PRODUCT VARIETY MANAGEMENT: A PROPOSAL OF METRICS AND INDICATORS FOR THE COSMETIC INDUSTRY

GESTÃO DE VARIEDADES DE PRODUTOS: UMA PROPOSTA DE MÉTRICAS E INDICADORES PARA A INDÚSTRIA DE COSMÉTICA

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Abstract

This paper aims to present the problems faced by companies in relation to Product Variety Management (PVM), make the management of the company's product variety studied less complex and more dynamic, balancing the marketing team's objectives with the constraints of the industry, proposing suggestions to assist in decision making and presenting metrics for PVM evaluation. The variety of products is a current theme and present in the day to day business. With the proliferation of diversified and customized products to meet the demands of different market segments, companies face difficulties to manage the increasing in their portfolio, where excessive quantity of products can cause confusion in customers and difficulties in the operation. On the other hand, the scarcity of diversified products can mean loss of market share and competitiveness. The study is developed from the observation of the production of a cosmetics company located at Pavuna, state of Rio de Janeiro. Based on the knowledge of each department dynamics and variables involved with the offered product mix, this study indicates ways to minimize the difficulties arising from PVM, presenting management tools to streamline and improve product-related decision making. To better understand the impacts and consequences of the PVM in the cosmetics industry three strands were considered: management of incoming items, management of cruise items and management of items to be discontinued. The study supports the creation and analysis of key indicators, capable of assisting decision making and reducing the risks of an inadequate portfolio.

Keywords: Product variety. Product variety management (PVM). Mix of products. Cosmetics industry.

Resumo

O objetivo deste trabalho é apresentar os problemas enfrentados pelas empresas quanto à Gestão da Variedade de Produtos (GVP) tornando a gestão da empresa estudada menos complexa e mais dinâmica, balanceando os objetivos da equipe de marketing com as restrições do setor, propondo sugestões para auxiliar na tomada de decisões e apresentando métricas para avaliação do GVP. A variedade de produtos é um tema atual e presente no dia a dia dos negócios. Com a proliferação de produtos diversificados e customizados para atender às demandas de diferentes segmentos de mercado, as empresas enfrentam dificuldades para gerenciar o crescimento do portfólio, onde quantidades excessivas de produtos podem causar confusão aos clientes e dificuldades na operação. Não obstante, a escassez de produtos diversificados pode significar perda de participação de mercado e competitividade. Desenvolveu-se o estudo a partir da observação da produção de uma empresa de cosméticos situada no estado do Rio de Janeiro. Baseado no conhecimento da dinâmica de cada departamento e variáveis envolvidas com o *mix* de produtos oferecidos, este estudo indica formas de minimizar as dificuldades decorrentes do GVP, apresentando ferramentas de gestão para agilizar e melhorar a tomada de decisões relacionadas ao produto. Para melhor compreensão dos impactos e consequências da GVP nesta indústria, realizou-se uma divisão em três vertentes: gestão de itens entrantes, gestão de itens cruzeiros e gestão de itens a descontinuar. O estudo sustenta a criação e análise de indicadores chave, capazes de auxiliar a tomada de decisão e diminuir os riscos de um portfólio inadequado.

Palavras-chave: Variedade de produtos. Gestão da variedade de produtos (GVP). Mix de produtos. Indústria de cosméticos.

1 Introduction

Product variety management (PVM) is an efficient strategy to increase market share, as it allows reaching several segments, satisfying different consumers. The strategy, however, does not always mean increasing the company's profitability (Klingebiel, Reis, Scavarda, Schaffer, & Brafman, 2011).

PVM can be defined as the production of a varied number of versions of a product over the same period and a number of different products offered by a company (Klingebiel *et al.*, 2011). It is a set of managerial practices which goal is to coordinate actions within the company and throughout the supply chain seeking to better align the areas and links of this chain (Reis, 2013). Due to the various factors involved in PVM, this activity becomes extremely complex and very important to companies. Product variety management is a challenge that requires conscious trade-off management between meeting customer needs and mitigating the negative impacts on the operation (Reis, 2013).

PVM is directly linked to the determination of the ideal products mix to be offered and the return of the highest profitability. Although it is a relevant topic for companies, few academic papers address issues related to metrics of PVM, which is configured in a gap in academic literature (Reis, 2013).

In this way, this study aims to reduce the research gap. The main aim of this article is to propose metrics for PVM evaluation in a cosmetics sector of a multinational company with its industrial plant located at Rio de Janeiro state. It analyzes the scenario of the cosmetics industry which aim is to produce beauty. Considering that the beauty pattern is different in each region of the world and that, to gain market share, companies try to adhere to the various needs of consumers, companies in this sector have an increasingly broad portfolio.

This fact is even more evident when analyzing the Brazilian market. It is a vast country in size and in mixed race. The great challenge of the Brazilian cosmetic companies is to serve the most diverse public, with different types of hair, skins, tastes and cultures, finding the key point of product mix to be offered. Brazil occupies the fourth position in the world ranking in the consumption of cosmetics according to ABIHPEC (Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry). The Brazilian market for HPPC (Personal Hygiene, Perfumery and Cosmetics), which moved by US$ 12.9 billion in 2016, employs 5,772 million people and it has 2,650 regularized companies (ABIHPEC, 2017).

The remainder of this paper is organized as follows: The next sections present the introduction, theoretical framework, the methodological approach, analysis of the data

collected, PVM in the cosmetic industry, proposed indicators and metrics. Finally, the paper ends with a general discussion of the main findings.

2 Literature review

2.1 Product variety: concepts

In the last decades, products variety has increased in several industries (Cox &Alm, 1998). One of the reasons for this phenomenon for Rajagopalan and Xia (2012) is the companies' attempt to satisfy the heterogeneity of consumers by increasing products variety. There are also other reasons, such as the desire of consumers for new functions and characteristics in products, different regional needs, different market segments with different needs and need to adapt to different specifications (Elmaraghy *et al.*, 2013).

The products mass customization that is already seen as a reality in companies, becoming a leadership strategy for customer satisfaction and essential for market survival (DaabouL *et al.*, 2011). Jiao and Zhang (2004) consider that the expansion of product lines and differentiation in their supply have been increasingly used by manufacturers to keep their competitiveness in the market. Ulrich (1995) defines products variety as the diversity of products developed in a production system target to the external market. Elmaraghy *et al.* (2013) makes explicit the diversity within a special class of the same product family, considering the existence of several variants in the same product.

