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Domestic Inflation, Cost Management and Control: A Successful Experience at a Brazilian Multinational

Abstract

Objective: Analyze the contributions of internal inflation dimensioning to the cost management and control and pricing strategies in a Multinational Corporation (MNC).

Method: A specific approach was developed to calculate the own price index (OPI), based on a quantitative and qualitative case study with a descriptive approach in a worldclass MNC.

Results: Based on the management strategy and control theories, it could be concluded that (i) the MNC benefitted from using a specific method instead of traditional market inflation rates; and that (ii) the OPI was a management control and accounting tool capable of equipping the company, differentiating the organization in price negotiations in its respective production chain. On the whole, (iii) the importance of effectively using the OPI was noticed for the sake of in-depth knowledge, accounting treatment, control and proper management of the company's costs, establishing a pricing policy in line with its strategic objectives.

Contributions: Besides the originality of the research, deriving from the lack of studies on internal inflation in the context of MNCs, the study broadens the theoretical knowledge on the theme, also evidencing the role of OPI as a cost management and control and pricing tool in MNCs – a matter of interest to most companies, experts and society, in function of the relevance of this type of company for the economy and the market.

Key words: Management control and accounting system, Cost management and pricing, Internal inflation, Multinational corporations (MNCs), Emerging markets.

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1. Introduction

Since the last two decades of the 20th century, management accounting and control systems (MACS) have increasingly been recognized in the international literature as mechanisms that facilitate the implementation of strategies and the achievement of corporate objectives (e.g. Langfield-Smith, 2008; Layton & Jusoh, 2012; Cooper & Ezzamel, 2013; Yadav & Sagar, 2013; Maiga, Nilsson & Jacobs, 2014; Jordão, Souza & Avelar, 2014; Otley, 2016; Turner, Way, Hodari & Wittemanc, 2017). The international literature also stresses that advances in information and communication technologies, increased competitive pressure from globalization and the turbulences in the business environment were some of the factors that significantly affected MACS, requiring a greater sophistication in those systems in order to generate useful information about business performance, enhance managerial decision-making and, above all, establish sustainable competitive advantages.

The classic strategy literature states that competitive advantage can derive from the company's ability to produce at lower costs or to differentiate itself, thereby being able to operate with higher prices (Porter, 1985; Montgomery & Porter, 1991). At this point, cost control and management systems are of particular interest because they are directly related to competitiveness, not only because they are the basis for differentiation strategies, but also because they affect the companies' price formation, profitability and survival, especially in multinational corporations (MNCs) - which tend to suffer competitive pressures from the domestic and international environment.

Authors such as Yadav and Sagar (2013) postulate that, although studies on cost accounting and management began in the 1930s, the international literature has highlighted that scholars and professionals dealing with MACS still face challenges in measuring costs on bases that improve business performance and emphasize both value creation and the development of sustainable competitive advantages.

These challenges are magnified in productive chains in which the competitive dynamics between MNCs and local rivals force competition and organizational coevolution, especially in emerging markets (Huq, Chowdhurya & Klassenb, 2016). Particularly in the automobile chain, commercial relations involve the evaluation of complex and interrelated cost and market variables, which can best be understood based on MACS instruments, such as the own price index (OPI). This type of index, according to Bugelli (1995), can reflect the company's internal inflation and support price negotiations on a fairer basis, a gap that is still to be understood in depth in the international accounting and management literature - even more in relation to the MNCs, due to the lack of studies on the subject in the Brazilian and international contexts.

In that sense, in this study, the focus was Sigma (a fictitious name for reasons of confidentiality), which is a globalized MNC in the worldclass automobile sector with shares traded in stock exchanges, having thirty-two plants located in sixteen countries, whose headquarters are located in São Paulo (SP), Brazil. This company has been facing a series of competitive challenges to increase its margins, considering that pricing is done by the client (assembler). The company needs to appropriately dimension its costs and/or create strategies that justify the transfer to the manufacturer - Fiat Cars S/A. In this context, cost control and management strategies and internal inflation sizing gain special importance as management tools, being profoundly relating with the profitability, profitability and value creation of Sigma.

Recognizing and exploiting this research gap, the research described in this article aimed to analyze the contributions of internal inflation sizing to cost management and control (CMCS) and pricing strategies in an MNC, based on the experience of a worldclass car parts industry.

The relevance of a research stems from its contributions to a substantial segment of society, as mentioned by Jordão and Novas (2013) and Jordão *et al.* (2014). In this sense, in addition to having recommendations from scholars such as Hitt, Li and Xu (2016), the study is justified by its originality, (i) helping to fill the aforementioned research gap, (ii) collaborating to understand the CMCS and pricing strategy through an OPI in MNCs (an issue that is of interest to most companies, scholars and society, as the international literature broadly recognizes the need for specific studies on the subject), (iii) improving the understanding about the role of MACS for the competitive dynamics of MNCs in emerging markets and (iv) contributing to enhance the theoretical body of knowledge on the theme.

Based on extensive research, covering major databases and portals such as Ebsco, Proquest, Emerald, B-One, Scholar Google, Science Direct, plus databases and portals with a Latin American focus such as SciElo, Redalyc, Latindex, Capes, among others, there are some studies that recognize the relevance of the topic and/or address the problem, citing it as a future research opportunity, but without discussing it - confirming the originality of the research and justifying its development. Although some studies focus on one, two or three of the five variables, namely OPI, cost control, industrial firms, globalized MNCs and emerging markets, studies have yet to be found that cover all these variables simultaneously. As management implications, it is noted that the use of OPI as a MACS instrument in internationalized industries can equip their managers in decision making on cost and price policies, serving as a strategic benchmarking for companies and/or similar situations, especially considering the relevance, size and sector of the company.

In addition to this introductory part, the article is structured in five more sections. The second presents the theoretical support platform of the research, about cost management and control strategies, pricing and internal inflation in MNCs. Next, the method used is detailed, which is a case study. The fourth shows the analysis and discussion of the results achieved against the background of the theory, indicating the role of OPI as a cost control and management and pricing tool. The fifth presents the final considerations, in line with the research objectives, followed by the references used.

2. Strategies for Cost Management and Control, Pricing and Internal inflation in MNCs

In recent years, many organizations have experienced different changes in their business processes as a result of a more complex and dynamic business environment (Herath, 2007; Yadav & Sagar, 2013; Hitt *et al.*, 2016), requiring actions and strategies that make it easier to achieve the objectives focused on maintaining and improving sustainable competitive positions in the market (Mintzberg, 1978; Porter, 1979; Prahalad and Hamel, 1990). In particular, Hitt *et al.* (2016) emphasize that MNCs have had to develop specific strategies seeking to exploit and harness critical capacities to build competitive advantages in an attempt to survive and thrive in international markets, especially in emerging economies, given the additional challenges brought about by this type of economy.

The international literature is high in examples that clarify the role of MACS as a means of implementing organizational strategies (e.g. Jordão & Novas, 2013; Jordão *et al.*, 2014). The literature has not yet clearly shown how OPI can be used as a MACS tool though, aiming to promote the implementation of cost management and pricing strategies. Nevertheless, many scholars have been studying alternatives that expand the use of MACS, cost management and pricing and OPI as managerial tools.

