



THE IMPORTANCE OF MATERIAL CATALOG MANAGEMENT FOR THE SUPPLY PROCESS - A CASE STUDY

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ABSTRACT

The correct management of a catalog of materials is important for the supplying process in a company. Without the necessary attention of this activity, problems may occur in the acquisition, control and consumption of materials and products with impacts on service levels and competitiveness. Through a case study, this work approaches the strategy used by a company to implement an integrated system of business management and the management of its catalog of materials that is the basis of the strategy. It is an official pharmaceutical laboratory of the federal government that operates in the health sector through the production and distribution of medicines for the whole country. The study reports the reasons that led the laboratory to exchange its computerized system by a management system of Enterprise Resource Planning (ERP), emphasizing the actions carried out in the management of the catalog, highlighting the change in the way the catalog is used for a centralized management strategy, in the treatment of information to register and in the alignment of the new processes with the sectors involved. The study highlights how the team was assembled to manage the material catalog and presented the difficulties encountered, solutions adopted and results achieved. This work was performed through a case study and a bibliographical review to identify the current concepts on the subject, having a temporal cut that includes the years 2015 to 2017.

Keywords: Business; Logistics; Management; Cataloguing; Purchasing.



1. INTRODUCTION

In the search for excellence in several areas, the Official Laboratory, object of this study, realized the need to implement an integrated management system. Among the reasons for the implementation of such a system are the need for greater data control and reliability, optimization of internal processes, real-time information monitoring, process revision and integration, and rework reduction.

With the need for the company to prepare for the implementation of the enterprise management system (ERP), it was necessary to carry out a planning for the arrival of this moment, in which several actions were initiated in order to adapt the internal business processes, including the catalog of materials of the company that needed to be appropriate to the registration model proposed by the new ERP. The new system has registration logic different from that used in the previous system and this characteristic forces a change in the way of registering new material and in the way of managing the catalog.

During the study, two experiences that provided solutions to problems with materials catalogs were identified: one in 2010 in the state government of Bahia, as it needed to adapt and modernize its catalog of materials through the standardization of material descriptions (*padronização das descrições de materiais – PDM*), as reported by Gomes (2010); another one initiated in 2011 by Logum Logística SA, which had to centralize material registers to improve the control and effectiveness of its catalog, aiming to provide answers to the problems faced by the company's business growth (Portal ERP, 2014).

This study was developed through the analysis of a theoretical reference, used to expose the concepts on the treated topic, according to the main authors. It then details the methodology used for its development; it talks about the laboratory studied and its strategic importance in the Brazilian public health scenario, its previous computerized system, and the way the catalog of materials was treated. In addition, it presents the new system, emphasizing the module of management materials (MM), in which the material register is inserted; reports the proposed model for the management of the material catalog; discusses how the process of migrating the catalog of materials from the previous system to the new one, how the post-implementation process was, and the analysis of the problems encountered; and discusses the mitigating actions taken to solve such problems. Finally, it concludes by reporting the results and stressing the importance of managing a catalog of materials and how it contributes to the life cycle of materials and products, to the production chain and to the procurement process within the company.

The problem studied was the lack of management of the material catalog, a situation that made it impossible to continue the implementation of the system acquired by the laboratory due to the amount of data that did not exist in the previous system, compromising the schedule for beginning the operation of the acquired system. To get an idea of the problem, the previous catalog had more than 26,000 items, of which only 6,820 were moved in the last four years, a situation that caused inconvenience for users, materials management and the buying sector, among others. For solving the problem, the management team of the Logistics Department proposed a catalog management model based on the concepts of classification and cataloging of materials that would allow implementing the new system and the monitoring after the beginning of its use.

In this sense, the general objectives of this study are: to report the experience lived by the managers of the Logistics Department of the researched laboratory during the adaptation of the catalog of materials for the implementation of a new management system; and demonstrate the importance of managing a catalog of materials for the management of a company. Specifically, the objective of this study is: to describe the previous model of material catalog management; to demonstrate the management system of the previous model; to report the specificities of the catalog of the new system; to highlight strategies for preparing and migrating data from one system to another; to analyze the process of implementing the catalog in the new system; to discuss problems identified after the implementation of the new system; and to show that the changes made have avoided accounting and tax problems in material management.

2. THEORETICAL REFERENCE

Material catalog and supply chain management

When it comes to the supply chain, one must consider the integration of all the actors involved in the life cycle of a product (goods and services). To meet the demands of its customers, the company needs to make several interactions inside and outside the company, including the customer itself. It needs to think about interaction with its suppliers, with suppliers of suppliers and even with customers of customers. To this range of interactions, in order to meet the expectations of the end user at the right time and in the desired form, it is called the supply chain. In this sense, a catalog of materials is of fundamental importance in the supply chain, since it needs to meet the needs of several actors involved in the supply process and supply of materials, since it contains information that



impacts on the supplier market, the customer, the internal users, suppliers' suppliers and customers' customers. In this sense, issues such as the description of materials and units of measures need to be given special attention because they have a major impact on the life cycle of materials and products inside and outside the company. According to Bastos (2015), logistics and supply chain activities need to be aligned so that customer needs are met effectively. This concept needs to be understood from the point of view of the need of all who will use the materials, the registration being the moment in which these issues need to be considered in order to avoid any damage to any part of the supply chain.

According to Bowersox et Closs (2010), the logistics functions are combined in three operational areas: physical distribution, manufacturing support and supply. This concept reinforces the importance of the catalog of materials within logistics activities in the supply chain, since it is unthinkable to speak of integration without the conditions for this being outlined in the initial phase of the material's life cycle, which is its registration in the catalog that will be used by various areas of the company. According to Gomes (2010), a catalog of problematic materials, which does not guarantee the quality of the purchase, is born and is developed due to the lack of standards that oblige the registration of the essential attributes for the characterization of each type of material. In contrast to this scenario, a standardized catalog can guarantee greater quality, agility and precision in the material supply process, resulting in efficiency and effectiveness.

Business Logistics and Public Company Management

The activities of the public administration that are inserted in some chain of production usually present difficulties due to the way the flows and services are organized and in function of the way in which its logistics operates in the execution of these activities. In general, the bureaucratic obstacles that are very common in the public sphere bring some kind of obstacle for carrying out these activities in the state administration, such as the excessive time spent acquiring materials due to poorly structured flows and processes, difficulty in meeting delivery deadlines due to poor contracts, difficulty in maintaining adequate levels of inventories to meet productive areas and unsatisfactory service levels. Some public sector companies operate in activities similar to private sector companies, such as the official laboratories that, like private laboratories, produce and distribute medicines to their clients; and although they belong to the public administration, their internal processes are the same as

those of any company in this segment and they need the management of their internal logistics and their participation in the supply chain to function in the most modern way possible. According to Ortolani (2001), it is inevitable that public organizations use the same advanced logistics practices currently applied to private companies, because only in this way will it be possible to reduce costs, optimize systems and increase efficiency and effectiveness in logistics operations in public management.