Fixson (2005) analyzes product variety behind the product architecture, defining it as a package of product features that include number of components and interfaces, representing the fundamental structure of the product. In this way, various products can be differentiated only by the way in which they are formed.

Products variety is also characterized in width and depth dimensions. Escobar *et al.* (2008) define the width as the number of available product lines and depth as the number of products offered in each line.

Fisher *et al.* (1999) relate products variety as the time variable and classifies it in two distinct dimensions. The first is the quantity of products that a company offers at a given moment and the second, the speed with which the company replaces the existing products to new products.

In addition, product variety can also consider the specific definitions that are directly related to the industry to which the products offered belong (Klingebiel *et al.*, 2011).

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Reis (2009) segments its study relating products variety in different industries analyzing their main and respective attributes. Table 1 exemplifies some attributes and some of their possible variables.

Table 1. Attributes and variables of product variety

ATTRIBUTE	EXAMPLE OF VARIABLE
Color	Black, White, Gray, Green
Flavor	Strawberry, Apricot, Grape
Size	Small, Medium, Large
Features	Voltage, Weight, Memory Size
Material	Wood, Iron, Aluminum, Steel
Design	Geometry
Packaging	Glass, Metal, Plastic

Source: Adapted from Reis (2009).

2.2 Product variety management

According with Vaagen and Wallace (2008) the optimum product level variety to be offered in each market is determining as fundamental to increase profitability. For Elmaraghy *et al.* (2013) this result is only guaranteed when variety is well managed at all stages of design, planning, production and distribution.

For Rozenfeld, Amaral, Toledo e Carvalho (2000), an efficient portfolio management should organize and order the integrated planning of products to be designed in the development phase and those that are in the market. The goal is to ensure alignment between the company's resource constraints and customer requirements through efficient platform planning, combinations of solutions, and module sharing across products. Reis (2009) emphasizes that the management of this variety should seek to balance the benefits from the marketing perspective with the negative effects caused, in general, by the perspective of operations and logistics, listing the main points of each department.

Xia (2008) characterizes two forces for the variety management: demand pull and supply push. On the side of the benefits derived from the marketing sector the perspective is the achievement of new markets meeting the need of consumers with new products (demand pull), and from the perspective of operations and logistics sectors, the pressure to increase the variety offered without increasing costs by combining production and more flexible distribution channels (supply push).

The new product introduction is not simple. It requires alignment of the whole company. According to Rozenfeld *et al.* (2000), it is necessary to carry out a project for the

development of the product incorporated in the strategic planning, involving all areas of the company. Cebeci (2009) emphasizes the importance of the top management involvement in the implementation of the variety to be offered and in establishing communication with other areas, facilitating their engagement.

For Pancieri (2011) the importance of a good communication between the parties allows marketing to consider the operational capabilities to design the requested variety and not to make production activity complex. From the operations side, this integration is important so that one understands what the customer really wants to reduce possible reactions to the necessary changes in the production process to implement this variety.

Jiao and Zhang (2004) discuss the need for a relationship between the areas in definition of the product portfolio to be offered. Marketing sector is seen as a central mediator of this relationship functioning as a channel between consumers and the Product Design area, without taking into consideration the technological limitations and productive capacity of the operation, the third party involved. Table 2 shows the impact of the product variety on the sectors of a company.

Table 2. Impact of product variety in the company sectors.

Product development	Acquisitions and Logistics	Production
greater effort to design new parts and manage changes. creation and management of additional technical documents.	planning of the most difficult needs. greater inventory to maintain service level. search and selection of additional suppliers.	Increase set-up costs due to the reduction in the size of the lots greater complexity in the production control process Decrease of productivity.
Accounting	**Marketing and Sales**	**Post Sales Services**
greater investment of capital in inventory. greater requirement of cost accounting.	forecasts of more difficult demands. need of intensive collaboration with production. difficulty in determining prices.	Increase training of customer support team. greater risk of complaints. increase stock of spare parts.

Source: Adapted from Brafman (2009).

Product variety management does not just mean changing the portfolio. For Elmaraghy *et al.* (2009), it means all levels of manufacturing is one of the company's most important priorities.

2.3 Product variety: indicators and metrics

For Peter Drucker (2013), "What is not measured cannot be managed," as well as Juran's (2009) recognized as the guru of quality, "Managing is controlling. Without control there is no management. Without measurement, there is no control". These authors (2013; 2009) illustrate well the ideals of indicators and performance metrics that are applicable to measurement of what is running so that it is monitored in order to achieve the corporate goals and objectives.

Key performance indicators (KPI) are management techniques. Its use was driven by total quality management (TQM), based on facts, data and guidance of internal processes for the satisfaction of final customers (FAE, 2002). They are quantifiable measures to understand if the objectives are being achieved and, consequently, help in taking actions that improve the current results.

There are three types of performance measures: (i) key indicator results, which demonstrate how performance is in some perspective; (ii) Performance indicators, which refer to what should be done / measured and, finally, (iii) KPIs that demonstrate what should be done so that there is performance growth in each perspective (Parmenter, 2007).

The non-financial performance indicators (PIs) proposed by KPIs methodology concern to the key business areas: customers, markets, products, processes, suppliers, human resources, community and society. The methodology suggests the adoption of targets for each of the key performance indicators based on benchmarks or procedures such as mapping the contribution of KPIs to the company's financial performance (FAE, 2002).

Although it relates non-financial performance in the key areas with the financial performance of the company, KPI methodology does not establish clear cause and effect relationships between different performance measures. The methodology does not contemplate the deployment of performance indicators to the organization's tactical and operational levels. To measure the performance of all factors impacting future financial performance, the company must monitor many non-financial and financial indicators (FAE, 2002).

KPIs can be obtained through sampling, analysis of calculations and validation of key parameters of the organization. They are mark and quantified indexes, which help as a tool for dividing a company's strategic target into operational goals that can be analyzed (Zhu *et al.*, 2013).

In the context of management by the guidelines, some KPIs become relevant only to some managers and boards. This will drastically reduce the number of indicators that each one

should be concerned about (FAE, 2002).

According to Parmenter (2007) seven characteristics are attributed to KPIs: (i) they must be measured frequently; (ii) measured not only financial parameters; (iii) used and measured by the senior management team; (iv) should have their measurement as well as their corrective actions understood by all the employees; (v) must have ties of responsibility to individuals or to staff; (vi) should have significant impact and influence in more than of BSC (Balanced Scorecard) perspective; and (vii) should also have positive impacts, affecting all other performances positively.