Cooper and Ezzamel (2013), for example, examined how management and accounting systems function as intervening means to turn the speeches of senior managers into something practical in companies. They argue that MACS instruments, such as the Balanced Scorecard (BSC), offer the promise of converting the top management's discourse into a series of actionable initiatives, that is, ways to turn strategy into action. These authors have realized that the way managers speak and give meaning to concepts and ideas is key to making such discourses a practice though. Ideas of competition, benchmarking, cost management, profits, motivation or innovation can be leveraged, for example, by expanding production, changing the product mix, increasing the volume, diversity and sales quality and encouraging employee engagement.

Lay and Jusoh (2012), Jordão and Novas (2013) and Jordão *et al.* (2014) call attention to the need to integrate the MACS with the organizational strategy, emphasizing that the quality of such systems is fundamental for the achievement of business objectives, for the success of the enterprises and for the generation of organizational value. Maiga *et al.* (2014) highlight the benefits of integrating MACS, in particular cost controls, with information technologies, and observed improvements in financial and productive performance resulting from this integration.

In the international literature, there are several papers that explored the CMCS theme (Yadav & Sagar, 2013), but there seems to be no universally accepted framework on the subject yet (Guilding, Cravens & Tayles, 2000; Langfield-Smith, 2008). Studies developed on CMCS, sales pricing and domesticinflation calculations mostly explore one or two of these variables in either productive chains or MNCs. Nevertheless, the need to expand the scope of the MACS to respond to the new information needs have been appointed in classical studies, such as Johnson and Kaplan (1987), Berliner and Brimson (1988), Bromwich and Bhimani (1989), Shank (1989), or more contemporarily Lay and Jusoh (2012) and Jordão *et al.* (2014). Besides the significant corporate interest in the issue, as presented in Yadav and Sagar (2013), in a competitive market, the price arbitration can flatten out the profit margins and erode the company equity. Also, the excessive cost transfer can affect the organizational sales and competitiveness.

Costs have become determinant for the competitiveness of many sectors (Govindarajan, 1993) and efforts to reduce them sometimes border on obsession, especially in MNCs operating in hypercompetitive markets such as the automobile industry. In this sector, automakers put pressure on part suppliers, and these, in turn, need costing systems that are able to incorporate, in their context of analysis, within the production chain, aspects such as: the influence of the supplier in the composition of client costs, the company's ability to rationalize its productive processes and labor productivity, making good management of these factors a key task for good CMCS. These aspects may affect the companies' competitive strategy, according to Shank (1989), Shank and Govindarajan (1992), Chenhall and Langfield-Smith (1998) and Lay and Jusoh (2012). On this occasion, Huq *et al.* (2016) argue that many MNCs sometimes opt for new productive organizational arrangements, acting in productive chains, value chains and supply chains, and may include the expectation of cooperation and/or coevolution among firms as a means of leveraging their decisions.

In accordance with these arrangements, companies seek management approaches that align the needs of production processes with the premises of CMCS, both for cost control and supplier relationships (Kato 1993; Carr & Ng, 1995; Ashvine & Shafabi 2011). One of the major business challenges currently in the automotive chains, related to CMCS, lies in the implementation of measures that 'ensure' cost reduction objectives, in line with Johnson and Kaplan (1987). In the attempt to achieve these objectives, however, some MNCs in the car parts industry impose their prices on suppliers, requiring discounts, productive, financial and operational performance improvements, instead of seeking to establish win-win situations and share the benefits obtained from these improvements among all stakeholders, being international or local companies.

In such a business context, the link between costs and prices needs to be established with due care because, through it, in the long term, the company expects to achieve the highest possible profit, increase its market share, improve its productive capacity and maximize the capital employed (Nagle & Holden 2002). The practical challenges for this to occur are truly quite significant, particularly because of the inflationary pressures on the MNC's industrial costs. Ross (1984) already recognized that inflation affects the sales prices, altering costs and affecting corporate profitability. In addition, the price set by the market as a result of the supply and demand forces does not relieve the companies from evaluating the best mix of products to be manufactured and sold, optimizing the productive capacity. In that sense, the importance of the CMCS, a MACS instrument, as a mechanism to analyze the pricing process is enhanced (Atkinson, Banker, Kaplan & Young, 2004). Authors such as Nagle and Holden (2002) already indicated that profits can be maximized through three pricing strategies: captive price (offering basic products at lower prices), bait price (attracting customers to buy even more expensive products) and the differentiated pricing for a set of products (with lower prices of the items sold together than of individually sold items).

According to Mendes (2003), most of the studies found in the literature on internal inflation use Brazil as a macroeconomic context - which in the recent past experienced a long inflationary experience, alternating periods of growth and recession. This author clarifies that, between the 1960s and 1990s, the average annual inflation rates varied between 18% and 200% - which indicates hyperinflation. Although the hyperinflationary period was overcome in Brazil with the adoption of the Real Plan in 1994 and the Brazilian economy has become stable to a certain extent, we cannot ignore the reflexes that price changes have caused in companies and people's assets over time. These reflections permeate the financial statements, mainly in those accounts measurable in monetary terms, impacting the perception of corporate value. This set of factors permitted generating unique knowledge of inflation sizing methods that allow for cost management, pricing and the measuring of assets in a particular perception, depending on the type of company, structure and, above all, "consumption basket" - which indicates the inflation of each company.

The issue of internal inflation, in particular, is a subject that has not yet been explored,although studies such as Francischetti, Padoveze and Farah (2006) can be found, which can be traced back to small and medium-sized enterprises, but not to production chains nor focused on cost management and pricing in MNCs. Specifically concerning the practical application of the OPI calculation, studies such as Silva and Souza (2003), Gazzana (2004) and Morato (20070 were located, in which the model by Bugelli (1995) called Inflatec was used. This model consists of verifying the relative weights of the cost and expense items, according to the time periods in which the indices are calculated and considering the historical weights and the inflationary effects on them. The method proposed by Bugelli (1995) can help in the CMCS and in pricing, favoring, according to Kato (1993), opportunities to reduce spending due to actions taken along the production chain based on knowledge on the origin of the material, human, financial and technological resources and on the end consumer. It is highlighted that, in companies belonging to a production chain, like in the case investigated, sales pricing depends on external and internal variables, such as: competitive conditions, the company's productive capacity, the automation levels and the management and production technologies applied.

In summary, it could be observed that the method proposed by Bugelli (1995) could theoretically be used as a MACS tool, permitting the sizing of internal inflation in MNCs, allowing managers to know the degree of organizational exposure to price variations of its main inputs along the production chain. The detailed analysis of the accounting accounts, the inflationary pressures and the behavior of the costs, besides constant and in-depth reviews in the company's production process, the application of management strategies appropriate to the corporate positioning towards the activity market, as well as the perception of how this set of actions could affect the company's profitability would be a 'way' for the CMCS, for pricing and for the identification of opportunities of gains within and beyond the company limits.

3. Methodological Procedures

The research described above consists of a qualitative and quantitative case study, with a descriptive and applied approach (Cooper & Schindler, 2006; George & Bennett 2005), seeking to approximate theory and reality, according to Eisenhardt (1989). This approach, according to Morato (2007), is sensitive enough to capture the complexity inherent to the calculation of internal inflation. Regarding the qualitative and quantitative approach, George and Bennett (2005) clarify that a single approach may not be sufficient to meet the requirements proposed in this type of research, justifying the methodological choice. In addition, the combined use of a qualitative and quantitative approach, according to Jick (1979), permits complementary knowledge and greater depth in the analysis.

Jordão *et al.* (2014) and Otley (2016) suggest that MACS need to be investigated using approaches that take into account the context of the organizations investigated, emphasizing the importance of case studies as a means to understand this type of phenomena. More emphatically, however, authors such as Mellahi, Frynas and Collings (2016) and Huq *et al.* (2016) defend the case study as the most appropriate strategy to understand the complexity of the phenomenon in the context of MNCs in emerging countries - as is the case of Brazil.