For companies to meet customer needs and remain competitive, they must have satisfactory service levels and produce goods and services at the lowest cost without compromising the desired quality. It is through their logistical processes that they seek to improve profitability in the offers of goods and services produced by distributing them to customers. Business Logistics studies how business management can do this.

According to Ballou (1993), business logistics associates the study and the administration of flows of goods and services and the associated information that sets them in motion. In addition, it deals with the activities of physical distribution, material management, transportation, warehousing, inventory control, order processing, internal handling, logistics planning, and service level. This concept has been widely used in private companies and, despite some recent initiatives, this practice is still not common in the public segment. With the increasing collection of control bodies and society for better practices of management and use of public resources, some public companies have already tried to manage their processes based on the concepts of business logistics, strengthening the understanding that the control and improvement of their processes are the way to achieve those goals. In this sense, business logistics has contributed to this understanding, since the various sectors that act to meet customer requirements for the production of goods and services must have strong interaction between their internal processes, maintaining high service levels. These activities impact on the production of goods and services, since they are important for the formation of the price of the products and during the accomplishment of these activities one must avoid the wastes that can raise the costs. According to Bowersox et Closs (2010), logistics management is concerned with the movement and storage of materials and products. These authors also point out that logistics operations begin with the initial shipment of material from a supplier and end when a finished product is delivered to the customer. In this context, all phases of this cycle need to be monitored so that there is no impact on price and quality. The correct management of a catalog of materials contributes strongly to these concepts.



Official Pharmaceutical Laboratories

Official laboratories have been an important government resource to promote pharmaceutical assistance to those in need, including the part of the population that depends exclusively on public services and the one that is able to use private services, but uses the public when it comes to public health programs such as vaccination campaigns and the program for the treatment of sexually transmitted diseases (STD/AIDS), for example, because it is these laboratories that meet the programs of the Ministry of Health. In addition to this vision, official laboratories also play an important role in the development of the economy, through partnerships with national and international private laboratories to transfer technology in the production of medicines that are also distributed to the population that needs access to them (Gadelha et al., 2012).

Another important role of official laboratories in the Brazilian national scenario is to formulate policies and promote the public production of medicines. According to Magalhães (2011), these laboratories act not only in manufacturing, but are strategic as inducers of policies, development of formulations and new drugs and, as a regulator of prices in the domestic market. These laboratories belong to the public administration and must follow specific legislation on procurement and contracting of services. Although they are public institutions, it is necessary that their internal processes are agile and are aligned with the concepts of business management so that interactions with the market do not result in delays in the supplies necessary for the operation of its production chain.

Government Purchases

While bureaucratic public administration focuses on the legally defined process to set procedures for hiring staff, purchasing goods and services, and meeting the demands of citizens, the managerial public administration is oriented towards the results. The state bureaucracy focuses on processes without considering the high inefficiency that it entails. This is because it is believed that this is the safest way to avoid the most common problems in public management such as corruption, and that it is much more difficult to punish deviations once they have been practiced, preferring to establish previous controls. The lack of clear objectives also imposes the need to control procedures through bureaucracy (Bresser-Pereira, 1998).

In the last decade, this scenario has been modified through several actions of improvements in the public management in order to make it more efficient. Initiatives

of some public agencies, and even some isolated ones of public managers, aim to optimize their internal processes. These actions have contributed to making the organizations more agile in their management, without losing the essence of their final activity, which is to serve the public. The modernization of public administration is important mainly in the process of supplying the materials and inputs needed for the functioning of organizations that depend on this supply to fulfill their institutional mission. This process causes another phenomenon: to make the public administration a great consumer, with great impact on the economy, through the volume of resources that the public purchases inject through the commerce.

Article 57 of the Brazilian Federal Constitution mandates that all procurement and contracting of services in the public sphere be performed through a bidding process to ensure equal conditions in the participation of all bidders. With regard to hiring, Law No. 8.666/93 establishes the rules to be followed in procedures with the public administration. In its article 15, the Law foresees that public procurement, whenever possible, should: 1) comply with the principle of standardization that imposes compatibility of technical specifications and performance; 2) to submit to conditions of acquisition and payment similar to those of the private sector; 3) be subdivided into as many parcels as necessary to take advantage of the peculiarities of the market, in order to take into account the principle of economy; and, 4) be based on the prices practiced in the market within the organs and entities of the Public Administration. In this sense, it is of the utmost importance that the public administration organs create the necessary conditions for compliance with the established in the legislation, from internal processes and procedures that allow the best purchase for the administration. Once again, the relevance of a perfect management of the material catalog in public companies is obvious, so that their strategies are viable.

Cataloging of materials

The importance of cataloging materials depends on the need to control the life cycle of the material or product, from the purchasing need to delivery to the client, through market research, acquisition, receipt, storage, physical movement, production, accounting, and shipment. The need to meet the requirements of an integrated process in the management of companies is also another important factor for cataloging materials and products, since the different sectors by which the materials will be used have different necessities and they need to be contemplated in their characteristics so that there are no bottlenecks in the production or distribution chain of the company. In this sense, it is extremely important



to properly manage the cataloging of the materials, following all the changes that are necessary after the acquisition. According to Mattos et al. (2017), due to the diversity of materials that are managed by the organizations, there was a need to classify them, to allow better planning and control, and to assist in the purchase process. A good system of Codification and Classification of Materials is fundamental for the operational efficiency and accounting. According to Severino Filho (2006), materials management is an environmental set consisting of all the company's organs, interacting with each other, providing the necessary conditions for an integrated and efficient performance, in order to adequately meet operational needs. According to Barbieri et Machline (2009), the cataloging is focused on a phase of the process in which each material must be identified and ordered logically, in order to meet the operational needs and facilitate their reading, either for the distribution or application process, to the purchasing sector or suppliers, and also to achieve the clarity required by the requestor for the end-user's service. Managing a material catalog requires the company's investment in this activity, which can have an impact on production costs and competitiveness, since the correct registration and careful cataloging allows the use and movement of the materials in order to avoid losses with failures during the internal processes.