BSC solves this connection issue through cause and effect relationships, where performance in a few indicators is related to key business areas with future financial performance. The BSC translates the mission and business strategy into objectives and performance measures organized into four perspectives: Financial Perspective, Customer Perspective, Internal Business Processes, and Learning and Growth (FAE, 2002).

Given the most varied methodologies for managing performance indicators, some characteristics must be inherent to indicators and should be considered at the time of their creation. A characteristic that must be considered is related to the congruence of the indicators, that is, they must first respect the organization's objectives (Nascimento *et al.*, 2011). Another characteristic relates to controllability. The indicator should be controllable by the manager with easy understanding and simplicity. Indicators should be timely, accurate and understandable to those who feed them and should have a relationship that compensates cost benefit (Nascimento *et al.*, 2011).

It is also relevant to emphasize the importance of the SKU (Stock Keeping Units). SKU is the identity number of a product through which it is possible to manage the maintenance of the inventory (Matthews *et al.*, 2018). It was created to facilitate and to give agility to the management of the warehouse facility (Hessler & Schwindt, 2017).

3 Methodology

This study is focused on the PVM analysis applied in a European multinational company operating in the Brazilian cosmetics market, more specifically considering the structural capacity of one of its plants, located at Rio de Janeiro state in the Pavuna region.

It adopted research method following three stages. The first was the identification of the problem, that is, the lack of adequate indicators to assist the PVM; after data were collected and results were analyzed and finally, was the elaboration of the conclusions (Gray, 2012).

Data collection was carried out under two strands, one theoretical and other empirical. The theoretical part was elaborated through research on articles, theses, periodicals and books of the portal of CAPES - Commission for the Improvement of Higher Education Personnel, which served as a basis for the preparation of the literature review chapter. This section aimed to understand the variables and impacts that influence decision-making process of the product variety. The methodological procedure presented was based on those described in Rowley and Slack (2004), which recommend four stages: evaluation of information sources, research and localization of information resources, development of framework and writing of literature review.

On the empirical side, a documentary survey was carried out, based on data, records, procedures and policies adopted by the target company as well as interviews with highly important officials in the decision-making process of the variety of products offered (Gray, 2012).

In order to have a real idea of the number of SKUs (Stock Keeping Units) offered and to obtain a better understanding of the company's current and practical situation, a survey was made in the entire portfolio offered by the company as well as some important product information involved. Through the internal data bases of the company, the costs involved were calculated on the products produced at Pavuna´s plant, comparing them with the respective sales volumes, analyzing the contribution margin per SKU.

The plan of production by products was raised, trying to investigate if the production of some items is justified. Also, the study observed how many and which products and formats (packaging) are produced in the factory understanding the percentage of products produced over the entire portfolio offered.

Interviews with executives of the organization aimed to evaluate how these managers see the decision-making process of the product mix, and to detect some specific characteristics of the company that may be fundamental for PVM. The interviews were conducted with a national Customer Service manager, a trainee of production sector located at Pavuna´s plant, a strategic supply chain development manager, a full logistics analyst, a product development director, a product development manager, a development director, an operational marketing analyst. All positions are directly involved in PVM in the company. With this analysis it is possible to determine which variables are more important in the decision-making process and thus to determine which are the main indicators that should help this process and how they are fed.

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4 Data analysis

The culture of constant innovation is an essential characteristic for the company to remain competitive in the cosmetics sector which is one of the most complex in the Brazilian market (ABIHPEC, 2017). The organization of the study adheres to this strategy. Most of the SKUs offered are produced in-house. With this the factory is in a scenario of resources saturation.

When analyzing the production plan of the Pavuna's facility with 12 months visibility over the range of SKUs offered, it is verified that 36.9% of the portfolio volume offered in Brazil is produced at Pavuna´s facility - Table 3.

Table 3 - Analysis of production at Pavuna's plant

Portfolio volume offered in Brazil	4142 (k un)
Portfolio volume offered at Pavuna	1529 (k un)

Source: Authors, based on the data of the company targeted by the research

The production of a high number of SKUs is due to tax incentives. Cosmetic factories in accordance with Decrees 35,418 / 2004 and 35,419 / 2004 were found to have tax credit benefits resumed to be ICMS for production in the state of Rio de Janeiro (Decree n° 35.419, 2004).

The interviews with company employees allow perceiving different perspectives on the variety of products offered. While collaborators in areas as marketing and development advocate increasing the variety of products, employees from operational departments have made clear the negative impact it brings and often is not justified, due to the large number of products that have slow turnover and high obsolete index.

4.1 Analysis of product mix

Following the strategy of the study a survey was made considering the mix of products made at Rio de Janeiro plant. It was verified that from the total volume of products offered by the company, Pavuna's facility is the only one that serves all four segments of the group: professional products, active cosmetic products, products offered to the public in general and luxury products.

For the analysis of industrial complexity and correlation between formats and volumes,

only cruise items will be considered in this study[1].

Data were obtained from the facility database that categorizes SKUs into two groups: internal and co-manufactured / external. Internal SKUs are those that are produced and packaged in the plant itself while the co-manufactured have at least one critical activity performed by a third party such as external carton and outer carton. The external SKUs are produced in full-buy system where the company buys the final product of a third company. This subdivision is necessary to separately manage internal production characteristics and production variables with the participation of third parties.

The study showed that 119 formats are produced with the participation of outsourced companies. By correlating the formats with the volumes, it is verified that 95% of the volume produced is distributed in 51 formats, while the remaining 68 formats correspond to only 5% of the volume of production.

These results indicate the high complexity faced by the industrial plant for volume management, setup times, losses, quality and services. It can be noticed the trend of more participation of third parties in the manufacture of items with lower annual production volumes.

Although the good practice of the company to encourage the sharing of formats to gain in scale and for simplification in component management and to the adoption of golden rules to mitigate saturations and obsolete, there are still several variables that require too much from the facility.

5 PVM in the Brazilian cosmetics industry

5.1 Variables involved

In parallel to the analysis of the product mix, interviews with company's stakeholders were made.

All the interviews gave great importance to the PVM, considering the performance of the company in a competitive market. On the other hand, they are concerned about the saturated capacity of Pavuna plant.