The selected unit of analysis was the company Sigma, which is a globalized multinational in the car parts business with operations on the five continents. The choice of the case was made based on three different criteria, namely the relevance of the case, the characteristics of the MNC and the profile of the respondents and the access to information - which is considered one of the greatest difficulties in this type of research, according to Jordão *et al.* (2014). The subsidiary where the research was developed is part of the Fiat Chrysler Automobiles (FCA) production chain. This subsidiary has Fiat Automóveis S / A as its main customer, which exerts strong competitive pressures, in addition to the requirement of price negotiation with open cost worksheets. This context offered the possibility to analyze how Sigma's CMCS could impact the competitive and cooperative relationships of these companies in an emerging economy - Brazil. In this sense, Sigma's choice made it possible to investigate the possibility of using OPI as a strategic MACS tool, as the price is not established within the company, but comes from the market - established by Fiat Automóveis S / A. It is particularly emphasized that pricing in Sigma is totally dependent on the costs of the period, given that a mark-up is added whose percentage was previously agreed between the contracting and hired companies.

The units of observation were the interviewees (qualitative part) and the information from the MACS (quantitative part), which were enriched by the vision of analysts and managers of the operational, tactical and strategic level of the company (including superintendents, directors and the president). It is worth mentioning that the respondents were selected by typicity, that is, by the informational capacity they had on the issue under scrutiny. Among the various sources of evidence in a case study, in-depth personal interviews, supported by an interview script, were a primary source of evidence, in line with Eisenhardt (1989). This script consisted of 24 questions based on variables extracted from the literature, concerning the organizational structure and costs; corporate and business strategies; cost control and management strategies; cost and business process; the costing system; the cost and pricing policies; the mechanism and analysis system of costs and prices; to the MACS and its use as an information system to support the strategic and operational decision-making process, the role of the MACS to monitor and monitor the achievement of the established objectives and targets; indicators of productivity, quality and efficiency and critical success factors; errors and opportunities for improvement in the processes; the relations between costs and corporate profitability; the relations among cost management, competitiveness and pricing; the relations among costs, prices and OPI; and finally, the relations among costs, prices and negotiation with assemblers.

The analysis of the results began with the answers to the interviews, which were carried out with 30 professionals at the operational (technicians and analysts), tactical (intermediary coordinators and managers) and strategic levels (superintendents and directors, including the president). These responses were recorded, transcribed and tabulated, with an average duration of 30 minutes each. The interviews were carried out in the last quarter of 2015, responses being complemented in December 2017 and January 2018. The qualitative part of the research was supported by the content analysis method which, according to Bardin (2004), consists of a set of techniques used to investigate the content of the messages of the linguistic communications, helping to make connections between the situation to be analyzed and the manifestations at the discursive surface, put in practice by means of semantic, syntactic and logical dismemberment and classification operations.

In the quantitative part of the research, we aimed to develop a proposal derived from the model originally devised by Bugelli (1995) for small and medium commercial enterprises, expanding it and adapting it for application in an industrial environment in an MNC. Thus, in the quantitative part of the research, the implications and results of the implementation of this proposal were analyzed in a large, globalized multinational organization - the activity universe of Sigma Company. The data for the years 2013 and 2014 were taken at the end of 2015 and beginning of 2016, from which a basic consumption basket and a criterion of weights could be defined for each group, subgroup and item - based on the use of the Pareto curve or ABC curve.

The starting point for the analysis of these data was the information extracted from the analytical income statement, used for the following: a) initial analysis; b) clustering of analytical accounts in the company's account chart with similar characteristics, forming a representative group of expenses for the salary and tax accounts (salaries, weekly paid rest, overtime, night additional, guarantee fund, National Institute of Social Security, provision for vacations and 13th salary, among others); benefits (e.g. health care, transportation); third party services (cleaning, security, lawyers, among others); travel (national and international); and financial expenses (interests, bank expenses, loan repayments, etc.); c) reorganization of the accounts, according to the logic established in item 1, i.e., obeying the criterion of a single account, representing a group by similarity of expenditure; d) consolidation of the expenses of the company's various cost centers in the account groups by nature: personnel (salaries with charges and benefits of all the cost centers of the company); production (all expenses, except personnel, of production cost centers); administrative expenses - all expenses, except personnel, from administrative cost centers; commercial expenses (all expenses, except for personnel, from the sales cost center); and financial expenses. The latter were separated for the sake of a complete income statement, but not considered as an item that could be included in the consumer basket, as its content, for Sigma, is mostly due to the loan repayment account, and is therefore not subject to reduction actions.

The data showing the disbursements that occurred in each of the expenditure items for the 24 months that made up the time series, already classified in groups, were arranged in Excel spreadsheets, side by side, monthly, and then added up. Each row was divided by the total of the respective month, resulting in a percentage value. The percentages of the whole period were added up and this sum was divided by the number of months, that is, 24, resulting in an average percentage - denominated "average weight".

Subsequently, the items were classified in descending order of values, based on the average weight percentages, in line with the method according to which up to 60% of total items should cover 85% of total expenses. Items with relative weights inferior to 3.5% of the total were not part of the expenses group and their percentages were redistributed proportionally among the other items. After determining the weights of each item, costs and expenses were segregated based on the income statement for the year. At this stage, for the purposes of calculating the OPI, indirect production costs and indirect labor costs were classified in the consumption basket of expenses, i.e., only the expenditures on raw materials were named cost. This separation of costs and expenses respected the original method of Bugelli (1995), being considered a central issue for the implementation of the model, in view of the company's reality and the complexity of the industrial environment. After determining the weight of the expense items, the weight of the direct costs also had to be discovered (in this specific case only spending on raw material). Therefore, the data from the time series had to be retrieved. To obtain the weights of the elements in a company's costs, the characteristics of Sigma's activity need to be analyzed - an MNC industry that manufactures car parts and belongs to the automobile value chain. This company is characterized by manufacturing many items and in large numbers. Therefore, for the purpose of simplifying the calculations, the following steps were taken to select the cost items: a) extraction from reports of the items indicated month by month from January 2013 to December 2014; b) the "explosion" of the items in the memorandum report according to the technical list of each; c) the valuation of each item at replacement cost at the end of the period, i.e. December 2014; d) the total valuation of each item by multiplying the replacement costs by the amounts indicated; e) the classification of the items in descending order of value and creation of the relative values of each item based on the division of its value by the general total; and f) the accumulation of the number of items. At the end of these six steps, we reached the list of 190 items, whose cumulative percentages met the method's assumption of covering at least 85% of total costs. Composing a cost basket with 190 items would be unfeasible for methodological purposes due to the number of items produced. Therefore, we aimed to rank the items, clustering them by similarity in the manufacturing: a) classification according to the main characteristic (complying with registration criteria in the company's integrated management system); b) sum of the shares of all items in each group and formation of a total for each group; c) valuation of each item, month by month, by the average cost of the inputs, except for the items in the group called the benefitted component (whose average cost includes raw material and services) that were valued at the contract value.