For Gomes (2016), standardization is a means of ensuring quality and usually results in cost reduction. The standardization of material descriptions leads to a reduction in the variety of materials used in public administration and, consequently, results in simplification of inventory control, reduction of warehouse space and reduction of storage costs, such as the cost of the physical storage, handling, distribution, and obsolescence. According to the author, another factor of standardization is the market, that is, preference must be given to materials that are easily found in the supplier market without, however, hurting the legal markup fence, items without similarity or with unique features and specifications. In short, without well-defined standardization criteria, it is impracticable to obtain a good cataloging of the materials. Considering the number of actions and controls to perform a cataloging, it is important that companies invest in material and human resources with skilled labor in carrying out this activity, since cataloging plays a fundamental role in purchasing and inventory management, among other activities of materials management.

3. METHODOLOGY

This is a case study carried out in the period from 2015 to 2017 on the changes made in the management of the material catalog to show the impact of this activity on the

management of the laboratory under analysis and its integrated management system. The research was carried out by the managers of the Logistics Department of the laboratory, who acted on the changes that are object of this study.

In 2015, we analyzed the mapping of the activities of the previous model, the modeling of the proposed strategy and an Excel worksheet created with the necessary information to the new system. Analyzes were carried out through consultations with the archives of the Logistics Department and the Laboratory Process Office. In addition, information about message exchanges between the catalog management team and end users was analyzed in order to identify the initial problems reported in a specific communication channel (corporate email) for the year 2016. With the information available and the problem situation known, an analysis of the proposed model was carried out to identify its effectiveness. Therefore, the indicators of the management sector of the catalog for the years 2016 and 2017, during which the proposed model was already implemented, were also evaluated. Together with the case study, a bibliographic review was carried out to identify what the literature advocates about the subject studied and set up a theoretical framework for research foundation. All the data collected were analyzed from the qualitative point of view, based on the theoretical knowledge and professional experience of researchers working in the area of business logistics, supply chain management and process management.

Scenario of the study

The study was based on an official pharmaceutical laboratory, with a strategic role in promoting health through the production of medicines, research, technological development, and the generation and diffusion of knowledge. In addition, it has a strong presence in the economic and industrial health complex (*complexo econômico e industrial da saúde* – CEIS), given its practice in the chemical and biotechnology-based subsystem and in the development strategy of the Brazilian economy, establishing partnerships with the private sector for the development of new products and transfer of technology for nationalization of knowledge in the area of fine chemistry and production of active pharmaceutical inputs (API).

The laboratory is a public organization of indirect administration, which currently occupies a strategic position as an official laboratory linked to the Ministry of Health, with an installed capacity to produce more than 6.5 billion units of medicines. It is responsible for the generation of 13% of the total gross income of the institution to which it belongs and represents 9% of the institution's workforce.



Among the drugs it manufactures are antibiotics, anti-inflammatories, anti-infectives, anti-ulcers, analgesics, drugs for endemic diseases, such as malaria and tuberculosis, antiretrovirals for AIDS treatment, and viral hepatitis, and drugs for the cardiovascular system and the central nervous system. In addition to the production of these items, the laboratory is also responsible for distributing these medicines to all municipal health secretariats in more than five thousand Brazilian municipalities.

4. DETAILING THE CASE STUDY

The previous system and material catalog management

Because it is a pharmaceutical laboratory, there is a need to follow the good manufacturing practices required by health legislation. For this reason, a few years ago, it created a computerized system to control the actions related to drug production. It is an internal system developed by its own team with the main purpose of serving the production area. However, it did not cover all areas and activities and, over time, the information technology (IT) developing team had to expand to meet not only the demands of the production area, but also the needs of other areas. The main deficiency of this system, which prevented it from achieving this objective, was the prioritization of the productive logic without considering the accounting and commercial logic that a company of this size needs. In view of this, there was difficulty in using it for other areas of the company that supported the production activities, among them, the logistics area, the accounting area and the commercial area. With this scenario, the control of some activities depended on operational procedures or was under the criteria of each user, as was the case of the material registration activity. In the previous model, the system resource that performed the material register was very simplistic and, with only two pieces of information – description and unit of measure – it was possible to register an item. This was possible because the previous system was neither integrated nor developed with accounting and commercial logic, its main conception was to provide support to the production area, without considering the integration of this process with the other processes of the company.

The material registration of the previous system

In the previous model, the process of registration of materials was decentralized, the users themselves accessed the system and made the registration and the mandatory information of the system for making a registration

was only the description and the unit of measure. This registration process proved to be inefficient: before registering an item, users did not perform a search to verify that it was already registered and this generated duplicate, triplicate and even multiplied numbers of registrations. This multiplicity of registrations also occurred because of the limitation of the system, which did not have a field to identify who requested the purchase of the material, that is, after receiving the material, any other requestor could request it from the warehouse. Although the purchase originated through planning for a specific project or activity of a requester or industry, the item could be withdrawn by any other applicant.

The result of this way of managing was a catalog packed with materials, with more than twenty thousand items in disuse, situation that negatively impacted the supply process, since a good part of the items of the cadaster was not compatible in terms of the characteristics offered by the market.

Sanitation of the catalog in the previous model

In 2014, the Logistics Department took responsibility for restructuring some of the unit's procurement processes. Among the actions to make possible the restructuring of these processes was the creation of a sector that, among other activities, was responsible for cleaning up the material catalog, registering new items and centralizing the material register. The premises defined for cleaning the material catalog were:

- Checking the repetitions of items registered;
- Creating status for obsolete, deprecated, and in-use materials;
- Standardizing the descriptions;
- Standardizing measurement units;
- Deleting repeated items (record down).

After centralization, the accesses for the registration of new materials were withdrawn from the applicants, at the request of the Logistics Department, so that they could no longer register items in the system. This attitude, although unpopular, was necessary so that the catalog could generate reliable information for the other areas of the company; therefore, it was a necessary strategy in that moment.

With the beginning of the sanitation activity of the material catalog by the new sector, it was possible to reduce



the items. A study by Bastos (2015) shows that there was a reduction of more than 26 thousand items registered to just under seven thousand moved in the last four years that preceded the study. In Table 1, one can compare the quantity of items registered with the number of movements made by type of material in the catalog of materials of the laboratory.

It should be noted that the data presented in table 1, column 'Quantity moved in the last 4 years', reflect the scenario after the exclusion of the repeated registrations, evidencing the impact in the way of managing the catalog of the previous system. This is a survey of laboratory data regarding the period within the temporal cut of this study.

