted by the concurrent or by the direct loss by the desistence of purchase. All members of the supply chain are impacted by this process.

The negative effect of the reduction of the assortment is frequently justified by the fact that the clients do not find their favorite product, due to the removal of these from the offered assortment (Broniarczyk *et al.*, 1998; Broniarczyk and Hoyer, 2006; Sloot *et al.*, 2006). The conflict of the removal of the favorite product tends to show a more significant effect on short term because after a certain period of time, the

Table 1: Review and classification of the articles that treat about the reduction of assortment on the retail

References	Description
Studies that defend the reduction of assortment on the retail	
FMI (1993)	Reduction of the redundant SKUs with maintenance of space on the shelf. The moderate reduction of the assortment incurred an increase of 2% on the volume of sales, meanwhile, the extern reduction generated a non-significant decrease. The reduction of the assortment is seen as a tool for the liberation of space on the shelf for the SKUs with high volume of sales
Dreze <i>et al.</i> (1994)	Reduction of 10% of the total SKUs in eight categories keeping the space on
Broniarczyk <i>et al.</i> (1998)	It is possible to reduce the number of SKUs offered by the retailer without compromising the volume of sales. The reduction of 54% of the assortment on the 4 main categories in 4 convenience stores. The consumer informs that the purchases are easier to be realized with the reduction of assortment. The increase on the sales on both stores (2 and 8%)
Hoch <i>et al.</i> (1999)	Analyze the reduction of assortment and the participation of market. The perception about the variety of an assortment will be positively influence in markets with less concentration
Iyengar and Lepper (2000)	It is possible to reduce the number of SKUs offered by the retailer without compromising the volume of sales. The complexity associated to the large assortments can be a demotivating factor and influence negatively on the client's satisfaction. Reduced assortments seem to be equally, or even more attractive than the assortment that have the preferred alternative by the consumer. About 30% of the consumers of the shelf with fewer assortments purchased and 3% made the assortment bigger
Boatwright and Nunes (2001)	It is possible to reduce the number of SKUs offered by the retailer without compromising the volume of sales. Reduction of the assortment in 56% for 42 categories of products did not generate negative impact on the volume of sales
Dhar <i>et al.</i> (2001)	The perception of a bigger number of brands in markets with less variation of market share
Chemev (2003)	For the consumers that do not know the category and do not have preferences well defined, big assortments have an oppressive effect due to the excessive volume of possible combinations of attributes
Botti (2004)	Big assortments impact negatively in the volume of sales due to the excessive complexity of search that influence the decision of the consumer to abandon the store without purchasing
Borle <i>et al.</i> (2005)	If the reduction of assortment does not impact the volume of sales (nor positively or negatively), the result is positive for each supply chain, since there is a reduction on the logistic costs of purchase, setup, storage, among others. The final result shows increase of profits
Cachon <i>et al.</i> (2005)	The desire to satisfy all the consumers induced the proliferation of products and consequently, the establishment of assortments with number of SKUs superior to the great one
Gourville and Soman (2005)	Big assortment impact negatively in volume of sales
Gaur and Honhon (2006)	The reduction of assortment must not be limited in less popular products. In situations when the disposal of leader products creates a fragmentation of demand, the economies of scale coming from these products are not enough to compensate the negative effect generated on the other items
Sloot <i>et al.</i> (2006)	The perception of the consumers about the number of SKUs available does not suffer impact in long-term, even after the decrease of assortment in 25%. The reduction of assortment generated reduction on the same time of search for the product and efficiency on the search
Yucel <i>et al.</i> (2009)	The increase of the assortment generated the decrease of demand by SKUs
Veiga <i>et al.</i> (2011)	The removal of the items of assortment can create the increase on the volume of sales
Fisher and Vaidyanathan	Well planning the assortment can increase the sales on a same store. The mistaken assortments can damage a retailer for years. The assortment may be evaluated by analytical tools
Studies that defend the adoption of extense assortment on the retail	
Zinn and Liu (2001)	If the clients do not find the desired product, they can substitute it for a similar item (62%); delay the purchase (15.1%) or abandon the store (22%), giving up the purchase of seeking other establishments
Dhar <i>et al.</i> (2001)	Bigger assortments increase the probability of the consumer to find ideal SKU, as well as to offer flexibility for the consumers avid for variety
Gruen <i>et al.</i> (2002)	If the client does not find the favorite product, 31% of the consumers exchange the retailer, 26% substitute the SKU for the product of other brand, 19% substitute for products of the same brand, 15% delay the purchase and 9% give up
Chemev (2003)	For the consumers that know the category and have preferences well defined, the big assortments increase the probability of finding the product with the combination of attributes that judge ideal
Borle <i>et al.</i> (2005)	The resistance of the retail for the reduction of assortment for fearing the negative impacts in the volume of sales. A reduction between 24 and 91% in the assortment of 147 categories of an online retailer, brought an average reduction of 4.8% in the volume of sales. The reduction of the assortment impacted in the frequency of purchase of the consumers and in the volume purchased
Oppewal and Koelmeijer (2005)	The addition of any item increments the evaluation of assortment, independent of the attributes of size of the assortment
Sloot <i>et al.</i> (2005)	If the client does not find the desired product, they can delay the purchase, exchange the item or the retailer
Broniarczyk and Hoyer (2006)	Big volumes of SKUs bring benefits to the retailer. Bigger assortments increase the probability of the consumers to find the ideal SKU, as well as it offers the flexibility for consumers avid for varieties
Sloot <i>et al.</i> (2006)	Retail resistance for the reduction of assortment for fearing the negative impacts in the retention of clients. The reduction of assortments caused losses on sales in short-term. This effect was gradually amortized on long-term