The values of replacement costs were used only to classify the items and select those with considerable shares in the cost consumption basket. In addition, the same criterion adopted in the composition of the basic expense consumption basket, related to the items with inexpressive shares, was adopted in the composition of the cost consumption basket, that is, the percentages of items that exceeded 85% were eliminated and their weights redistributed, thus forming the basic cost consumption basket. This decision is in line with the calculation method proposed by Bugelli (1995), in which companies with a wide range of products could depart from the representative items of a group or family of items. Without this, the study could not be successful, considering that it was not only the replication of a tool in another context, but there was a translation of a tool originally intended for a commercial environment to an industrial environment with its own characteristics and singularities. On this opportunity, with the technical data of the products and reports of the items sold at hand, the cost variation of raw materials was analyzed over time, verifying their behavior in relation to the previous month.

After this stage, the Inflatec III method was adopted, with mobile weights of the weighted averages. Thus, the weights assigned to each item in the consumption basket were based on the arithmetic mean between the previous weights and the current weights, with monthly updates. These weights fed the first column of the average weights to calculate the second month, and the monthly variation between the weights that increased and the previous average weights represented the OPI of each month.

The calculated index was compared with the official inflation indices IPCA and IGPM. Based on the systematization and processing of the data, the results were evaluated and an indicator sufficiently representative of the price variation the company was subject to was generated. These results were presented and discussed with the respondents - who also provided information on the company's cost structure and its MACS. The concept of improving costs and expense management was emphasized, highlighting those items of greater relevance or above-average growth, with the indication of limit prices in negotiations with suppliers, as well as the monitoring of cost and expense inflation in relation to price growth. The research assumptions analyzed were:

i. OPI originally developed for application in small and medium-sized commercial enterprises can be adapted as a MACS tool in multinational industries; and
ii. the calculation of internal inflation strengthens the CMCS and pricing in the company analyzed (our highlights).

The most important limitation of this study, according to George and Bennett (2005), was that it was based on data from a single company. This fact, however, despite limiting the indiscriminate generalization of the results, does not impede the research. On the contrary, it emphasizes its contribution, considering the need for the availability of detailed and unrestricted data the method requires - which would be hampered in case of multiple companies or large-scale studies. This issue gains special emphasis at this moment in the research, in which there are still few studies on the subject and none, as we know, in MNCs.

According to Cooper and Schindler (2006), the final quality of a paper depends fundamentally on the diversity of procedures used to obtain the data, which is reinforced by Yin (1984), in that the opportunity to use multiple sources of evidence, from a triangulation process is enhanced in a case study. According to Jordão *et al.* (2014), this process is fundamental as a way to increase the reliability of the results and grant internal validity to the study - which in this case was done by comparing the information resulting from the application of the method (quantitative part) with those deriving from the content analysis of the testimonies, direct observation (participant) and documentary analysis (qualitative part). Still, according to those authors, we tried to dismember the research findings affecting each of the specific objectives in topics and compare them with the previous empirical theory and results, in order to obtain greater external validity. Finally, as additional procedures, the recommendations of Kvale (1995) were followed, presenting the results of the research to a group of senior executives of the company. At that time, people examined and validated not only the results, but also the calculation system and how it was adapted and applied in the study conducted in an MNC.

4. Results and Analysis

Founded in 1918, the multinational Sigma acts globally with a strong worldwide presence in the production of components for motor vehicles, currently generating around 18,450 jobs, distributed in 32 plants located in 16 countries. Due to the high competitiveness of the sector, accentuated by all managers (coordinators, managers, superintendents and managers), this company adopted the expansion and global consolidation of its activities as a market strategy, for which it has developed and maintains a worldwide production and distribution of products: Europe accounts for 32.9% of business, South America 32.3%, North America 28.7% and Asia and Oceania 6.1%.

> The Board of Directors defines strategic guidelines at the macro level and the corporate board works with each division in the preparation and annual review of the strategic plan in the respective business units (Chairman of the Board of Shareholders).

The statements of managers at the strategic level have shown that the current global competitive landscape has required that Sigma enhances its ability to identify opportunities nowadays, aiming to achieve sustainable competitive advantages and require changes in organizational structures and processes, in a process of competition and coevolution in countries like Brazil. In the specific case of the branch analyzed, despite all efforts to increase its efficiency, Sigma has been suffering from the loss of margin due to the difficult relations between companies in the automobile production chain, needing to deal with key issues daily, such as the need to have instruments available to support the CMCS and pricing, in an attempt to compensate for the increases resulting from inflation, at prices acceptable to the market. In this sense, the results confirm and broaden the findings of Cooper and Ezzamel (2013), which emphasized the role of MACS in providing key performance indicators in the context of MNCs.

In Brazil, where its parent company is located, Sigma, despite the crisis in the sector, has achieved revenues of nearly two billion reais in recent years. Its strategy includes the search for greater participation in the international markets and for greater production and cost reduction efficiency. In this sense, control over cost management has gained particular interest, relating directly to the competitiveness, profitability and sustainability of this MNC.

> The strategic goals are monitored on a quarterly basis with a long-term focus and monthly in relation to the annual plan, according to specific performance indicators - monitored at operational review meetings with the divisions (CEO).

The set of strategic, tactical and operational testimonies revealed that, in the analyzed unit, the chances of passing costs to the sales prices are more distant from the reality every day because suppliers increasingly inhibit readjustment initiatives beyond the contractual criteria (which are quite restrictive), making it essential to adopt objective tools that reveal the actual effect of inflation on costs and prices, furthering decision making about these factors. The documentary analysis revealed that inflation is one of the few factors that permit price adjustments according to contractual criteria. In this context, it was observed, through several statements, that the information coming from the MACS, by enhancing the calculation of the OPI, gained prominence in Sigma in the analysis and confrontation of the competition, confirming the studies by Morato (2007) and Lay and Jusoh (2012). Several respondents, such as the Controller, considered that "the MACS contributes to the analysis of internal inflation, CMCS and pricing, and can be used easily and effectively as a support tool in company management."

The empirical research results have revealed the need to equate costs with management tools such as IPP which, based on the company's MACS, could facilitate the pricing process or model, amplifying and corroborating the findings of Francischetti *et al.* (2006) related to the extended use of OPI. In this sense, in the course of the research, we aimed to include into the list of available cost management technologies for MNC Sigma an instrument capable of measuring its internal inflation so that, based on the calculation of the price variations of its main inputs, the company could have proper control over its costs. Afterwards, we sought to analyze the costing system of Sigma and what possible contributions it could provide to the CMCS and sales pricing, considering the particularities of the company size, the automobile sector and value chain in which the company carries out its business - this is because ignorance of internal inflation could lead to a distorted perception of its costs' trajectory, making it difficult to establish an appropriate pricing policy.

Thus, considering the information obtained from the MACS, in a time series, and following the Inflatec calculation model developed by Bugelli (1995), the aim was to classify expenditure in costs (58.97%) and expenses (41.03%), excluding taxes or financial disbursements. Similar accounts were clustered, sorting the items in descending order and eliminating the inexpressive items. Expenses corresponding to 41.03% of expenditures are presented in Table 1, whose analysis reveals that personnel expenses are the most relevant, corresponding to 79.22% - which amounts to 32.5% of total expenditure. The other items are less than 2%, reaching less than 9% of expenditure.