Table 1. Number of items in the material catalog X quantity of items moved in the material catalog of the laboratory studied

Materials	Quantity of items	Number of items moved in the last 4 years
Chemicals	8.343	2.097
Office supplies	497	247
Packing and Packaging Material	652	365
Material for Maintenance of immovable property/Facilities	2.205	1.064
Materials for Maintenance of Movable Property	6.452	1.124
Electrical and Electronic Material	1.395	407
Laboratory Material	6.638	1.516
Total	26.182	6.820

Source: Elaborated from Bastos (2015, p. 102)

With the strategies and actions of change defined and validated, we started with the actual implementation of the proposed model. At the moment, actions were taken for data migration, contemplating all the sanitation work carried out in the material catalog so that the new system began based on the pre-established concepts for a modern catalog management.

New system

One of the goals of ERP is to integrate all the data and processes of a company. The Integrated Enterprise Management System, another concept for ERP, acquired by the laboratory was SAP ERP. Created by a German company of the same name, the system is divided into modules, which contain the functionalities aimed at all the business areas of the company. These modules cover the areas of production, purchasing, sales, distribution, warehousing and human resources, among others. Those implanted up to the date of this study are:

- SAP MM - *Material Management*
- SAP WM - *Warehouse Management*
- SAP SD - *Sales and Distribution*
- SAP FI - *Financial Accounting*
- SAP PP - *Production Planning and Control*
- SAP PS - *Project System*
- SAP CO – *Controlling*
- SAP QM - *Quality Management*
- SAP PM – *Plant Maintenance*

The registration of the materials and the management of the catalog are carried out within the MM module. This module integrates with all others of the system and supports the planning phases of consumption needs, planning and purchasing management, receiving materials, selling products, among others.

Alignment between systems

The new system uses a feature called "material types" to define how they will be purchased, received, stored, posted, delivered to the requester, and shipped. These types have their acronym in German which hinders understanding and creates some rejection on the part of the collaborators. To facilitate internal communication, it was suggested to modify its original acronyms to a model that would allow a better understanding for the users.

During planning for the entry of the new system in production, it was necessary to identify, by material type, which fields would be required (the system does not allow the registration to be completed if it is not totally filled up) and which would be optional, although relevant (if the field is not filled, there will be some problem, but the system accepts the registration). Each type of material received an acronym closer to the reality of the laboratory. Figure 1 presents the relationship between the original nomenclature of the types of material and the nomenclature created for each type of material already used, with its detailed description.

The nomenclature used by the previous system to separate the types of materials and their merchandise groups was "groups and subgroups". The validated definition for this segregation is shown in figure 2, which shows the relationship between the type of material of



the new system, its denomination, its range of registration - also called numbering range - and which groups and subgroups of the previous system are related to them.

Type of Standard Material	Type of Material	Material Type Designation
ZAWA	ZREV	Marketable Products - Resale
ZERT	ZFAR	Finished products
ZALB	ZSEM	Semi-finished products
ZVER	ZEMB	Packing
ZERP	ZFLX	Flexography Packaging
ZROH	ZMAT	Feedstock
ZIBE	ZCON	Auxiliary/Consumer Material
ZESA	ZREP	Spare parts
ZIEN	ZSER	Provision of service
ZATV	ZPAT	Fixed assets / capital assets

Figure 1. Type of original material X type of laboratory material
 Source: The authors themselves (2016)

This strategy was necessary to adapt the data in the previous system, which were minimal, to the model of the new system due to the disparity between the two models, since the former was an internal solution to meet a specific demand; while the second is a universal system with a totally different logic and with a multitude of fields and data to be filled to ensure its integrated management system.

Characteristics and peculiarities of the new system

The new system has brought some characteristics common to its integrated system profile and it is this profile that forces the laboratory to have all its processes reviewed to act from the perspective of integration and thus enable implementation. Three of these characteristics are: commodity group, measurement unit and valuation class.

The merchandise category is a required field that segregates a specific group within the material type. For example: within the type of 'consumer material' (ZCON), there is the merchandise group 'laboratory material'. In this group are the materials used in the surveys, as well as other groups linked to other important areas, such as production. This field is important because it segregates the materials within a specific material type and if not used correctly, it will cause problems in the use of the material after it is entered into the stock.

The unit of measurement is the part of the catalog of materials that requires more attention. It is directly related to how the market provides the material and its use

within the company. A special look at this part is necessary to avoid problems in the use of the material in all phases of its consumption.

For a quality register, it is essential to interact with the other areas that have important information about the material. In this sense, based on a relationship provided by the quality sector, the measurement units of the new system were standardized according to the National Institute of Metrology, Quality and Technology (*Instituto Nacional de Metrologia, Qualidade e Tecnologia – INMETRO*) and, as of this moment, it was not allowed creating new units of measurement without the consent of the centralizing areas, with the objective of preserving the established standardization.

The new system has three unit of measure fields, namely: "basic unit of measure", which refers to the inventory management unit; "Sales unit of measure" field used for output invoices; and "purchase unit of measure", which is used in purchase orders. Of these fields, only the first one mentioned is obligatory; the others should only be filled if the unit of measure is different from the basic unit of measurement. In view of these cases, it was necessary to register a conversion table so that the system understands how much of a unit of measure is equivalent to the other. This aspect requires a lot of attention, since this conversion always occurs with the unit of basic measurement of the material, not allowing including two units of different measurements.

Com.	Texto da unidade de medida
CXT	Cabote
D	Dias
D1	Diária
DIA	Dias
DM	Decímetro
dm ³	Decímetro Cúbico
DZ	Dúzia
FML	Unidades enzima/mililitro
FL	Folha
FOZ	Onça líquida EUA
FR	Frasco
g	Grama
GAU	Grama ouro
GIA	Grama - ingrediente ativo
GIL	Grama IngrAtivo / litro
GJ	Gigajoule
GL	Galão
GLI	Gramas/litros
GM	Gramas/mol

Figure 3. Units of measurements and their descriptions

Source: New system screen (2016)

The unit of measurement field of the new system has an acronym with three characters and, to meet this requirement, "masks" have been created for the descriptions of the units of measurement used. This was another necessary adjustment, because the previous system did not have this characteristic, and from there, this rule would