The interviews consisted in understanding the variables that lead the company to expand, maintain or reduce the range of products offered in the Brazilian market. It also wants to understand the effects of each attribute, to enable managers to decide the appropriated

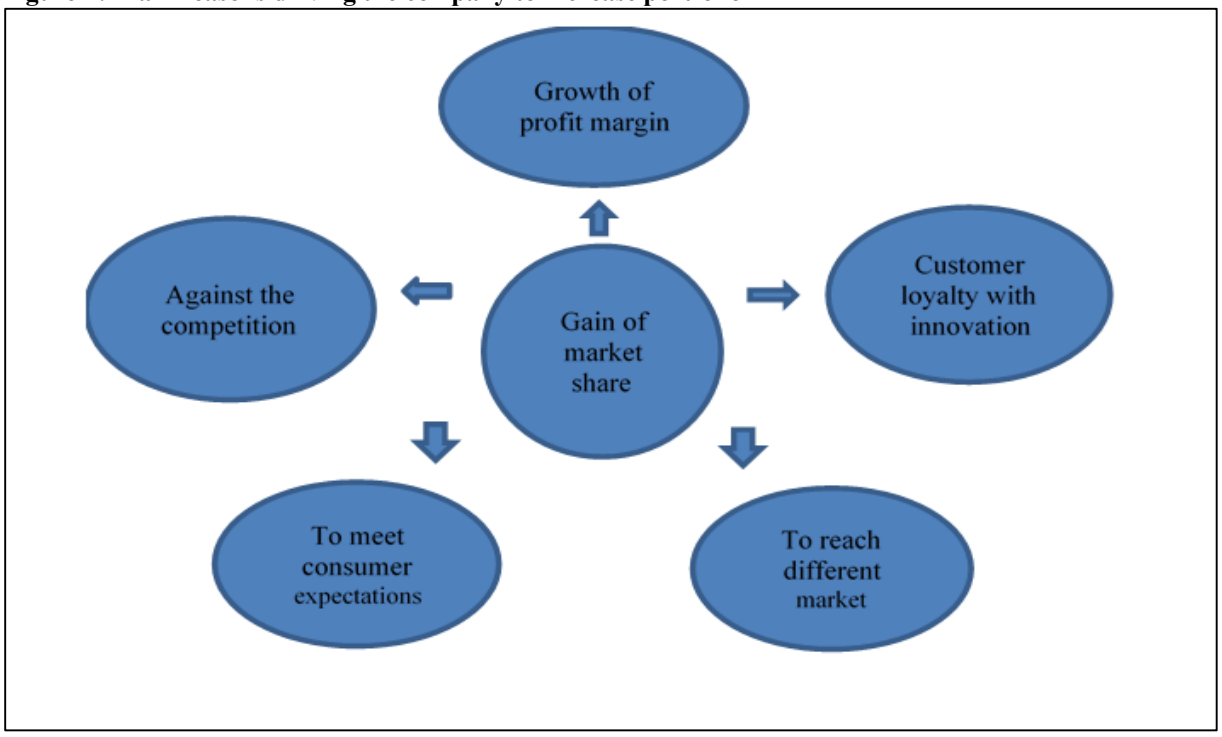
[1] Cruise Items - Products already in the catalog

number for the company's strategy, facilitating decision making.

Seeking to understand the main reasons for increasing the variety of products, the employees unanimously defended the market share gain and pointed out similar causes for the growth in the variety of products, among them: reach of different market segments, adherence to diverse expectations of Brazilian consumer, loyalty of customers through constant innovations, firm positioning in front of competitors and also the generation of profit margin for the company with the new product.

Figure 1 shows the main answers regarding the reasons for expanding the company's portfolio:

Figure 1: Main reasons driving the company to increase portfolio



Source: Authors based on the data of the company targeted by the research

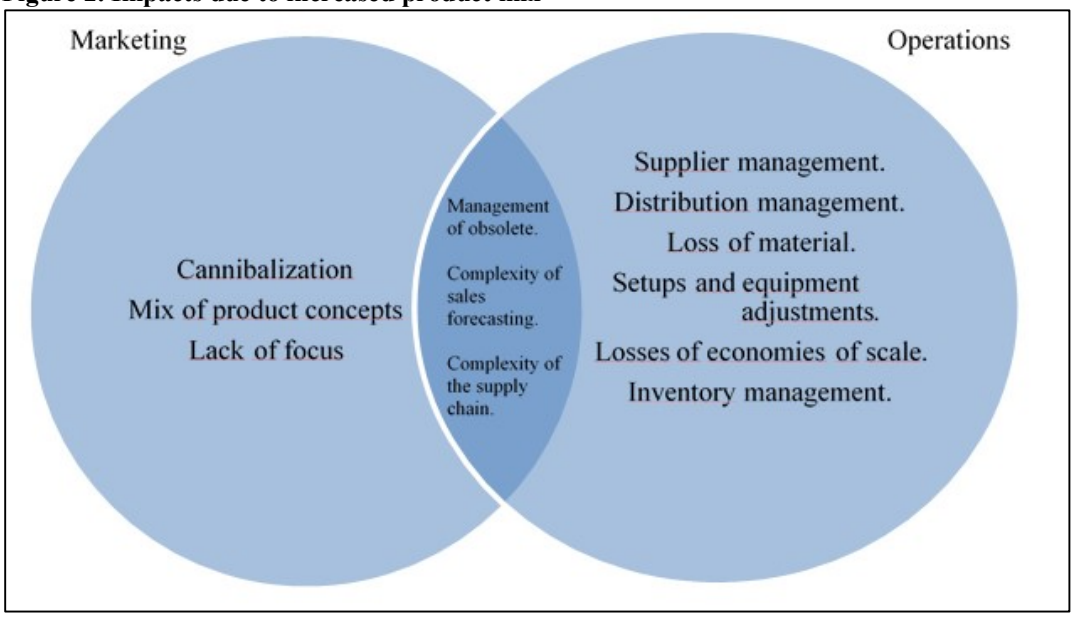
For professionals working in marketing and development departments, answers were more generic, addressing common points, such as those cited by the product development manager: "Predicting more complex demand and its consequences and increasing complexity in the management of supply chain. "Specific points were cited such as cannibalization caused by product launches similar to cruising items. Due to the high number of product families in the catalog, the mix of product lines can raise the complexity of managing gondolas and shelves in markets and pharmacies.

