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## **Lean production and just in time: a case study of the e-procurement application**

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**Abstract.** Guided for an increasingly competitive market, companies have sought to attend consumer expectations by offering the best product, quality, flexibility, agility and cost effectively. Studies have been shown that the Just in Time (JIT) has proven to meet these requirements. Allied to information technology through e-procurement, using the JIT has boosted results. Practical results of this combination are presented in this paper, through a case study in a large multinational company in the food sector. The purpose of this article is to identify and present the benefits of using the JIT philosophy in the implementation of e-procurement in the purchasing and routing company.

**Keywords:** ERP, B2B, Supply Chain

### **1 Introduction**

Just in time (JIT) is an important philosophy in logistical activities, especially when it refers to lean production, initially of used by Toyota Motor Company in 70's. Mainly since 80's so far, the JIT philosophy which is one of the pillars of lean production has been used in several of companies segments with success such as: cost, time, reliability, quality and flexibility [1;4;10].

The variables that form the primary activities and the value chain has suffered alteration with the information technology introduction, it evolves machines, equipment, raw materials, supplies and other consumable items which are already commonly associated with primary activities [2; 9; 11].

The objective of this paper is to present the results gotten by an American multinational company (called XPTO Brazil, on this study), active in Brazilian market and it is a producer of food and beverages that through JIT philosophy, associated to an e-procurement tool, provided improvement in the purchasing process and company routing.

## 2 Backgrounds

### 2.1 Lean Production

Through a reverse logistical Lean Manufacturing and JIT study has realized other discoveries about philosophy contributions in areas related to logistics. The lack of integration between the key areas studied by authors that are Collecting, Inventory, Remanufacturing and Distribution. Through a long bibliographic review, the authors could get the JIT performance results in five sectors, such as: cost, speed, flexibility, quality and reliability. It's believed that JIT contribute for the process of remanufacturing as optimization of line production, involving the acquisition of resources and diagnosis of any activity in advance [3; 6; 13].

### 2.2 E-procurement

E-procurement is a buying application based on the Internet/Intranet or a place service that boosts the trade purchasing partners, maximize the commerce efficiency along the chain supplies and provides e-commerce strategy skills on the Internet.

The solution of e-procurement facilitates the cooperative purchases through the Internet. According to the author, the tool has the power of turning into the purchasing process because it spreads in all steps identified by supply manager. E-procurement is the most revolutionary aspect of B2B and it will change completely and definitely the way of companies do business, replacing the physical process that involve trade. [2; 5; 8; 10]. The (table 1) presents some e-procurement types, its main models and features [6].

**Table 1.** Models of e-procurement

<b>Ecommerce templates</b>	<b>Main features</b>
Networks EDI Electronic Data Interchange.	Range of commercial and customer opinions. Simple transactional capabilities. Processing in series. Shift to value-added networks and reactive expensive way.
Applications requisition Business-to-Employee (B2E).	Quick Shopping for corporate employees. Automation of approval and standardization of the requisition process. Provides the buyer management tool suppliers.
Corporate procurement portals.	Better control over the procurement process and allows business rules of most companies are consistently implemented. Customize with prices negotiated in a multi-vendor catalog. Management cost analysis.
Trade first generation.	Industrial content, jobs and news. New sales channel for distributors and manufacturers. Service bundling and catalogues.
Trade second generation.	Automating the process of requesting and-order transactions. Discovery of suppliers, prices and products/services. Catalogues management and credit.
Trade third generation.	Synchronized operations and satisfaction in real time. Transparency in the process leading to restriction of demand and supply chain. Alternative information for inventory.
Industrial consortiums.	Next step in the evolution of corporate procurement portals.

Source: Adaptation by Kalakota and Robinson [7].

### **2.3 Just in Time**

Experiencing a post - WWII environment, Japan saw an opportunity to gain competitive advantage to optimize their processes through the use of quality tools and standardization, based on items of verification and control at all stages of the production process, generating customer value [1; 10]. JIT is used in a pull production system which produces only on demand, after the completion of an application in the amount and at the desired time, since it does not allow anticipation of purchases, production or transportation [4; 9; 11].