Type of Material	Material Type Designation	REGISTRATION RANGE		Previous System			
ZREV	Marketable Products - Resale	1000000000	1999999999	30.09	(except 30.09.07)		
ZFAR	Finished product	2000000000	2999999999				
ZSEM	Semi-finished product	3000000000	3999999999				
ZEMB	Packing	4000000000	4499999999	30.19	(except 30.19.17)		
ZFLX	Flexography Packaging	4500000000	4999999999	30.19.17			
ZMAT	Feedstock	5000000000	5999999999	30.33			
ZCON	Auxiliary/Consumer Material	6000000000	6999999999	30.03 30.04 30.07 30.09.07 30.11 30.15 30.16 30.17	30.18 30.21 30.22 30.23 30.26 30.28 30.29 30.31	30.35 30.36 30.39 30.40 30.41 30.42 30.44 30.46	30.47 30.50 30.99
ZREP	Spare parts	7000000000	7999999999	30.24 30.25 30.58			
ZSER	Provision of service	8000000000	8999999999	51 39 37 36 35 34			
ZPAT	Fixed assets/capital assets	9300000000	9399999999	52			
ZFAB	Manufacturer's Brand	9400000000	9499999999				
ZRES	Waste	9900000000	9999999999				

Figure 2. SAP material type x numbering range x previous system

Source: The authors themselves (2016)

have to be used. Figure 3 shows a screen of the new system, with some examples of unit of measurement and their original descriptions that needed suitability.

Units of measurement need to be routinely controlled and sometimes adequate, as they have strong interaction with internal processes, such as inventory management, consumption, manufacturing, supply and physical movement, and external processes, such as purchasing and payment to the supplier.

Another feature of the system that is also relevant to highlight is the valuation class, mandatory field of the new system that is located within one of the accounting views. This field is linked to a class of accounting accounts corresponding to it; this means that all bookkeeping is based on this information and any error or failure to choose or control this field will impact the accounting of the company and the life cycle of the material or product.

The accounting takes place on the input, output and consumption of the material automatically. This process is activated when entering the item in the system and the posting movement is pre-configured prior to entry into the inventory for the correct item accounting at all stages of its use.

With all these characteristics and specificities, it is unthinkable to implement a management system of this size without paying special attention to the material catalog process and without continuous management on it so that these minutiae do not compromise the activities of the company's production chain, once these actions are dealt with in the act of registering the item.

The migration process to the new system

During the preparation phase for data migration and loading of existing items into inventory in the previous



system, it was necessary to create some criteria to start with a lean system and to facilitate all the necessary controls in the new way of managing the material catalog. At that moment, the most important part was ensuring that the new catalog contained only items in stock and with purchase orders in progress; the others would be migrated to the new system as needed.

In order to guarantee the success of this phase, in relation to the specific material management module, a strategy was set up aimed to generate reports extracted from the old system, create report sheets, clean up the worksheets by material type, and link the data from spreadsheets with the required and relevant fields of the new system. Compulsory field is one in which it is not possible to proceed with the registration without its completion, and relevant field is the one that impacts the other business processes of the company, even if the system allows to proceed with the cadaster without filling it. The spreadsheets were prepared separately, by type of material, to be delivered to the analyst in order to unify them for the loading procedure in the new system. With the unified and filled worksheets, the process of loading the items that were in the warehouse's physical stock and those that were in the purchase process was started in the new system. At that moment, in order for the new system to start based on the pre-established concepts for the modern management of the catalog, the data migration actions were done contemplating all the sanitation work carried out in the catalog.

Registration of materials and services - new system

Considering the amount of new information that would be required for registering an item in the new system and that were the responsibility of other areas of the company, a workflow feature was devised so that all the areas involved could provide information. The registration request workflow was conceived as follows: the requestor sends an e-mail to one of the three centralizing areas, according to the type of material to be created. After analysis, the central area registrant fills out the primary information of its responsibility in the views "Basic Data 1 and Basic Data 2". At this point, the system sends an e-mail informing the next responsible system that it should fill its vision and so on until the registration of the item is complete. After registering the last view, the system sends an e-mail to the centralizing area that initiated the registration, informing the conclusion. The centering area analyzes all registered views and releases the material for use. Figure 4 shows the initial flowchart for registering an item.-

In figure 4, blue processes are performed outside the system and the green ones are performed within the sys-

tem. This model was proposed with the objective of improving the original workflow of the new system. However, after its implementation, it would still be necessary to evaluate its effectiveness in relation to the control of the data registered and the time to finalize a cadaster, since this activity depended on the actions of a large number of people and areas.

Still on the new registration process, it is important to highlight the registration of the visions that are also used in the different moments in which the materials are used. The registration of a vision depends on the type and specificity of the material to be registered and, in order to define which visions would be registered in the new system, a careful analysis of the types of materials used in the laboratory was carried out. In Figure 5, the schema assembled from this analysis can be visualized to define the register of the visions.

In an integrated system, the register is very specific and the views are mandatory by type of material, as you can see in the figure above. In addition, within the mandatory views, the fields to be filled may be different for each type of material. With all this specificity of the material register, it was necessary a detailed training of the registration team so that possible errors were minimized and/or avoided. These fields have a direct impact on the life cycle of the material from purchase to user's use. With these actions, which allowed the migration of data and materials in stock from the old system to the new system, the system can start operating.

Process analysis implemented

With the system in operation and the progress of registration activities, it was verified that the registration time was much higher than expected. The reason identified was that, although there were three centralizing areas, the other views of the register were filled in a decentralized manner by the applicants. This happened because the strategy initially used was to divide the activities with those responsible for the information of each type of material, a situation that caused the cadaster to pass through nine sectors for its completion. This model also made it impossible to define a maximum term for the item registration, since it was impossible to control the information registered and the time it was made, since it was done by other sectors and not by the centralizing areas.

Because of a system limitation, it was not possible to quickly identify in which sector the item registration was, which made it impossible for the centralizing area to finish the registrations already started. In the initial model, a work front was formed with 18 employees to comple-