Table 1
Composition of expense items and recalculation of relative weights

Items	Weight (%)	Share of expenses in OPI (%)	Redistributed weight (%)
Personnel	79.22	41.03	32.50
Outsourced services	4.67	41.03	1.90
Maintenance (production)	4.61	41.03	1.90
Electric energy	4.23	41.03	1.70
Consumption materials (production)	4.17	41.03	1.70
Freight on sales	3.11	41.03	1.30
Total	**100.00**		**41.03**

Source: elaborated by the authors based on research data

In order to collect cost data, the calculations had to be simplified, which are classified by application similarity, that is, each item was analyzed according to its main characteristic, according to the registration criteria set out in the integrated management system of the company, being classified as: raw material steel, raw material component or benefitted component, maintaining the calculations of shares obtained in the previous stages. Next, the shares of the items in each group were added up and a total per group was formed that valued each item, month by month, by the average cost of the inputs. The exception was the items in the group called "benefitted component", whose average cost value included raw material and services, evaluated at the contract price because it only referred to the outsourced industrialization service.

The values of replacement costs were used only to classify the items, according to their importance, thus forming the cost basket which, similarly to the expense basket, was transformed according to the proportion in the total spending. Details are shown in Table 2.

Table 2

Expense and cost consumption basket with percentage shares

Benefitted component	Initial weight (%)	Share in OPI (%)	Redistributed weight (%)
Raw material (steel)	60.10	58.97	35.40
Personnel	79.20	41.03	32.50
Raw material (components)	22.70	58.97	13.40
Benefitted components	17.20	58.97	10.20
Outsourced services	4.70	41.03	1.90
Maintenance (production)	4.60	41.03	1.90
Electric energy	4.20	41.03	1.70
Consumption materials (production)	4.20	41.03	1.70
Freight on sales	3.10	41.03	1.30
Total	**200.00**		**100.00**

Source: elaborated by the authors based on research data

The analysis of Table 2 reveals that, more impacting than the expense on personnel is the spending on raw materials, followed by benefitted components and others. After completing the composition stage of the expense and cost consumption baskets, the next step was the establishment of the forms and procedures for the collection of prices and the calculation of Sigma's OPI. According to Bugelli (1995: 26), "the first step is to identify, for each expense, the factors that influence its price increases". Table 3 shows the component items of the company's price basket in descending order of participation and the form used for its readjustments.

As can be seen in Table 3, the three items that make up the raw material account for 59% of total expenditures and were grouped for the purpose of simplifying the calculations in: a) raw material steel (most important cost in the company, which produces structural components for light-alloyed steel vehicles), b) components of raw materials and c) benefitted components.

The option was made to analyze the price variations of the items based on the average cost of the inputs with all variations analyzed and corrected distortions; the average prices of the inputs were extracted from the company's integrated system and listed in an Excel spreadsheet. All the variations that occurred were analyzed and the distortions found (such as occasional entry errors, occasional supply with an alternative value, among others) were corrected in order to neutralize non-real price changes. The groups were totaled and the total compared to the previous month.

Table 3

Factors influencing the price increase of company Sigma

Description	Weights (%)	Indexers
Raw material (steel)	35.40	Variation in mean entry price
Personnel	32.50	Wage correction factors (collective agreement)
Raw material (components)	13.40	Variation in mean entry price
Benefitted component	10.20	Variation in mean entry price
Outsourced services	1.90	IPCA and IGPM
Maintenance (production)	1.90	Variation in mean entry price
Electric energy	1.70	Variation in provider and free market tariffs
Consumption materials (production)	1.70	Variation in mean entry price
Freight on sales	1.30	Negotiation on truck value per stretch – single provider
Total	**100.00**	

Source: elaborated by the authors based on research data

This step was translated into one of the main adaptive changes of the method for application in the industry, as Bugelli (1995) initially suggested that prices be submitted in each item, analyzing variations through replacement prices. This would be impracticable due to the large volume of raw material items Sigma uses. A similar fact occurred with consumption and maintenance materials. It is worth mentioning that internal and external audits use average price variation analyses at the end of quarters to validate inventory account balances and cost and profitability calculations. The maintenance of equipment is done by employees of Sigma itself, whose salaries make up the item personnel expenses in the consumption basket. Only maintenance materials which, for internal reasons, are stocked separately from consumer materials, were valued under this heading. Wages, as a rule, are corrected at the time of the category's collective bargaining agreement (CCT). In the case of metal workers and for the sake of simplification, all salary-related funds received the same correction factor established in CCT - which was another adaptation of the original method to the industry's reality. Expenses arising from outsourced services, measured on the basis of contractual criteria, varied according to the IBGE's IPCA and FGV's IGPM indices (accessed through Internet search engines). The company Administre, which provides electric power management services to Sigma, calculated the variation in electric energy expenses.

The company Sigma concentrates more than 90% of its sales to the automaker Fiat Automóveis S/A without incurring freight expenses, as the automaker collects the merchandise in the JIT system. The other freights (including tolls) are paid per distance covered and type of vehicle. In the period analyzed, there was no change in trading conditions. Nevertheless, the price variation of the items in the company's consumption basket was obtained based on the criteria mentioned, over which Sigma has no control. Being variables established by the market, it is up to the company to measure and evaluate the impacts of these variations on their cost and price structure. On the whole, however, the aforementioned groupings provided for the application of the method and the analysis of the effects of internal inflation on prices in the course of 24 months, as shown in Table 4. On several occasions, the deponents emphasized the importance of this analysis and its internal coherence with its strategic objectives, in line with Lay and Jusoh (2012).

> Monitoring internal inflation is fundamental for the company's sustainability over time and serves as a fundamental pillar of support to the cost and sales areas (Director-Superintendent of the Plant).

Table 4

Price variations in items in the consumption basket of company Sigma - 2013 and 2014

Items /Variation percent. 2013	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Personnel	–	–	–	–	–	–	–	–	–	6.58	–	–	6.58
Outsourced services	–	0.14	0.48	0.33	0.37	–	0.50	1.22	–	–	0.35	1.68	5.08
Maintenance (production)	-0.07	0.23	-0.02	0.26	0.01	0.05	-0.10	0.05	0.17	0.29	0.10	0.16	1.12
Electric energy	-2.21	-7.57	-0.34	21.83	2.68	-0.25	0.24	-0.15	1.55	-0.14	1.52	-0.23	16.93
Consumption materials (production)	-0.07	0.23	-0.02	0.26	0.01	0.05	-0.10	0.05	0.17	0.29	0.10	0.16	1.12
Freight on sales	–	–	–	–	–	–	–	–	–	–	–	–	–
Raw material (steel)	-0.65	-0.30	0.51	0.79	1.86	0.78	3.71	-0.47	0.81	0.75	0.10	0.74	8.63
Raw material (components)	-0.04	-0.81	0.50	0.12	0.36	0.35	1.14	0.37	-1.47	1.81	2.13	2.06	6.52
Benefitted component	-0.10	-0.02	0.16	-0.16	0.59	-0.29	-0.28	0.23	0.43	0.16	-0.24	-0.18	0.32
Itens /variação percent. 2014	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
Personnel	–	–	–	–	–	–	–	–	–	7.00	–	–	7.00
Outsourced services	–	0.12	0.44	0.34	0.39	–	0.51	1.30	–	–	0.39	1.82	5.33
Maintenance (production)	0.09	0.09	0.75	0.51	0.34	0.75	0.44	0.24	-0.04	0.10	0.06	0.45	3.77
Electric energy	1.24	0.04	0.17	0.60	0.38	-0.06	-0.36	0.36	1.37	0.78	1.15	0.34	6.01
Consumption materials (production)	0.09	0.09	0.75	0.51	0.34	0.75	0.44	0.24	-0.04	0.10	0.06	0.45	3.77
Freight on sales	–	–	–	–	–	–	–	–	–	–	–	–	–
Raw material (steel)	1.31	3.99	1.91	0.91	0.26	-0.29	-0.25	-1.19	0.07	1.53	-0.19	-0.07	7.99
Raw material (components)	0.93	0.71	0.87	0.97	0.69	0.40	-0.91	3.41	0.84	-0.19	-0.07	0.02	7.67
Benefitted component	-0.19	-0.15	0.14	0.24	-0.12	0.16	-0.29	-0.03	-0.08	0.07	0.42	0.02	0.18

Source: elaborated by the authors based on research data

Table 4 shows that the analyzed items behave quite peculiarly over time. Although there is no single standard among them, in both years, the largest readjustments happened in electricity, raw materials and personnel. It could be observed, in agreement with the findings of Bugelli (1995) and Ross (1984), that the internal inflation calculation system in the company permitted observing the evolution of the expenses, thus influencing both the cost control and management process and the sales pricing - because the analysis of Sigma's internal inflation derived from the creation of price indices for its main inputs.