consumer must buy the product of that category due to the lack of a domestic storage. In this occasion, even if the decision is delayed, the consumer must opt for changing the retailer to buy the favorite product or to buy a substitute product. On this point, the reduction of assortment can create losses of sales in short-term but the effect of the consumer is gradually amortized in long term (Sloot *et al.*, 2006).

Finally, it is important to highlight that big assortments can bring the consumer initially but the difficulty in making a decision among many SKUs become de-motivating, generating regretting and purchase desistance (Broniarczyk *et al.*, 1998; Botti, 2004; Gourville and Soman, 2005; Sloot *et al.*, 2006). Big assortments exercise oppressive effect about the consumers that the preferences are not well defined due to the excessive

volume of possible combinations of attributes. In case of consumers that know the category and have preferences well defined, the big assortments increase the probability of finding a product with a combination of attributes that judge ideal (Chernev, 2003).

Defining the ideal variety and the quantity of the products, co-relating the needs of the clients and the operational costs is a complex and decisive task for the competitiveness of the retail (McElreath and Mayorga, 2012). Consequently, it represents a challenge for the retail to generate an assortment planning that maximizes the profits of the business (Telebian *et al.*, 2014). Inside this pessimistic perspective for the reduction of assortment, if the reduction of SKUs does not impact the volume of sales (nor positively or negatively), the general result is positive for the supply chain, since it incurs the logistic costs of purchase, setup and storage among others. In this case, the final result shows a profit increase. The decisions about the assortment planning, however depend on the set of strategies among the members of the chain. Due to this interdependence, the made decisions about the assortment can influence diverse or every, members of the supply chain. Those implications are presented on the next section.

Impact of the reduction of the assortment on the supply chain: The definition of product assortment depends on the competitive differential that the company intends to support (Grewal *et al.*, 1999). An adequate selection of the line of products to be produced and commercialized must check a different and competitive advantageous aspect but also be consistent with the other variables of the retail assortment, such as localization, price, promotions and staff of sale.

For the industry in some cases, to make available every portfolio of possible products may not be the best strategy. Despite, there could be possibility of maximization of the profits and the sales for the satisfaction of the final consumer desire, this alternative generates high costs for the system. A bigger assortment on the points of sale implicates in demands and smaller storage of each product, low availability, as well as high costs of handling (Kok *et al.*, 2006). Besides, a compost assortment by a big number of products can limit the profit margin of the industry obtained through the scale economy. The decisions related to the assortment generate implications on the costs of products mainly when it is about the need of the down time of the machinery due to the change of SKU/item/flavor to be produced. This way, the bigger the composition of the assortment of a company, the bigger will be the time spent on the period of transition of the process of production.