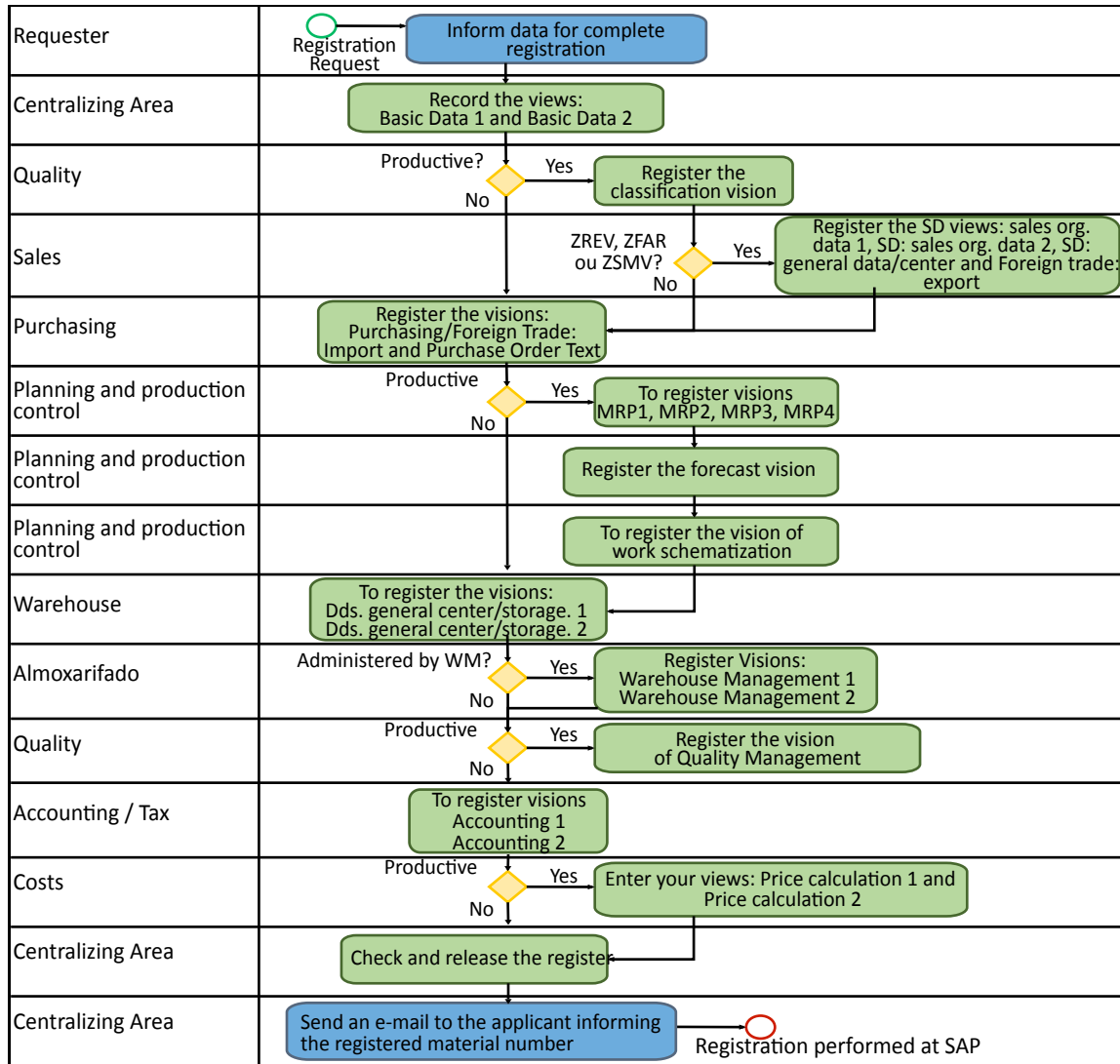


Figure 4. Process of registering items in the new system
 Source: The authors themselves (2016)

te the 12 visions imposed by the system, nine to register and another nine to replace them in cases of absences. In this model, it was not possible to define a specific area to attend the problems that were being identified after the registration was started and/or completed.

Solution for identified problems

Considering that loading the data in the material catalog was the main factor for starting the new system, it could not be implemented without the company meeting the requirements and peculiarities of the new registration model and presenting a solution for its implementation and for the management of this catalog after the start of operation. Considering also the strategic importance of the catalog for the company's production chain,

the proposed change would not be possible without a special look at this activity, which required a thorough management of the catalog to ensure that the processes were not impacted by master data failures of the materials registered. With a Logistics Department structured to support internal laboratory logistics, the lack of an area dedicated to catalog management was a threat to the proposed strategy of maintaining a lean and modern material catalog. Based on these arguments, the creation of an area for managing the catalog in the new system was proposed. Management accepted the proposal and endorsed all the necessary actions for the implementation of a complete management of its material catalog with the centralization of this activity in this sector.

In order to carry out registration with the best quality and the shortest possible time, some changes were made



	Vi-sion	Visions	ZREV	ZFAR	ZSEM	ZSMV	ZEMB	ZFLX	ZMAT	ZCON	ZREP	ZSER	ZPAT	
registering	K	Basic data 1	X	X	X	X	X	X	X	X	X	X	X	
		Basic data 2	X	X										
	C	Classification	X	X	X	X	X	X	X					
	V	SD: sales org data 1	X	X										
		SD: sales org data 2	X	X										
		SD: general data / center	X	X										
		Foreign trade: exports	X	X										
			SD text											
	E	Shopping	X			X	X	X	X	X	X	X	X	X
		Foreign trade: import	X			X	X	X	X	X	X	X	X	X
Purchase order text														
PPC/PlanLog	D	MRP 1		X	X	X	X	X	X					
		MRP 2		X	X	X	X	X	X					
		MRP 3		X	X	X	X	X	X					
		MRP 4		X	X	X	X	X	X					
	P	Prediction		X	X	X	X	X	X					
A	Work layout		X	X	X	X	X	X						
registering	L	General center / storage d.1	X	X	X	X	X	X	X	X	X		X	
		General center / storage d.2												
	S	Warehouse Management 1	X	X				X	X	X	X			
		Warehouse Management 2												
	Q	Quality Management	X	X	X	X	X	X	X					
	B	Accounting 1	X	X	X	X	X	X	X	X	X	X	X	X
		Accounting 2	X	X	X	X	X	X	X	X	X	X	X	X
	G	Price calculation 1		X	X	X	X	X	X					X
Price calculation 2			X	X	X	X	X	X					X	

Figure 5. Material type x visions

Source: The authors themselves (2016)

MRP: Material Requirement Planning; SD: Sales and Distribution

in the processes initially adopted. The most important change was the creation of a sector dedicated to the registration of items and the management of the material catalog, this sector was directly linked to the Logistics Department of the unit.

Registration of materials and services - proposed model

Due to the amount of information needed to register an item that is the responsibility of other sectors, a strategy of communication and interaction with them was set up to avoid the error in the choice of material type, as

well as in its evaluation class. An error in these two pieces of information will cause problems in all sectors of the company that will use the material and in those that are impacted by its movement. Contact with the Heritage Sector and the Accounting/Tax Sector, for example, is given by e-mail before the beginning of the creation of the material. The Quality Assurance Sector has prepared a standard document for completing the information of its responsibility. As for the Production Planning and Control (PPC) sector, which requests registration only of items used in the production of medicines, it was not possible to adopt either of the two previous procedures, since there is a variety of information to be filled in according



to the product to be manufactured. The PPC sector will access the register already made and expand the visions of its responsibility. Figure 6 shows the design of the new process.