These findings were in line with the premises of Francischetti *et al.* (2006), indicating that simply obtaining an index is not enough for a company to make decisions on CMCS. In order to do so, these authors propose that the use of the information deriving from the internal inflation calculation system should consider its impact on profitability, taking into account the market the company operates in, which demonstrates similarity with the research findings.

Table 5 exemplifies the calculation of the OPI for one month at Sigma, a procedure repeated for the entire 24-month period. The calculation of this index was in line with the expanded perspective of control, according to the findings of Jordão *et al.* (2014), related to the development of a strategic awareness oriented to continuous improvement, as the competitiveness of the market Sigma is inserted in was already fierce in the XX century, but, in the last four years of the 21st century, the company 'suffered a lot' in terms of competition due to the entry of new players, considering that the market did not grow in that period and, as a result, the company's turnover was reduced. The changes in spending observed in Sigma as shown in Table 4 represent a real increase of the costs distributed in the items of the consumer basket, as exemplified in Table 5. The triangulation among the statements of the different levels revealed that this company has difficulties to pass them on to the customers, especially due to (Fiat) - which requires an open cost sheet in the negotiation of prices and exerts strong pressure on the company's pricing. These pressures, coupled with the reality of the car parts industry in 2016, which showed an average decline of 12.4% in sales in 2015 compared to 2014, impacted the company analyzed, leading to a sharp drop in or-

ders by this automaker. The triangulation among the testimonies, direct observation and documentary analysis also revealed that manufacturing overheads - which make up the hourly rate, which divided by a smaller volume of items produced - increase the unit cost - need to be recomposed so as not to "erode" the banks. In this sense, if there is no counterpart of revenue, the company may end up losing in the product margin. This scenario of decline was repeated in 2016, presenting a 24.3% loss in production in the period from January to May when compared to 2015.

Table 5
Demonstration of internal inflation calculation in January 2013

Items	Mean weights 24 months (%)	Variation (%)	Weights with increase (%)	New weights (%)	New mean weights month 01/2013 (%)
Personnel	32.50	0.00	32.50	32.60	32.55
Outsourced services	1.92	0.00	1.92	1.92	1.92
Maintenance (production)	1.89	-0.07	1.89	1.90	1.89
Electric Energy	1.74	-2.21	1.70	1.70	1.72
Consumption materials (prod.)	1.71	-0.07	1.71	1.71	1.71
Freight on sales	1.27	0.00	1.27	1.28	1.28
Raw material (steel)	35.44	-0.65	35.21	35.31	35.38
Raw material (components)	13.36	-0.04	13.36	13.40	13.38
Benefitted component	10.16	-0.10	10.16	10.18	10.17
	100.00		**99.71**	**100.00**	**100.00**
	OPI		**-0.29**		

Obs.: The same procedure was adopted for each of the months in the period analyzed.

Source: elaborated by the authors based on research data

In Sigma's competitive context, it was observed that the OPI was perceived as a tool that objectively reveals the true effect of inflation on the company costs, providing it with a means to justify the transfers in the prices to the clients. In Figure 1, the OPI is compared with the IPCA and IGPM indices during the 24 months used to support the analysis made.

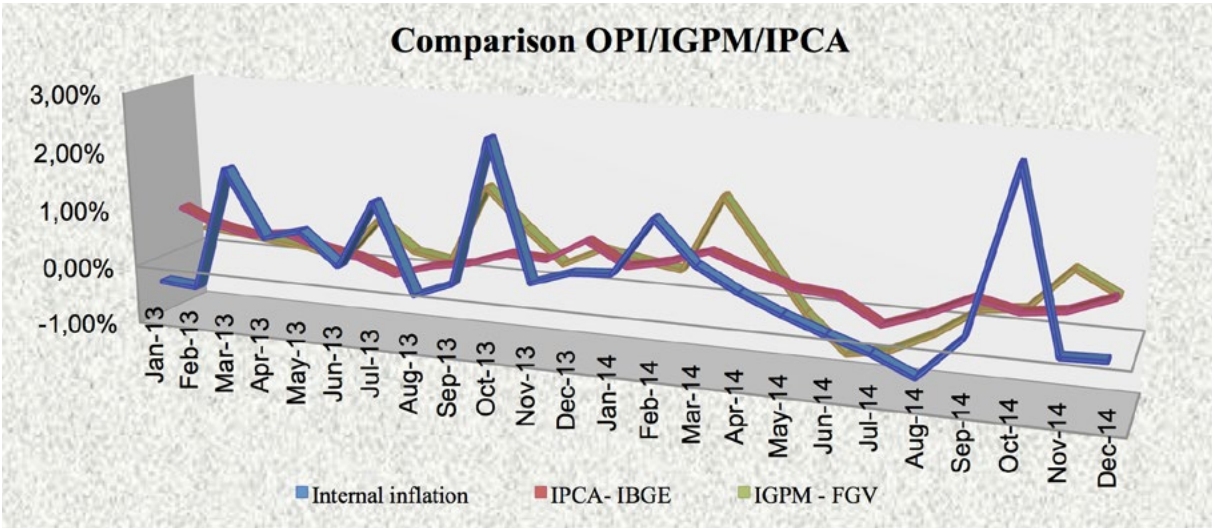

Figure 1. Comparative graph of inflation between OPI using official indices (IPCA-IBGE and IGPM-FGV)

Source: elaborated by the authors based on research data

The analysis of Figure 1 indicates a greater linearity of these indices than of the OPI, that is, the analysis revealed that Sigma is more subject to price changes in its main inputs than revealed by the main official inflation indexes disclosed. As observed in this figure, the accumulated internal inflation index for the years 2013 and 2014 at Sigma was 13.99%, which is two percentage points higher than the IPCA, which reached 11.99% and 4.95% higher than the IGPM, which recorded 9.04%. This demonstrates that, if the company had opted for one of these two indices (which were previously used as the basis for negotiating margin recomposition), instead of OPI, it would have significant losses, especially when considering that the company's turnover is about two billion reais per year. In fact, tactical and operational statements confirmed this possibility, indicating that the index itself was not yet being used, but emphasized that this possibility could be fully utilized in the company and could bring financial benefits without a great increase of work, making future price negotiations fairer.