The reduction of assortment can generate advantages for the retail and the industry if the supply chain if it is structured on an integrated way, so there is no diverges between the line of products offered by the industry and the assortment of products selected and stocked by the retail (Cadeaux, 1997). Usually, these two links of the chain present conflicting and diverging goals. The desire of the manufacturer, most of the times is to maximize the availability of all the product line on the retail when on the other hand, the retailer chooses for the availability of smaller assortments that favor the interests and benefit diverse suppliers (Kok *et al.*, 2006). This conflict is intensified by the tendency of the current retail to produce and commercialize its own brands. These have lower prices and risks with the guarantee of better margins (Bertaglia, 2009) which influence the retail to reduce the investment in storage and the physical space for the exposition of the other products.

On the past decades, the limited availability of space on the gondolas and shelves, as well as the annual growth of the product launching and the increasing investments needed for the storage, implicated on the adoption of strategies for the selection of space for exposition and storage of SKUs (Hubner and Kuhn, 2012). The conflicts between retail and industry gave space for the practice of payment (Kok *et al.*, 2006). Due to the transfer of power of the industry for the retail, the practice of slotting fees represent a strategy for the fabricant to influence the retailers to have their own products distributed, exposed or stocked on the points of sale. This value is paid by the industry and it can be funded in money or on the way of allowance, as discounts on the orders of bonus of products (Wilkie *et al.*, 2002).

Despite the conflicts between retail and industry, only collaborative actions on the planning of the assortment can generate bigger volume of sales, bigger profitability and reduction of time of supplying for all links of the supply chain. The more the industry learns about the needs and preferences of the final consumers, more able they will be to preview the precise and accurate demand of the market. The retailer is the only link of the supply chain that has the domain of the information related to the behavior of the consumers, their desires, needs and preferences (Attaran and Attaran, 2007; Bertaglia, 2009). An adequate infrastructure for the exchange of information can contribute for the reduction of the bullwhip effect (Lee *et al.*, 1997) for the reduction of storage (Campos *et al.*, 2002) and for the achievement of economic and strategic advantage (Attaran and Attaran, 2007). On the next section, the methodological aspects will be presented.

MATERIALS AND METHODS

The current research is characterized as a study of the investigative, explicative, almost experimental case. It was proceeded the manipulation of an independent variable (assortment) but without the control of the application of experimental stimulus or the random distribution of the items. In a case study format, researchers sought to analyze a real fact to achieve a detailed knowledge of the situation (Yin, 1987). It was used qualitative and quantitative historic data, direct observation and meetings with the sales executives to combine different methods and to allow the triangulation (Voss *et al.*, 2002).

The searched industry on the perishable food product segments was selected by its competitive differential by its representativeness on the segment of actuation and for making it easier the access of researchers. It is a company with big representativeness on the Brazilian retail, positioned among the leaders of actuation segment. It is composed by industrial unities and business unities located on the main regions of the country. Its line of assortment is composed by perishable products, frozen and dry with large diversification on each unity of business. The case study was held on the South part with actuation on the exclusive retail for dessert.

The dessert segment was selected by the organization in study for the implementation of the plan since it is about a strategic business unity and for being focus of the industry on the geographic area of analysis. This category presents a margin of contribution superior to the other with high profitability for the business and for the segment. In 2012, according to the data of the AC Nielsen research, this category presented approximately 13% of participation on the dairy market. Given the importance of the segment, the consume of dessert have been presenting important increase on the past decade, justified by the technological progress in ingredients and processes.

The period of analysis for the research was selected having as a base the occurrence of the study phenomenon. The reduction of the assortment happened on the first 2 months of 2011 and the analysis covered the previous and later period to this phenomenon inside a longitudinal research with cross-sectional. It was collected primary and secondary data of research.

The primary research data was collected in meetings with the commercial department of marketing, responsible for the region and for the unity of business analyzed. Based on the literature, it was developed a script for the data collect, on a way that it was incorporated a set of attributes related to the product assortment, details of

organizational routine, participation of market, innovations of category, analysis of costs and performance, collaboration of the canal, formation of networks, competitiveness and finally the developed strategies by the company on the dessert segment in study.