As shown in the figure above, blue activities run outside the system and green activities run on the system. This model was proposed instead of the initial model that was time consuming and involved many areas and people. The proposed model was necessary to solve the problems encountered with the implementation of the new system which, if not modified, would impact the entire production chain. The creation of a specific sector to manage the catalog of materials of the laboratory allowed a routine monitoring of all variables that influence the use of the registered items, besides offering advice to other sectors of the company that need to make changes in their processes that will impact the catalog. Another advantage was the possibility of standardizing the registration in the description and units of measures together with the area of quality of the company.

5. RESULTS

With the implementation of the proposed strategy of managing the material catalog, creating a specific sector for this activity, it was possible to identify some advantages and results. They are:

- Securely tailor measurement units whenever necessary to meet the specific needs of the company’s business processes;
- Quickly and reliably change the master data according to the need to update/add information, eliminating rework by correcting mistakes in completing the data;
- Update and modernize the catalog of materials according to the market and the updating of legislation, aiming to keep the company up to date with its management practices;
- Reduce the amount of areas and people involved in the activity, freeing them to act on their end activities;

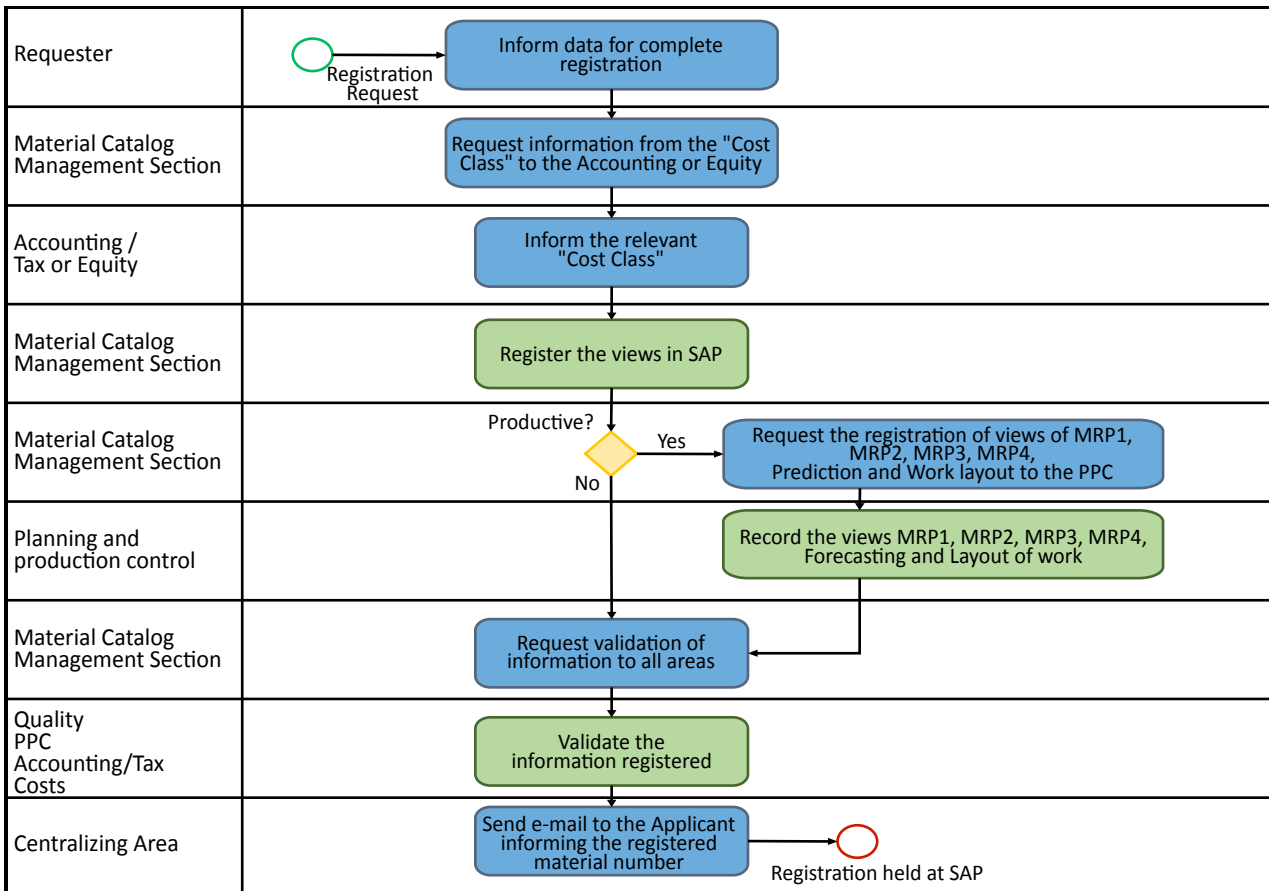


Figure 6. New registration process
 Source: The authors themselves (2016).



- Control the entire flow of the registration process to ensure that all steps are done correctly and safely;
- Give reliability to registered master data so that processes are not affected by fragile data;
- Reduce the time of registration of the item through the centralization of the activities with a staff exclusively dedicated to this activity;
- Facilitate the management and modernization of the material catalog;
- Expedite the creation of purchase orders with the guarantee of correct master data and consistent with the reality of the market;
- Ensure the receipt and entry of the material into the inventory through interaction between the catalog management area and the other areas involved;
- Improve service levels by allowing orders to be addressed correctly by controlling and updating master data of materials;
- Ensure correct accounting of materials through properly registered master data, avoiding financial and tax problems.

These results point to the resolution of the issues that were impacting the company’s strategies, the main ones being: the need to implement the new ERP acquired by the laboratory and the need to restructure the material registration process that was not adequately managed.

Figures 7 and 8 show the catalog management activities carried out by the team, which allow interaction with all the users of the laboratory to ensure that their demands are met safely, in addition to keeping the catalog lean and updated, and this is one of the main gains with the proposed model.

6. CONCLUSION

The study made it possible to verify that the laboratory was really facing a problem due to the new moment, since it did not have an established material catalog management model and had been working for a long time with a management system that did not meet the requirements of an integrated system and business logic. Given this, it was necessary to use some strategy that would allow the continuity of the implementation of the acquired system, which was the object of a heavy financial investment.