According to one analyst, these are direct costs and losses in the production line, such

as the acquisition of equipment, losses of productive setups due to the variety of items shared in the lines and the losses of economies of scale, since volumes are fractionated in several references. This is very evident in the following passage from the production planning and control officer: "When there is a change in product format, there is a greater demand on the part of production. The machine must be adapted to all existing formats, so that it is able to rotate the products with different packaging. This setup takes a much longer time and demands that it be done by a technician. This change can affect productivity in many ways. The speed that the machine can produce can be affected and adjustments during production are not so simple. It can cause quality problems and a high rate of material losses." The demand analyst points out "supplier management; inventory management of raw materials and components; inventory management of finished products; greater complexity of sales forecasting and management of gondola space in customers, as well as impact on higher risk of inventory saturation and optimal mix of customers."

Negative points were pointed out by the marketing team: complexity in the internal management of the brands with extensive portfolio and the lack of focus directed to the market strategy. Due to the great number of products the strategic positioning can be different even within the same brand / family. Figure 2 shows the convergences and divergences, corroborating more impacts to the area of operations than to marketing:

Figure 2. Impacts due to increased product mix



Source: Elaborated by the authors based on the data of the company targeted by the research

To understand the consequences of a vast products portfolio of the cosmetics industry it was asked how to mitigate the problems and difficulties of managing a more complex chain.

For such questioning, both sections were unanimous in confirming the existence of processes to mitigate the consequences of increasing the offered mix of products.

For operations sector, some of the examples cited were: the analysis of capacity and feasibility of new projects by experts, the optimization of packages encouraging the sharing of components and a robust inventory policy, thus using the modularity strategy in order to manufacturing complexity. The main tool emphasized for a healthy productivity is the adoption of the "golden rules" that must be respected by the group and are also understood by the marketing team.

Such rules include restrictions such as "one-in, one-out", in which the entry of a new product design in the plant requires the discontinuation of some existing catalog product and also, as explained by the demand planning analyst, the requirement of at least four annual outputs of the product, so that there is the possibility of building a learning curve as well as an optimal rotation of inventories. This rule can give us perspectives of product performance indicators so that from the process of insertion of a product in the market, these indicators already respond to the most suitable product to be discontinued.

The only factor that the marketing analyst highlighted as a good practice, and that has a great contribution in the management of obsolete plants, is the development of promotional actions for the flow of final products with more fluidity.

Mitigation of risks, especially for launches, is still a point not explored by respondents and is seen as a good opportunity to anticipate possible problems and react with confidence to them.

The areas of marketing and innovation (M & I) and Research and Innovation (R & I) are responsible for launching decisions as pointed out by all the interviewees. These areas, together, assess market needs by proposing innovations and products with the aid of market research and consumer testing. The operational areas play a major role in decision-making through demand planning inputs, time to market information, start-up costs, financial return analyzes, risk alerts, production feasibility, quality assurance, as well as economically feasible options and simplify projects.

Although employees are aware of the portfolio management process and which responsibilities fit each industry, when asked if the company's current mix was ideal, some disagreements have emerged.

Some managers responsible for marketing and development detached that it is essential to expand the portfolio to other categories not yet reached by the company as the offer of products to the male or child in order to conquer new segments of the market still little

explored. In relation to the product mix, offered by category, consider the opposite opportunity to reduce supply.

One point especially emphasized by marketing sector is that some products, although not expressive in sales or in production volumes, are important to avoid the market to be dominated by the competition.

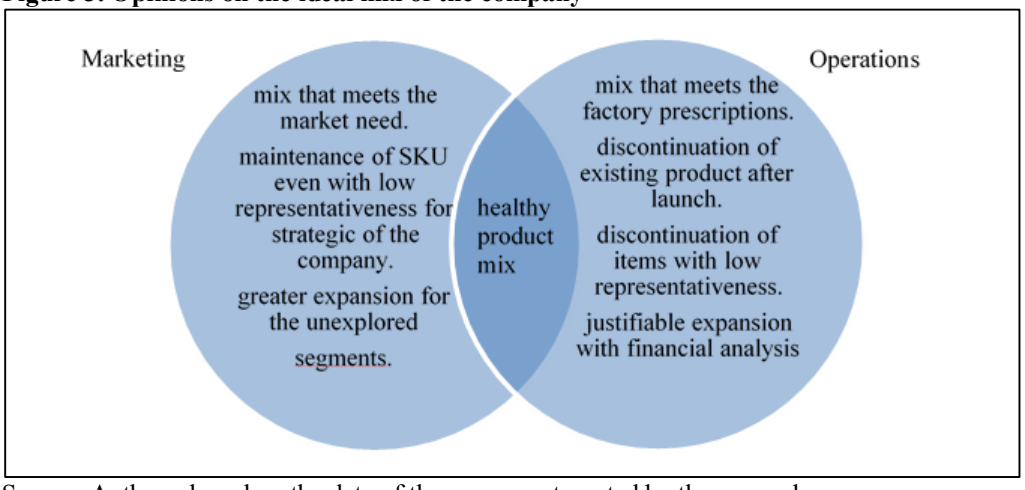
The employees involved with operations sector were divided. Some of them understand that expansion should be encouraged, but if it is financially justified. Projects with high complexities may not be representative in the market, and they will incur a negative tradeoff to the industry.

For the demand analyst, the current portfolio has a high degree of complexity, many low volume SKUs because they have many target audience variations with low sales representativeness. These reasons added to the commercial and productive variables that lead the operational team to propose the decrease of the mix.

There is also the opinion of the packaging engineer that the "current mix is adequate, but I believe that the formulas between the competitors and their effects are all very close and it is necessary to invest more in research."

In this way, both operations and marketing desire a healthy mix, however they have different ideas of this concept as can be illustrated in figure 3:

Figure 3. Opinions on the ideal mix of the company



Source: Authors, based on the data of the company targeted by the research

In order to base a possible increase or reduction of the products in the portfolio offered to the clients, each area has several tools as a form of analysis and justification for the strategy to be adopted.

The marketing area uses consumer testing and market research to understand the needs

of the Brazilian public and serve every type of segment by offering at least one product family for each different need. In addition, according to the manager of international projects, the area's agents also have the function of monitoring market trends, observing competitors' launches and the emergence of new technologies.

