THE USE OF JIT, MRP II AND OPT TOOLS AS STRATEGY TO REDUCE COSTS IN HERBAL MEDICINE INDUSTRY

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ABSTRACT

Following a new worldwide trend, the pharmaceutical industry has applied its investments in the area of technology industrialization towards herbal medicinal products. The use of such products has been increasing due to its prevention potential and with fewer side effects. To achieve some competitive advantages, it is essential for the companies to use tools like JIT, Manufacturing Resources Planning and Optimized Production Technology in order to provide quality increase of their products, aiming at optimizing their resources as well as rationalizing their stock and, consequently, reducing costs. This study proposes an analysis of industrial statistics, by means of an only exploratory case study with limited scope, in order to create a model of managerial analysis for the effective use of installed capacity. After this step, an analysis of the production system and its influence on the logistics and cost accounting will be developed with focus on: production, sales forecasting, seasonality, layout, stock management, supplies and distribution logistics. Based on the analyzed results, information to develop a logistics flow may be obtained so that industries from the herbal medicinal segment can seek continuous improvement.

Key words: Logistics. Production. Administration. Cost accounting.

\footnote{Title in Portuguese: Utilização das ferramentas JIT, MRP II e OPT como estratégia na redução de custos em indústria de fitoterápicos. English version by TANNER, Claudia Marília Ramos. 2013}
INTRODUCTION

The pharmaceutical industry has adopted the strategy of constant and significant increases in medicine prices. Defined as oligopolistic sector, it has been submitted to public regulation (ABIFISA, 2010). This segment can be described by the inelasticity of demand to prices, by the substantial entry barriers for new competitors, by the existence of a replacement product, coupled with the strong information asymmetry whose product – medicines – has the characteristic of essentiality.

The industry of herbal medicines was benefited in terms of economic regulation as a segment of the pharmaceutical industry. In spite of its products are not under the control of prices, there was a call for restructuring processes and products due to the requirement for validation implemented by technical regulation. Phytotherapy has never been in the media focus as today.

Regardless its market area, small and medium enterprises generally do not employ logistics solutions for the manufacturing of their products. The industry of herbal medicines is not the exception to this national rule and needs improvements on the production management process. In this type of company, the use of techniques such as Just in Time (JIT), Manufacturing Resources Planning (MRP II) and Optimized Production Technology (OPT) can bring solutions for the existing problems and it can increase the competitiveness on national and international market.

Literature review and discussion

According to Simões (2001), the herbal medicines are all and any transformation of plants in a medicinal product. They must aim to preserve the chemical and pharmacological integrity of the plant by ensuring the constancy of its biological action, as well as the safety in use requirements, in addition to enhancing its therapeutic potential. To achieve these goals, the production of herbal medicines

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necessarily requires previous studies related to the botanical, agronomical and phytochemical aspects of the development of analytical and technological methodologies. (PETROVICK, 1997).

**Manufacturing resources planning - mrp II**

According to Slack et al. (2002), MRP - developed by Orlick (1975) around the 1960s - broke the paradigm of models based on the Order Point Policies.

The new model proposed that the demand of finished products should be analyzed differently from the demand of raw material, once the first one is generated out of the system and, as a result, it is called independent demand because it is subject to random variations. The demand for raw material should be treated as a function of the final demand and, consequently, “known” or “dependent”.

According to the same author, the Material Requirements Planning (MRP) allows companies to calculate when and how much material of a certain type is needed. To do this, the portfolio orders are used as well as the order forecasts that the company believes it will receive. Then, MRP checks all the necessary ingredients and components to complete these orders, ensuring they will be provided in time.

**Just in time**

To Moreira (2011), in relation to the *Just in time* concept, the first difficulty would be with regard to its own nature. For the Association for Operations Management (APICS), *Just in time* is a manufacturing philosophy which means a way to address, understand and conduct the manufacturing activities of an organization. The basis of this philosophy is the planned and systematic elimination of wastage, leading to continuous improvement of the productivity.

As Ohno (1988) says, *Just in time* (JIT) was originated in Japan for the world in the 19th century with Taiichi Ohno and the Toyota Production System. The author explains that JIT was based on a concept similar to the reality of the North American
supermarkets: the customer picks up the product from the shelf exactly what he/she wants to buy in accordance with the desired quantity and at the time he/she needs it. In the supermarket, stock is replaced according to consumption. Similarly, in the industry, the internal or external customer should be treated in the same manner as the supermarket. Stock should be replaced as consumption is achieved.

**OPT - optimized production technology**

According to Corrêa and Gianesi (2007), Optimized Production Technology (OPT) is a management technique developed by a group of Israeli researchers, of which the physician Eliyahu Goldratt was a member, and who ended up being the main disseminator of its principles.