The documentary analysis revealed that the variation in the months October 2013 and 2014 was due to adjustments in the payment sheet resulting from the collective agreement of the (metal worker) category. The adjustments observed in the months March, April and May of 2013 and of February, March and April 2014 consist in readjustments in the steel price. As changes in the items that make up the company's consumption basket are subject to variations that are beyond its control, it needs its own instruments, such as the OPI, to measure variations in expenses and it needs to act in order to minimize the reflections of those variations in the expenses. Based on the adapted method, it was possible to arrive at the final calculations, also witnessing opportunities for improvement and potential efficiency gains, deriving from optimizations in processes and production systems. It is important to highlight the contribution of the application of this method, as it does not derive from statistical or econometric methods, but it allowed the company to know the behavior of the variables that influence the behavior of the prices of its main items in the analyzed period in a relatively simple way. The use of multiple methods for data collection, analysis, and interpretation has made it clear that this perspective links methods to assumptions. The fact that it was able to combine methods and sources of qualitative and quantitative data collection (testimonials, documentary analysis, ERP reports, direct observation and field notes on the calculations of internal inflation) allowed a broader view of the effects of inflation on costs in the industry analyzed. The triangulation between the different statements at the strategic level (superintendents and directors, including the CEO) allowed us to understand that the application of the OPI calculation method has great strategic value and was well accepted in the company management, particularly as, in the market Sigma operates in, prices are imposed by the automaker Fiat, which, in hiring suppliers, often requires extra efforts from these, such as the concession of discounts on current products (the so-called performance discount). The synthesis of the management's perception is illustrated by the account of a senior executive, who said:

> The calculation of internal inflation is an important instrument, as it supports the company in the systematic monitoring of its costs, thus creating parameters based on the complexity of the company itself. Maintaining profit margins, in an increasingly competitive market, requires applying, in the company, methods to monitor inflationary effects and know how to pass them on to the market or, where this is not possible, to compensate them with internal actions. Therefore, companies that seek to maintain controls to measure their internal inflation and effectively know their effects, have greater probabilities of success (Controllership Director).

5. Discussion of Results and Analysis of Premises

Through the triangulation between documentary analysis, formal and informal statements, direct observation (participant) and cost data extracted from the MACS, it was verified that, during the period in question, the company was subject to price variation in its main inputs, measured by the OPI, which was higher than the IPCA and IGPM, revealing both the managerial utility of the method in industrial companies and the effects of the analysis of internal inflation for the CMCS and sales pricing, fully confirming the first and second research assumption, as shown in Figure 2. In this sense, there was a significant alignment between the quantitative and qualitative analysis of the research.

In analyzing the method used for internal inflation calculations in Sigma, it was noticed that, due to the industrial characteristics and quantity of items in the company's manufacturing, the method proposed by Bugelli (1995), for small and medium enterprises, lacked adaptations such as the clustering of items by similarity in the application and the variation analyses by groups and the adoption of the average stock price instead of market prices, which would permit measuring the price changes of the company's main inputs and how to explain the main flows that relate to the CMCS. Sigma, part of the automotive production chain, participates in the market through requests for price quotes for which there is a target that needs to be reached. To compete, efficient cost control is required. Although it was considered relevant for the company to know its OPI and use it as a management tool in strategic cost planning and pricing, the findings revealed that there were practical difficulties in sizing the effects of internal inflation on cost management and pricing, as the company was not, until then, knowledgeable about its OPI.

In Sigma, through a detailed analysis of its costs, it was verified throughout the research described that the 'paths traveled' by the resources in the industrial transformation process, in a simplified view, originated from purchases, where other costs are aggregated, and are finalized upon delivery to the customer. These evidences were supported by the direct observation and documentary analysis, being confirmed by the operational statements.

During the process of cost sizing and inflation analysis, the adaptations that were necessary for the effective calculation of the OPI were discussed and defined, such as: the substitution of the pricing in three suppliers by the use of the average stock value, the clustering of items by similarity and the treatment of variations by groups. Together, these adaptations would enable the application of the method in the case analyzed, allowing its application in a large multinational industry. In this sense, interviewees of all levels perceived the calculation system of internal inflation as an important innovation that can now be considered in the company's cost control and management process, confirming the first research premise.

Premises	Result	Theoretical-empirical implications
(i) The OPI originally developed for application in small and medium-sized commercial companies can be adapted as an MACS tool in multinational industries.	Fully confirmed	The analysis of the original system was unable to permit decision making in industries. Through the adaptations, the method was capable of permitting cost appropriation in the multinational industry analyzed, according to the accounting parameters in force in the company. The OPI calculation method led to the adoption of the mean inventory value as the base for verifying price variations – which broadened the applicability of the method.
(ii) The calculation of the domestic inflation makes possible CMCS and pricing in the company analyzed.	Fully confirmed	The dimensioning of the internal inflation provided increased knowledge on the reality of the analyzed companies' costs, furthering the CMCS in relation to the MACS model that used to exist in the company. The experience supported the creation of a standard to support future price negotiations.

Figure 2. Synthesis of research premises, results and theoretical-empirical implications

Source: elaborated by the authors based on research data

When analyzing the second research premise, it was realized that, for the sake of sales pricing, the company uses the manufacturing route, which is designed by process engineering, whose valuation is based on hourly rates that reflect manufacturing overheads. The raw materials are valued at the replacement price. In addition, general, commercial and administrative expenses are considered. On these expenses, a mark up is established. Automakers impose a target price limit, however, which has to be achieved for the auto parts manufacturer to be appointed as the supplier of a particular item. The negotiations between automakers and the auto parts industry were increasingly difficult, as the system of calculating the company's internal inflation, as well as its role for CMCS, is also important in the pricing process as this method provides the negotiator with relevant details about costs in order to reveal the effect of internal inflation on them. This helps to identify the price limits, aiming for greater flexibility and maintenance of the company's profitability. The controllership and sales departments systematically monitor the product margins and periodically open negotiation rounds with the assembler to pass through changes in costs, such as collective bargaining and/or steel price increases. The testimony of the plant director illustrates this dynamic:

> Negotiations are necessary based on internal and external changes of economic indicators and/or cost evolutions. This occurs directly (sales x purchases), with the open demonstration of the economic evolutions and their influences on the cost and prices. When we deal with individual items, minimum price parameters are defined through controllership, in an attempt to guarantee the defined margin (Director-Superintendent of the plant).

The findings of the study are in line with the observations of Mutlu, Zhan, Peng and Lin (2015), which advocated that the result of increased competitiveness and rivalry between MNCs and local firms made it difficult to predict the competitive results between the former and the latter, as some domestic companies with lesser resources can leverage their unique domestic skills to establish a global presence, facing the competitive challenge posed by MNCs from developed economies. In the case of Sigma, this challenge generated a hypercompetitive environment, and the analysis of the inflationary effects on costs and prices helped it to meet the shareholders' expectations of return. The results of the study show that the CMCS can be leveraged through the use of OPI, as the analysis and detailed monitoring of the inflationary effects on purchases, especially for the main consumption items, may open up new possibilities for the company to obtain gains over processes and the supply chain, especially with suppliers, aiming to increase profitability and competitiveness - which until then were not considered, in view of a worldwide trend (very strong in Brazil) that automakers demand open cost sheets in the negotiations. These issues are emphasized in the statements of tactical and strategic managers - who on several occasions explicitly mention the importance of using OPI, suggesting that it can be used in the formulation and implementation of new cost and pricing strategies. This corroborates and amplifies the observations of Nagle and Holden (2002), for whom the design of a company's pricing strategies should make it possible to obtain a unit contribution margin in the quantities to be sold, according to the desired return.