The secondary data of the research was supplied directly by the company and also through Nielsen research for the periods among 2009-2012. These covered the participation of market, numeric and pondered distribution, participation in volume and billing of sales corresponding to the preview and later periods to the implementation of the assortment reduction strategy.

For the conduction of the research, it was used qualitative and quantitative historic data of sales and participation of market covering the period between 2009 and 2012 for the group of dessert. Between 2009 and 2010, this line of products presented an assortment composed by 17 SKUs. The reduction strategy of 35% of the assortment happened in 2011 with the goal to improve the positioning of the company on the products presentation and exposition on the points of sale, bigger turnover capital comparing to the SKUs, participation on the market in volume of sales and billing. It was withdrawn from the assortment the products that presented low turnover and high index of compensation for exchanges and returns occurred on the points of sale.

It is a study that intends to compare the averages of two normal distributions of a same population but in different moments being one before the implementation of the assortment reduction and the other after. Inside these statistic procedures, researchers intend to verify if the average of growth after the strategy is lower or higher before and after the implementation of the reduction of assortment. In order to evaluate the significance level of the average difference for each indicator of the researched variables, it was only possible for the volume data of monthly sales that made pairs. This way, it was possible to test 24 pairs.

The reduction of the assortment was analyzed in the context of the industrial production and of the physical space available by the retail on the South part of Brazil, here represented by the convenience stores, bakeries, grocery stores, supermarkets, hypermarkets and authorized distributors. The sample of the research contemplated 1,300 active points of sale and accepted by the companies. It is important to highlight that on the period of analysis, the company chose for the pulled demand and did not realized promotional actions or payment of slotting fees with the goal of alternate the volume of sales, in order to obtain better space on the shelf or better exposition of the product on the point of sale.

RESULTS AND DISCUSSION

Presentation and analysis of the result: Initially, it is important to verify the possible influence of the external factors on the achieved results. Table 2 shows with volume of sale data, the participation of the researched market comparing to the Brazilian market for the dessert segment between 2010 and 2012. Table 2 shows that the total dessert market in Brazil moved a sales volume of 27,743.42, 29,050.20 and 29,267.40 ton in 2010, 2011 and 2012, respectively. Brazilian dessert market presented a growth of 4.71% comparing between 2010 and 2011 and a growth of 0.75% comparing between 2011 and 2012.

The dessert market on the business unity presented growth of 9.59% comparing 2010-11 and growth of 5.82% comparing 2011 and 2012. The sales volume of the company presented a retraction on the sales volume of 1.89% comparing 2010 and 2011 and a growth of 1.35% in 2012. For the sector in analysis, after the implementation of the strategy of reduction of 17 for 11 SKUs, the volume of sales increased 9.13% from 2010-11 and 3.33% from 2011 for 2012, percentuals superior to those presented for the whole Brazilian market and for the company in situ on the same periods.

The tendency of growth presented by the region confirms the increasing participation of the dessert category on the total market of lacteous on the geographic region. Despite the importance of the segment strategy of dessert for the region and for the company in

study, only on the analysed sector where it occurred the reduction of assortment, the company achieved results of growth on the sales volume. In front of these comparatives, it is possible to say that the company growth on the sales for the segment in analysis is due to the strategy of assortment reduction and not the natural growth of market.

Table 3 presents volume data of sales for the sector in analysis based in 1,300 points of sale analysed between 2009 and 2012. It can be noticed that in 4 years of analysis, the result of a specific year was not superior during all the months of the year. Despite the fact that the company in study chose the pulled demand and did not realize promotional actions of payment of slotting fees, the same did not occur to the competition. These actions of the competitions were more significant in some periods resulting in superior monthly volumes of sales. In 2012, it did not show results superior in volume of sales during all the months but on a general way, the total result for this period was superior to those achieved in 2009-2011.