The decision-making process for the insertion or withdrawal of a product depends on analyzes of different areas, being subject to approval in each of them. The development area has the role of evaluating within the operations aspects whether there is technical and financial feasibility to launch a product. And if there is not, what adaptations can be made so that the project is feasible.

From the decision to launch a new product through marketing, the area of operations, according to the strategic development manager, has the role of providing the information related to its area, such as the operational changes necessary for the production of the same and the cost to fit in this new scenario. The development area plays a fundamental role in the process, being responsible for analyzing the product design presented and verifying the industrial feasibility of producing the scope of products presented by the client, alerting to the risks related to their industrialization.

With this, it is possible to realize that the whole process of launching a new product requires several analyzes and has numerous restrictions and can't be decided unilaterally by some area, but rather, in agreement with several segments of the company. Moreover, such decisions also depend on bureaucratic processes.

6 Proposed indicators and metrics

Given the variables understood through the interviews some indicators and metrics can be proposed to achieve an ideal product variety management that is applicable to the referenced case study.

Initially, it is necessary to group the portfolio decisions into three groups: incoming, maintained, also denominated as cruises and discontinued. Such grouping is fundamental for applying the correct analyzes for each case. To achieve a healthy ideal for both the industry and the business, SKU reviews are required. The portfolio management of the company portfolio is illustrated by Figure 4:

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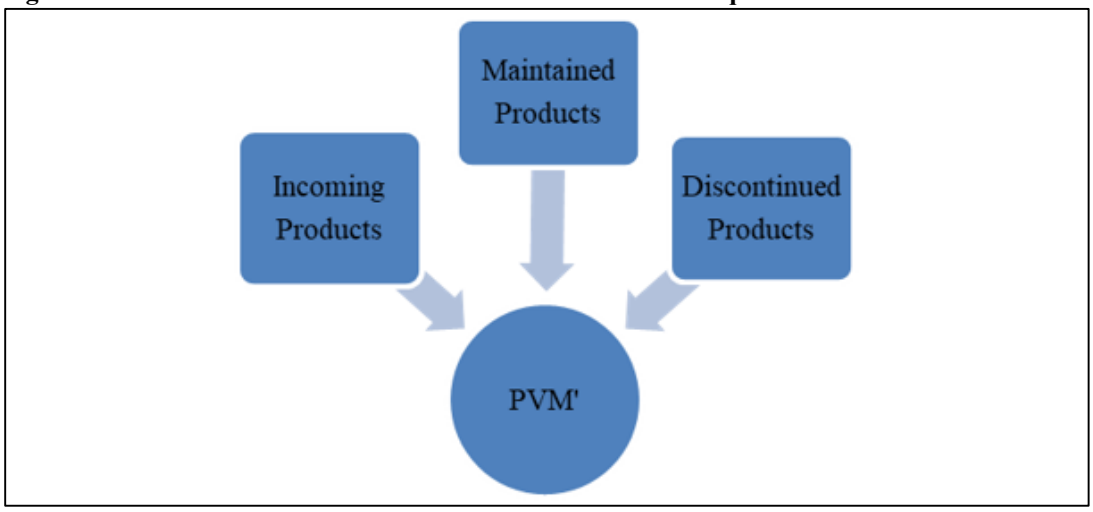
Figure 4: Classification of SKUs in which PVM decisions are required



Source: Authors based on the data of the company targeted by the research

According to this classification, the indicators proposed for analysis to each category will be explained.

6.1 Management of incoming items

In this category indicators and concepts are presented and must be analyzed to evaluate whether a product should be introduced in a company's current portfolio.

6.1.1 Conceptual development

The SKUs presented should be analyzed on 3 parameters. The first is conceptual development, in which marketing must develop new products in order to meet the demand that arise in society that allows bringing new consumers. For this, creative marketing should be used in market research to identify the main demands of the target audience and the trends that are emerging in the cosmetics market.

It should be considered if the product to be launched is in line with the brand, if the benefit that the product provides is in line with the proposal of the family that will be assigned and even if the product claims with the proposed brand.

It should be emphasized that the packaging and advertising decisions of the product are the responsibility of marketing sector but must be respected the industrial restrictions signaled by the factory, if these are produced in the same place.

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6.1.2 Industrial feasibility analysis

The second parameter is the industrial feasibility analysis, which intends to observe if the location determined to the production of the launch has the industrial capacity to support the entry of this SKU. In general, this stage of analysis is managed by the area of management and development of new projects.

To do this, it proposes some metrics:

a) demand forecast for at least four production batches without the *pipe*[2] volume;
b) existence of technology in the factory to produce the proposed SKU;
c) saturation analysis of the production line;
d) minimum lot of packaging purchase adapted to the needs of production;
e) harmonization of formats.

It is necessary for the launch of a product that it has a minimum demand forecast that exceeds the production of 4 annual lots without considering a launching pipe. This ensures economies of scale and prevents loss of time due to the machine setup. In the factory under study it was considered appropriate to adopt the rule of the minimum of 4 productions but can be changed to other cosmetic factories according to its the structure and the policy adopted by the company.

In this stage the existence of technology in the factory is verified to produce a new item. This analysis is determinant for the definition of the possible manufacturing batch and identification of the adequacy to the proposal of the first metric, and then it is necessary to check if the production line capable of industrializing the product is saturated, which makes the project unfeasible.

Regarding to the consumption of packaging indicated on topic, the fourth metric should be adequate to the needs of production, so that excess of packaging is not acquired. It requires a greater complexity of inventory to avoid degradations and high indexes of obsolete and few packaging, to reduce their cost to suppliers or on-site production, to guarantee economy of scale.

The amount of packaging purchased interferes directly with the cost of industrial production and, consequently, with the profit margin of the product, since the cosmetics market has well-defined prices for the consumer market and the competition and, therefore, the way to

[2] Pipe - Initial production volume for the introduction of the product on the market. In general, it corresponds to the first three months of the launch in which larger volumes of the product are injected for good diffusion in the launch market.

make a profit is the reduction of production costs. The metric suggestion is to also buy 4 annual batches of packaging components along with the productions.

The following analysis relates to the SKU format to be produced. It is proposed that the item to be launched has components shared with already produced items, so it is possible for the supply chain to be simplified and the necessary adaptations to the production lines be minimized in addition to better transport and inventory management.