The Optimized Production Technology (OPT) is a computerized technique that assists the programming of productive systems, according to the pace dictated by the most heavily loaded resources or, in other words, the bottlenecks. If the activity rate in any part of the system exceeds those of the bottleneck, some items that have been produced will probably not be used. If the work rate drops below the bottleneck pace, the entire system is underused.

For Goldratt (1993), this set of ideas was named as the “theory of constraints”. According to this theory, the programming should be done in accordance with the production pace of the bottleneck resource to maximize the use of this resource and to increase the production flow. The production bottleneck is identified as the step that limits the efficiency and the capacity of a production line. Thus, the author suggests the following rules: to reduce the variability of the resources around the bottleneck, to expand the bottleneck capacity, to transfer part of the bottleneck resource load to other resources and to eliminate all the bottleneck idle time.

According to Slack et al. (2002), this programming theory was named as DBR – drum-buffer-rope. It is associated to the pace and to the volume of the system.
production, based on the availability of bottleneck denominated as “drum”. The “buffer” refers to the protective stock that should be maintained exactly before the bottleneck so that it never stops due to lack of material to be processed. The “rope” is an analogy to the synchronization that must exist between the arrival of the material in the protective stock and the entry of raw material in the system.

For the authors Corrêa and Gianesi (2007), the programming is done in way to keep the bottleneck resource always busy. The resources before the bottleneck are programmed to maintain the “buffer” always at the proper level. After the bottleneck, the tasks must be “pushed” in order to finish as soon as possible. The implementation of OPT may be difficult because its software is like a black box, and it uses an algorithm which is not clear to the user. Therefore, the OPT demands some knowledge on finite programming and analytical ability from those who use it.

Correa and Gianesi (2007) add that the identification of bottlenecks is not something easy to be done, since many factors may mask their identification. If it is misidentified and if there are errors in the software parameters, the OPT - for being a pushed production system - can result in accumulation of stock in process and long flow times.

Material and methodologies

This topic describes the current condition of the production planning and control department (PPC) of a herbal medicine industry located in the city of Botucatu, state of São Paulo, in Brazil. The study was carried out by means of technical visits, and based on the previous experience of the author of this article as an employee of the company. Data and information were collected regarding the PPC mechanism, the equipment, systems and methodologies that were implemented. Observations and researches were also carried out on the work stations and with the current employees.

One supervisor (administrator), four PPC analysts, one production engineer and one trainee and two interns worked on the PPC studied.
The daily routines of the production planning and control department of the company are:

- Checking stock balances
- Response to queries from the commercial department
- Productivity calculation
- Production planning
- Production control
- Control of the satisfaction regarding delivery
- Human capital measurement
- Delivery and receiving logistic programming

The implementation of the MRP Integrated System at Grupo Centroflora is still in progress. However, it is possible to verify and analyze the results obtained from the system in some sectors.

As presented previously, with theoretical foundation by Slack et al. (2002), it can be proved that regarding the efficiency and organizational effectiveness, the system helps to improve the process, the content of the decisions and the control of production. There are also improvements in meetings and internal discussions, and it enables better coordination among the operational areas of the company. Moreover, it contributes to better evaluations on budget annual reports, as well as it improves the strategic planning. Thus, it helps to increase profit margin.

**FINAL CONSIDERATIONS**

By means of a literature research, this article gathers collected information on scientific papers about the key concepts of the methodologies denominated MRP II – *Manufacturing Resources Planning*, Just in Time and OPT – *Optimized Production Technology*, under a perspective of production management and
material flow. Some characteristics from each theory were presented, in other to provide comments on the topic studied.

In summary, so far the results presented significant contributions regarding the strategies, within the departments in which the system has already been “running”, and also in relation to customers and consumers, competitive rivalry and market. It demonstrated to add value regarding suppliers (relation, monitoring, etc.) and production (productivity gains). MRP provides significant contributions to organizational efficiency, and especially to the inter-organizational efficiency, by facilitating the integration and communication among different organizational units and with other institutions.

Finally, it can be concluded that the gain to be presented with the implementation of these tools is enormous. This can be verified with the reduction of operational costs, rework reduction, batch reduction, in-process stock reduction, and other optimizations in production line, capable of ensuring deliveries to the planned time and, consequently, maintaining the customer loyalty.
REFERENCES


PETROVICK, P.R.; GONZÁLEZ ORTEGA, G; BASSANI, V.L. From a medicinal plant to pharmaceutical dosage form. A (still) long way for the brazilian medicinal plants. Ciência e Cultura, 1997.