Although authorized in the planning of the year 2016 that the calculations of the OPI were made via ERP, the data analysis revealed that this still did not take place in 2017. The declarations of the leaders clarified that this fact is due to the reflections of the economic crisis on the performance of the Brazilian automobile industry and the necessary expenses for the changes in the company's ERP, in order to allow this to be done systematically. The managers' expectation is that this integration between cost controls and ERP can provide for a faster calculation and refinement of the method, confirming and expanding the results of Maiga *et al.* (2014). Even so, a surprising result, aligned with the research object, was that the organizational learning deriving from the research, resulting from the involvement of the people in the construction of the OPI to be used as a managerial tool, already supported the price recomposition negotiations with the customers in 2015. At the end of the research, a work group was created to deepen the cost controls in 2015, 2016 and 2017, such as: (i) review of apportionment criteria of indirect manu-

facturing expenses, (ii) revival of the cost module of the ERP (optimizing its functions), (iii) joint work with the process engineering, logistics and manufacturing area (review of manufacturing scripts and their relation with the work centers), (iv) knowledge of recording levels, including automation studies, as well as (v) increase of the level of details in the analyses of the realized versus planned hour rates (with identification of main variations).

On the whole, the results showed the managers' concern with the effects of the OPI on the costs and the performance. Triangulation among the different data sources confirmed that the sizing of domestic inflation, in fact, can contribute to cost management and to improved business profitability. These results align with and amplify the findings of Mellahi *et al.* (2016), who perceived, through a qualitative case study in three Brazilian MNCs, that these companies had a strong tendency to centralize and standardize their performance measurement policies and practices. In a similar way to the present study, these authors verified that the MACS practices of the MNCs analyzed were strongly influenced by the global and non-local best practices, revealing an alignment between the policies and management processes of the subsidiaries in developed countries with the subsidiaries in developing countries. In the case of Sigma, however, the results go beyond those authors, as changes in the company's functional structure in the last quarter of 2016, especially in the controllership directory, added to the statements of the directors, indicate the inclination of the board to implement the calculation method of the internal inflation in all the plants of the company in Brazil as from 2017. These issues are highlighted in the testimony of the plant director, for whom:

> The work presented demonstrated the importance of inflation sizing for CMCS and pricing, being a valid question for our company. Similarly, I think it will be for others as well. This theme should be further explored in order to be implemented as a daily activity in our current management (Director-superintendent of the plant).

The results of this study extend the understanding of MACS in a broader perspective that takes into account the context of organizations, as advocated by Otley (2016). In this sense, in line with Eisenhardt's (1989) premises, the results of this case can help construct theories and models on the subject, especially in MNCs. In an integrative perspective, the sizing of internal inflation in the firm can be thought of as a 'driving force' for the costing and pricing strategy, corroborating and amplifying the observations of Turner *et al.* (2017) on the role of the MACS in the strategic implementation - because the information extracted from the MACS was considered fundamental for the correct dimensioning of the product costs and for the analysis of the impact of the inflation on them.

Likewise, it was realized that the MACS contributes to this sizing, facilitating the implementation of measures that 'ensure' the objectives of cost reduction, in line with Sakurai (1997). What is more, a surprising finding of this study contradicts and expands the observations of Mellahi *et al.* (2016), who considered it plausible that, as emerging market MNCs increase their experience in managing global operations, they will learn how to build rapport with local actors and adopt global best practices in order to increase the legitimacy of approaches from the parent to the subsidiaries. In the case of Sigma, the statements of the managers revealed that the experience reported in the research and that is already being implemented in the subsidiary is that it can and will be incorporated in the other MNC units.

On the whole, these statements exemplify some practical possibilities the implementation of OPI for CMCS offers, generating significant contributions to managerial practice by providing similar companies with a benchmarking process and allowing the analyzed MNC to improve its structure every day in order to face the challenges of remaining competitive in its market.

6. Final considerations

The theme involving the CMCS and sales pricing in MNCs has gained relevance in the accounting and management literature, also being a concern of professionals and academics. Nonetheless, the understanding of the effects of domestic inflation on the CMCS and pricing in MNCs is yet to be understood in depth. Recognizing and exploiting this research gap, the research described in this article aimed to analyze the contributions of the internal inflation sizing to cost management and control strategies and pricing in a world-class MNC.

The empirical results indicate that a method originally developed for small and medium-sized commercial enterprises could be adopted, allowing the company to access detailed information about its costs, analyze how the main cost variations occur, verify the relations between internal inflation, costs and pricing, in addition to permitting strategic cost management. As a result, the research described in this article allowed us to establish relationships that can serve as a standard for the company to adopt and that can enhance current and support future price negotiations at Sigma. In this company, the calculations indicated, for the two years analyzed, that the OPI captured a change in input prices superior to the value measured by the official inflation indices.

The qualitative analysis revealed that this company lacked a tool that would direct the 'managerial look' to the in-depth analysis of costs and how they incur, helping Sigma to balance the capacity to absorb increases and its need to transfer them, aiming at the maintenance and/or improvement in expected profitability. In the company, the OPI emerged and permitted the expansion of the control perspective, related to the development of a strategic awareness oriented to continuous improvement in the MNC by continuously seeking production efficiency and cost reduction (basis of its competitiveness), keeping in mind that it develops its activities in the context of the automotive value chain, that is, in a complex, unstable, competitive and often hostile environment.

Considering the inherent limitations of a single case study, we aimed to increase the internal and external validation of the research findings through triangulation among the different sources of evidence and between the findings and the literature, respectively, in order to grant greater wealth of details to the interrelationships among the research variables. For this purpose, methodological triangulation (internal and external) was used, which resulted in the possibility to analyze the data obtained from different sources, corroborating, complementing or contradicting the previous empirical findings. Specifically, in this case study, the scope did not encompass analysis along the value chain, due to time and access constraints, being also an aspect beyond the scope of this research. As a result, it could not be quantified whether benefits can be obtained to be shared among the companies in the chain, and the subject deserves further research. In this sense, it is recommended that new case studies can be done, specifically involving the other companies in the value chain (MNCs and local), replicating the method applied or applying it in more than one MNC along the supply chain. The expectation is to share knowledge among the companies, to observe opportunities for joint task development that can somehow contribute to the CMCS of the chain, and not only of a certain company. As the study of internal inflation is still an incipient field in accounting and management literature, it deserves discussion and deepening of how to use such information in cost management and profitability in different MNCs. The CMCS itself requires more in-depth research, especially in the observation of other cases in other value chains and/or the comparison among different sectors.

As managerial implications, other MNCs can use the research experience described in this study, either to materialize concepts of a technical-commercial proposal via an open cost spreadsheet, or to support decision-making on price negotiation in situations similar to those of an assembler or its suppliers, or to size international cost variations in MNCs. Thus, it is expected that the observed results can make the customer-supplier relationship compatible with the declared expectations in the formulation of its strategy.

Summarizing the results of the research, it could be concluded that (i) the OPI calculation method developed for small and medium commercial enterprises was successfully adapted to an industrial world-class MNC. As observed, this case study established possible routes for its future application in other large industrial companies and/or MNCs. In addition, (ii) it was noticed that the OPI, by helping the company to know its costs in further depth, indicated opportunities for appropriate and "aggressive" cost management, helping the company to establish a pricing policy in line with its profitability objectives. Thus, the OPI calculation is a differential capable of equipping the MNC with better CMCS for sales price negotiations, as it reveals the company's specific exposure to price variations of its main inputs. This tool can turn into an indicator of profitability maintenance, gain or loss when compared to indicators like IPCA or IGPM, normally used for the recomposition of losses in the Brazilian context. What is more, based on the research findings, we can conclude that, (iii) in an integrated perspective, the effects of the price variation the MNC suffered in its main inputs are directly related with the CMCS and should also reflect in the sales pricing.

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