6.1.3 Projected financial performance

The last parameter to be analyzed relates to the expected financial performance for the incoming SKU. In order to consolidate the proposed indicators, it is necessary to integrate different areas as demand planning responsible for the estimated demand for the market launch; MSL (master supply logistics) responsible for the confirmation of feasible volumes for production and distribution; management financial analysis, which responds to the financial return; and operational product development (OPD) analyzes that are currently responsible for production cost estimates and confirmation of the most feasible launch date. The following financial metrics are proposed:

a) sales forecasting;
b) profit margin percentage.

The sales forecast of a SKU should address some factors to approach the maximum of the actual demand. These factors are divided into two parts: quantitative and qualitative.

The quantitative analysis seeks to understand the gross value of a given product with the main responsible areas. The commercial sector must make a preliminary survey with the main customers of which the expectation of purchase of a certain product. Marketing should propose the desired amount of manufacturing based on the market power that this new SKU promises. Together, the area of demand planning should perform a benchmarking analysis on past launches of similar products, aiming to lapse the values proposed by the commercial and marketing team. Care should be taken with the "whip effect" that small variations in consumer demand may cause in the quantities presented by the commercial, since the minimal fall of Sell Out can give a feeling of market recession that is often untrue. In any case, the values presented by Marketing tend to suppress this effect and mitigate ruptures caused by it.

Qualitative factors should be addressed. If it is a new technology, that is, there is no benchmark of similar releases to evaluate the level of acceptance of the public, increasing the level of risk of the entrant. To understand if the product has a relationship with seasonality in

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its use.

It is also crucial to consider the profit margin that the new product promises to have, knowing that although a product has a slightly higher risk rate, if it has a high profit margin, it is worth the "risk". It can represent a great profitability for the company.

In order to identify a good indication of profit margins, the profit margin percentage indicator is proposed, so that the lower the percentage compared to the average percentage of the category, the better the indication of a good launch for the portfolio.

The calculation made to consolidate this indicator is proposed as follows: initially the cost of the industrialized product called CPI is calculated, which is calculated by the sum of direct costs (raw materials and components) and indirect production costs in accordance with the determined by the plant. CPI charges and invoice transactions, sales taxes, IPI, PIS COFINS and ICMS are then added to the CPI, which leads to the final cost of the product available at distribution centers called CPD. After such a consolidated estimative, it is possible to establish the indicator when verifying its percentage on the net price of the product. The net price is the catalog price minus deductions such as discounts to customers, rates of returns, and others.

Thus, the indicator can always stimulate the increase of the average profit margin and avoid the entry of SKUs in the portfolio that could compromise the average of the category.

It is important to emphasize the estimative character of these values since it is an initial phase of study of launch implementation, such values can only be confirmed after the actual production of the SKU. Table 4 presents the proposed indicators for management of incoming items:

Table 4: Indicators for management of incoming items

Management of incoming items			
Parameter	Indicator	Logical criteria	Analyse
Industrial Feasibility	Saturation analysis of production line	Time available for production ≥ SKU production time	Yes. It's viable
			No. It's not viable. Investment
	Format harmonization	Use of existing format / New format required	Existing format. It's viable
			New format. It's not viable. Investment
	Minimum purchase batch of components	Quantity required to cover the demand forecast	Yes. It's viable
			No. It's not viable. Investment
	Demand forecast	Demand forecast ≥ 4 lots + pipe production	True. Viable
			False. It's not viable. Investment
	Existing technology	Yes/No	Yes. It's viable
			No. It's not viable. Investment
Expected Financial Performance	Profit margin percentage	% CPD = CPD + net price	% CPD SKU ≤ CPD of the category
	Sales forecast	Sales forecast = commercial expectation + marketing expectation + supply expectation + qualitative factors	-

Source: Authors based on the data of the company targeted by the research

6.2 Cruise items management

Continuing the proposal, it is necessary to review among the already catalog items, also called cruises, if they are still within the expectations and ideal production parameters.

6.2.1 Portfolio management

For the proposal of portfolio management metrics for products that compose the catalog, two of the most important market indicators should be compared: market share and sell out.

Market share serves to assess the strength and difficulties of a company, as well as the acceptance of its products in a market segment while the sellout gives the vision of the sales evolution of a product, as well as of a market segment, understanding whether it is growing or in recession.

With an isolated analysis of market share it is possible to understand if a product or franchise is gaining or losing market share. However, when comparing with the indices of competing products, whether from the same company or not, it is possible to identify if this market share was incremental (gain market of products of another company) or there was cannibalization on the products of the same company.

Together with sell out its possible to understand in what direction and speed the market is moving and if the company is having a good result within the identified scenario.

6.2.2 Industrial feasibility

The items already present in the catalog should be reviewed following the proposed metrics:

a) annual demand forecast 4 production lots;
b) lots of purchases appropriate to production needs.

The first question is the same already addressed for launches, however, with an application in catalog products. In general, there are variations in demand during the product life cycle due to several variables such as the action of competitors in the market, the change in the trend of use of the product, among others.

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6.2.3 Sales analysis

The proposed indicator for sales analysis for catalog items follows the same reasoning and nomination proposed for incoming items as discussed in the previous section. However, because they are already produced and not estimated as the case study of future launches, their values are real.

In view of possible fluctuations between the estimated and the definitive, it is proposed to reapply the CPD percentage indicator, considering the same assertion that the lower the percentage compared to the average percentage of the category, the better the indication of financial return of the product.

Thus, the calculation applied in cruise items can be described as follows: from the consolidated costs of the industrialized product (CPI) confirmed by the actual production of the item, a final cost of the available product (CPD) is reached after real additions of transportation taxes and invoice transactions, sales taxes, IPI, PIS COFINS and ICMS. Starting from the effective value of the CPD, the indicator can be reached by checking its percentage of the net price of the product in the same way.

In this way, it is possible to have an analysis already with real values to verify the financial return of the product. Table 5 presents the proposed indicators for a good management of cruise items.