Table 3 also presented the data of the evolution of price by kg from the dessert segment between 2009 and 2012. The evolution of the price by kg of dessert presented a retraction of 1.98% from 2009-2010 and an increase of 4.32% on the comparative between 2010 and 2011 and 9.57% comparing 2011 and 2012. This fact suggests that the growth in the volume of sales in the period of implementation of the strategy was not due to the promotions of significant reduction on the price that justify a bigger search for the product.

Based on the data and the results of the research, it was analysed statistically the volume of 2009 and 2010, comparing to 2011 and 2012 with applications of t-test. It can be observed on Table 4 that there were not significant differences among the various levels of significance. The calculation of t-test with p-value <5% shows that the

Table 2: Volume of sales in tons between 2010 and 2012

Period	Total segment in Brazil	Total analysed area (South)	Total company	Total sector
2010	27,743.42	5,911.22	1,454.93	373.5
2011	29,050.20	5,967.90	1,427.40	407.6
2012	29,267.40	6,315.40	1,446.70	421.2

Adapted from AC Nielsen (2009-2013) and enterprise; April 21, 2014

Table 3: Sales in tons, value by kilo and billing (thousand) of dessert between 2009 and 2012 for the researched sector

Periods	2009			2010			2011			2012		
	Ton	Value (kg)	Billing (x1000)	Ton	Value (kg)	Billing (x1000)	Ton	Value (kg)	Billing (x1000)	Ton	Value (kg)	Billing (x1000)
January	16.3	7.0	114.00	27.5	6.4	175.00	31.1	6.7	209.70	27.6	7.6	209.40
February	18.3	7.0	127.00	24.4	6.4	155.40	36.2	6.7	244.00	35.6	7.8	275.60
March	18.8	6.9	129.90	31.5	6.4	201.60	35.0	6.7	235.50	28.7	7.6	219.20
April	18.9	7.3	138.40	24.3	6.8	164.60	34.7	6.9	239.80	35.3	7.7	269.90
May	21.3	7.3	155.00	27.4	6.8	185.00	29.6	7.1	209.90	38.3	7.7	295.70
June	21.0	7.3	153.10	30.1	6.8	203.90	32.0	7.1	227.70	32.1	7.7	247.10
July	19.8	7.4	147.20	26.2	6.8	178.90	33.4	6.9	230.20	36.0	7.5	270.90
August	30.3	6.8	206.90	33.5	6.8	227.30	36.5	7.0	254.80	39.8	7.6	303.80
September	29.8	6.6	198.80	36.5	7.0	253.90	39.0	7.1	275.10	39.8	7.7	304.50
October	26.0	6.5	168.20	36.3	6.8	247.90	37.5	7.2	268.50	41.4	7.7	319.20
November	29.2	6.4	187.50	38.1	6.7	255.40	34.6	7.0	240.90	37.5	7.7	287.90
December	32.7	6.4	208.90	37.7	6.8	256.60	28.0	7.7	215.90	29.2	7.7	225.90
Total	282.4	6.9	1,934.46	373.5	6.7	2,505.98	407.6	7.0	2,53.23	241.2	7.7	3,230.87

AC Nielsen in 2012 and company data

Table 4: t-test two samples in pairs for the averages between 2009 and 2012

Variables	2009-2010	2011-2012
Average	27327,99	34534,90
Variance	43560520,66	15988560,83
Observations	24	24
Pearson's Co-relation	0,213029744	
Hypothesis of average difference	0	
gl	23	
Stat t	-5,079939887	
p (T≤t) uni-caudal	1,91325E-05	
tcritico uni-caudal	1,713871528	
p (T≤t) bi-caudal	0,0000383	
tcritico bi-caudal	2,06865761	

The researchers

independent variable analyzed (assortment) contributed for the success of the implementation of assortment reduction strategy.

As it happens every year except in 2009, the company realized in 2010-2012 a co-relation of the prices Table 4 with adjusts superiors to the values practiced due to the increase of insumes for the productions. Despite the increasing of prices, the total volume of dessert sales increased 9.13% in 2011 and 3.3% in 2012. The total growth in volume of sales considering the sum between 2011 and 2012 was 12.46% and in billing of 12.48%. For the billing, due to the price increase that the product suffered during the time, it was used the calculation of Intern Tax of Sector Growth (ITSG) and the baseline of 2010.