During the research, it was observed that the managers involved in the problem had a great challenge that, in a strategic way, was worked in stages as described in this article. The key point to solve the problem was the creation of a specific sector, with a qualified team dedicated exclusively to the activities that involve the registration of the materials and the management of the catalog. This has brought confidence and credibility to both top management and end users, factors considered important for the success of the strategy that involved material and human resources. In order to deal with issues involving business management, it is important that practitioners involved in decision making have practical and theoretical knowledge to critically analyze the impacts involved, to

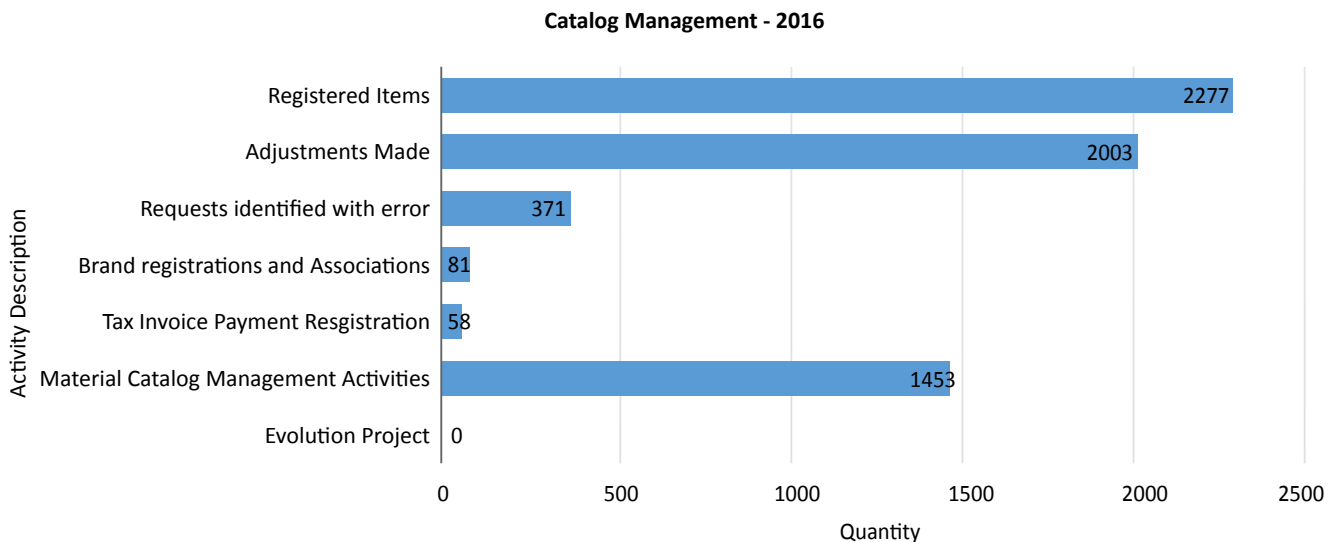


Figure 7. Catalog management activities in 2016

Source: The authors themselves (2016)

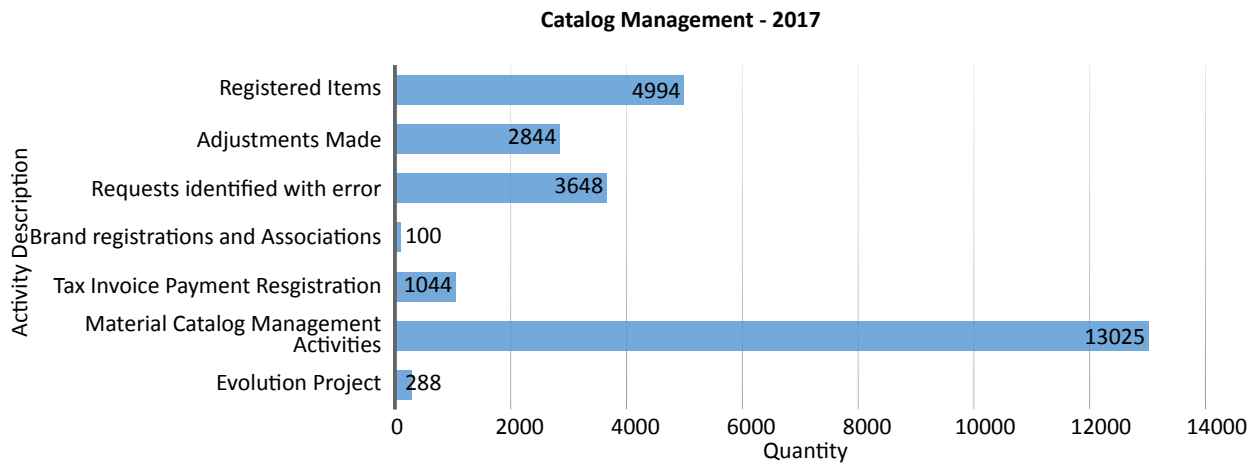


Figure 8. Catalog management activities in 2017

Source: The authors themselves (2017)

interact with all stakeholders to convey trust and credibility, and to engage the greatest number of people in accepting the proposed solutions. The creation of a material catalog management area composed of professionals trained in administration, logistics and supply chain management was a factor that contributed to the results achieved.

Analyses showed that the previous model precluded the implementation of the new system, since the new master data that would be needed did not exist. In this way, the mapping and the modeling of the process allowed identifying the exact points that needed intervention. These two forms of process analysis allowed identifying the failures and planning all the necessary data to the new system, which served as the basis for the migration from the previous system to the acquired one. At the moment, it was identified that the management strategy used was on the right path for the other idealized actions.

The strategies that followed allowed the monitoring of impacts. Among them, we highlight the change that had to be made in the use of the systemic resource of workflow that, initially, did not give the expected results. The decision to centralize the registry in a sector, instead of maintaining it in more than one centralizing area, also brought gains because it considerably reduced the registration time of an item, besides ensuring that the registered master data were those really needed. One way of looking at the importance of the proposed model with continuous catalog management is to compare the number of registrations carried out and management activities in the years 2016 and 2017. With the increase in the number of registrations, the catalog management activities increased in the same proportion, as shown in figures 7 and 8. This was necessary to avoid duplication

and unnecessary entries and to guarantee correct master data that are responsible for the accounting of material movements, which was only possible through such management activities.

In the foregoing, it is concluded that the research experience brought significant advances in laboratory management, especially regarding the problems faced by the absence of catalog management, which made it impossible for a senior management decision to implement a new management system for improving the performance and fulfillment of the institutional mission. Companies operating in a highly competitive segment, such as the pharmaceutical industry, need to have optimized processes and levels of services with standards that allow the supply of products with the lowest production cost, as well as an effective supply chain to meet the internal and external demands. In this sense, investments in the modernization of process management are extremely important in the management of these companies.

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