Table 5. Presents the proposed indicators for a good management of cruise items

Management of cruise items			
Parameter	Indicator	Logical criteria	Analyse
Industrial Feasibility	Saturation analysis of production line	Time available for production ≥ SKU production time	Yes. It's viable
			No. It's not viable. Investment
	Format harmonization	Use of existing format / New format required	Existing format. It's viable
			New format. It's not viable. Investment
	Minimum purchase batch of components	Quantity required to cover the demand forecast	Yes. It's viable
			No. It's not viable. Investment
	Demand forecast	Demand forecast ≥ 4 lots ÷ pipe production	True. Viable
			False. It's not viable. Investment
	Existing technology	Yes/No	Yes. It's viable
			No. It's not viable. Investment
Expected Financial Performance	Profit margin percentage	% CPD = CPD ÷ net price	% CPD SKU ≤ CPD of the category
	Sales forecast	Sales forecast = commercialexpectation + marketing expectation + supply expectation + qualitative factors	-

Source: Authors based on the data of the company targeted by the research

6.3 Management of discontinued items

The last classification to be approached refers to the items that must be discontinued because they do not present satisfactory metrics in comparison to the others.

6.3.1 Decision making

It is established that decisions to maintain or withdraw a SKU from the catalog fall within the trade mark itself. Despite all the indicators and metrics proposed to guide and aid the decision, the final answer is always from the marketing sector, which should consider intangible factors.

The marketing sector reassesses whether the benefit of the product matches the needs of the market or whether it is already obsolete by innovations. It also evaluates if there is interest of the target public in consuming this product, if the product's flare still dictates a trend and suits what the customer really wants and, finally, if there is still product consistency with the brand identity.

On the other hand, however much a product has indicators that propose discontinuity, if it is understood by the marketing team that there is a potential growth according to the behavior of the consumption trend, the decision is not to discontinue it.

6.3.2 Industrial feasibility

The industrial feasibility indicators show the SKU that should be discontinued are the same as those applicable to postings and catalog items. So, if the product does not correspond to four annual productions the alert for revision of this SKU occurs. The SKU does not contribute to a healthy portfolio, and it is up to the decision if the product really should continue in the portfolio or if it should be discontinued.

6.3.3 Sales analysis

As for the sales analysis, two metrics are proposed. The first denominated analysis of 1% and the second refers to the stock coverage for analysis of slow spin of the SKU.

The 1% indicator proposal indicates the portfolio's products within a brand that together represent only 1% of the company's last 3 months of activity before the analysis. In

this way, these items are selected and reported for their respective brands, and the latter must make the decision they deem most appropriate, whether at discontinuity or at some measure to try to reverse this situation.

Although it is an important index, there are still several aspects directly involved in the production of a certain item, which, even if it is included in the list of 1%, can have its importance, as we can see with the intangible values already explained above. An extremely important factor that should be considered in this indicator is the value of the loss of the items indicated in the discontinuity study. As the decision to discontinue an item is part of the responsible brand, it must be aware of these data and consider whether there are intangible and representative values that justify the existence of the product.

In addition to this indicator, another important analysis is the number of items that make up this list and how much this represents in the company portfolio. In some divisions, for example, where the portfolio consists in 200 items, if there are 40 SKUs integrating the list of 1%, it means that 20% of the products marketed are insignificant in the turnover of the company. It indicates a very high number, where the company could certainly save production costs and inventories, or easily replace them with new products under development. According to the management of new entrants' products, it will have a greater representation in the billing and would help making a more balanced portfolio and close to the ideal one, up to 10%.

A second indicator for identifying the most elected items to be discontinued from the company portfolio is the analysis of the inventory coverage of an item. The inventory coverage index consists of the ratio of the quantity of inventory to the average demand. This can be done in the measurement of quantities, but it can also be considered the value of this commodity. The lower the index, the better the business performance, i.e. the lower the result, the faster the capital will be realized.

By convention the company under study considers items in slow rotation those that have a stock coverage over 6 months, because above this value the items tend to a very high stock level of obsolete bringing great financial impact to the company.

With this analysis, even if you do not opt for the discontinuity immediately, the company will always have a list of items more indicated to leave the portfolio in cases of new entrants, so you can perform the replacement faster. Table 6 presents the indicators proposed for the management of discontinued items.

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Table 6. Indicators for the management of discontinued items

Management of discontinued items			
Parameter	Indicator	Logical criteria	Analyse
Industrial Feasibility	Minimum purchase batch of components	Quantity required to cover the demand forecast	Yes. It's viable
			No. It's not viable. Investment
	Demand forecast	Demand forecast ≥ 4 lots + pipe production	True. Viable
			False. It's not viable. Investment
Sales analysis	Analyse of 1%	∑ SKU turnover ≤ 0,01 % X ∑ turnover	Yes. integrates the list of 1%
			No. It does not integrate the list of 1%
	Slow spin	Sales forecast = commercial expectation + marketing expectation + supply expectation + qualitative factors	-

Source: Authors based on the data of the company targeted by the research

7 Conclusion

This study aims to make the management of the company's product variety less complex and more dynamic, balancing the marketing team's objectives with industry constraints and making proposals help decision-making.

Through the knowledge of the functions and objectives of each area, it was possible to measure the real benefits and impacts of the entry and/or the exit of a product in the company's portfolio, according to the impacts in each area. The interviews applied with their respective managers allowed to elucidate these benefits and damages of each department and allowed the creation of management tools to minimize bureaucracy and speed up the process.

The divisions were made to better understanding the impacts and consequences of the PVM in the cosmetics industry, such as: management of incoming items, management of cruise items and management of items to be discontinued.

For the proposal of the indicators and metrics it was necessary to group the decision variables according to the sectors so for incoming items the indicators were grouped in conceptual development of marketing responsibility, industrial feasibility of the areas of operations and predicted financial performance shared between operations and financial management.

As for portfolio management, there was also the need to group operational marketing metrics such as market analysis, operations for reanalysis of the industrial feasibility and analysis of sales in conjunction with the area of financial management. The proposed indicators for items to be discontinued were also divided among the marketing areas, this time responsible for more intangible analyzes, while the feasibility and return analyzes were carried out.

The study provides evidences and compilations able of organizing the company's access and control information for the composition of indications favorable to the best PVM.

It should be emphasized that the indicators and metrics have a role of help and inform, since the final decision regarding the growth, maintenance or retraction of the SKUs that make up the portfolio is exclusively the brand itself represented by the marketing team.

Such decisions are great strategic importance for the company, which can generate the growth and the conquest of market share or, on the other hand, negatively influence the positioning of the company in front of its competitors. The information compiled by the indicators allows a better understanding of the impacts on the management of the product variety, as well as providing safer data for a decision aligned with the objectives of each product category.

For future studies, it is advisable to expand the discussions of the study and to apply or develop similar metrics and indicators to other industrial sectors such as automobile, food and even service sectors that involve different variables

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