The reduction of the assortment from 17 for 11 SKUs caused a cut of 35% in the variety of products to be produced, fact that allowed the availability of production machines for specific lines of interest and reduction of necessary time for the transition. Lower the number of SKUs also allowed the reduction of the number of suppliers for the industry with directing of the investments for the assortment of bigger turnover and preferred by the final consumer. The reduction of SKU, also influenciaded all the Commercial Department, as well as the repositores and promotores sellers. On the first case, it was possible to direct better the commercial actions, merchandising and supplying and better exposition of the products. A better variety of products inside a physical constant space allows to increase the visibility of the products with bigger turnover and the more accepted and flavors approved by the bigger percentual of consumer from the segment. As long as the products of preference as maintained, the reduction of assortment does not compromise the demand from the business unities (Broniarczyk *et al.*, 1998; Iyengar and Lepper, 2000; Boatwright and Nunes, 2001; Veiga *et al.*, 2011).

CONCLUSION

On the academic research, the obtained results through the reduction of assortment depend on many variables associated to the consumer's profile, the product and/or the category. In South Brazil, the demand

of desserts presents a superior result comparing to other areas. The same results achieved by this study could not be achieved by the analysis of other products in Southern area or by the reduction of the dessert assortment in areas where this category has lower representativeness. For the analyzed area, in special the reduction of dessert assortment in 35% generated an increase of 12.46% in the total volume of sales in 12.48% in the billing between 2011 and 2012. This strategy represented a tool for the liberation of space on the shelf for SKUs with high volume of sales, preferred by the flavors or formulation. The removal of the assortment items increases the exposition of the brand on a point of sale and becomes more attractive for a consumer that is not willing to seek a specific item in front of an offer of a big variety of products.

The achieved result on this research also contributed with the empirical evidences found on the literature about the assortment planning (Broniarczyk *et al.*, 1998; Iyengar and Lepper, 2000; Boatwright and Nunes, 2001; Veiga *et al.*, 2011). Despite the literature around the dimensioning of assortment showing significantly large, the results are still more divergent and variables according to the research conditions for the categories, products and specific markets. For further analysis, researchers suggest similar researches in other categories of products and the use of other financial analysis tool. The analytical tools to base the decisions around the assortment planning needed to be grounded in science and not on the art of trial-error, practice that is well common on the Brazilian retail.

SUGGESTIONS

The goal of this study was to investigate possible effects of the assortment planning from the point of view of the supply chain management. On a specific way, the study intended to analyze the consequences of the implementation of a strategic tool of reduction of assortment available on the dessert retail on South-Brazil. As a contribution, besides the large bibliographic review and the assistance for the understanding of the Brazilian retail, the results show that the decisions about the assortment planning assume a prime role on the supply chain strategy as a whole, since the goal, of the retailers and producers is to get the loyalty of the clients and offer a balance of variety, depth and level of service.

The negative effect of the reduction of assortment is frequently justified by the fact that clients do not find their favorite product, due the removal of this assortment offered on the point of sale. The consequences of an inadequate assortment reduction drag on all links of the chain, since the consumer can exchange the retailer, substitute the SKU by a product of other brands, substitute by products of the same brand, delay the

purchase or give up. Given the importance about the subject, the decision-making about the assortment have been emerging, as an important competitive tool to influence the demand of products on the point of sale.

For the food products of the supply chain, specially, it is relatively easy to identify the items with low turnover on the retail. The action practice collaborative between retail and industry allows the sharing of information about the needs and preferences of the final consumer. On a general way, it can be said that the preferential products of the consumers are kept, the reduction of assortment does not compromise the demand of the business unity.

Despite the data of behavior, the consumer contribute to analyse, they do not represent the only source of information needed to define what SKUs could be eliminated of the portfolio. The decision making for the ideal assortment depends, also from the various negotiations that occur between suppliers and retailers on the commitment of purchase that are firm. In practice, the constant negotiations of both sides seek own favouritism and the final result depends on the balance of channel force. It is a multifactorial process, hardly considered on its totality in a unic scientific study.

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