The stock is part of the assets of a company and thus directly influences the working capital. In this context, the JIT philosophy aims to meet demand instantaneously with perfect quality and no waste. Note in this context that the primary activities are essential to the achievement of logistics objectives are also those that contribute the largest share of logistics costs [1; 5; 12].

## **3 Methodology**

### **3.1 Case study**

The methodology used has been the application of a case study supported by a review of JIT philosophy and the application of an e-procurement platform in a specific view. The identification of weaknesses and strengths of XPTO Company was accomplished through the interviews with Supplies and Information Technology Directors, being guided by theme and goals as follow:

Needing evaluation in order to determine the Planning, Warehousing, Handling and Storage Control, aiming at the service optimization and costs reduction through the concept of Lean Production, Just in Time and the application of an e-Procurement Platform. The specific objectives of the case study are:

- a) Evaluate the application of Just in Time and Lean Production concepts in XPTO Company Brazil identifying possible opportunities of improvement.
- b) Understanding the main techniques for storage sizing in order to attend business needs of a company, its warehousing and handling, focusing on Lean Production.
- c) Evaluate the results gotten through the application of e-procurement platform and its improvements in productive process and Just in Time.

It has showed by the directors, reports, prints, graphs, sheets, floor plans and these documents have been used for the identification of weaknesses and opportunities of improvement and these ones served as a reference for the elaboration of proposals following the theme and goals pre-established and can be viewed in SWOT matrix and for being strategy information they will not be presented in their totality in this article.

On the documental analysis was possible to identify that: “XPTO Brazil firmly believes that the international trade strengthens the stability and peace when it promotes the economic growing, the opportunities and the mutual understanding”.

### **3.2 SWOT Analysis**

The identification of strengths, weaknesses, threads and opportunities was the critical factor of success for the suitability of theme and proposed goals in this study, guided the incorporation of the best market practices and available technology following concepts and specific scientific methodology.

- a) Evaluate the application of Just in Time and Lean Production concepts at XPTO Brazil identifying possible improvements opportunities.
  - Strength: overview of all storages in movement in the company.
  - Weakness: Absence of improvement actions and data analysis comparing them with scientific literature.
  - Opportunity: Integrating SAP-ERP system with e-procurement.
  
- b) Understanding the main techniques for a storage sizing in order to attend the business necessities of a company, its warehousing and movement, focusing on Lean Production.
  - Strength: ERP (Enterprise Resource Planning) System of routes managing and supplies.
  - Weakness: analysis and improvements lack using the data and information from ERP-SAP linked to scientific methodology.
  
- c) Evaluate the results have gotten through the e-procurement Platform Application and its improvement in productive process and in Just in time.
  - Strength: Emphasized only the improvement opportunity.
  - Weakness: Lack of ERP (Enterprise Resource Planning) - SAP integration with a supplies module, being this also not contemplated in the organization core-business
  - Opportunity: implementation of an e-procurement Platform linking the ERP-SAP with supplies area.

### **3.3 The nature of strategy of the company business unit**

Each business unit of XPTO Brazil follows the net and search international corporate strategy in order to provide the best conditions of understanding the benefits Logistics foundations, being that the business unit chosen was a distribution center of the company and the pilot project was also the unit studied for the e-procurement implementation, automatize the purchasing system from all over the group XPTO Brazil through an e-procurement Platform linking the ERP (Enterprise Resource Planning) - SAP with the supplies area, aiming at the lead time optimization, gains of competitiveness and cost reduction, being the strategy adopted to Brazil branch.

## 4 Results and Discussion

Through the analysis of the case study was possible to realize that the project of a warehouse should evaluate many factors in its interrelation with the performance and the company costs, in order to find the system that optimize the operations. The company studied (XPTO Brazil) showed layout organization failures, caused by the lack of planning from the top management, mainly related to the fleet control, management of distribution centers and optimization of purchasing process through the utilization of Information Technology.

The solution of Purchasing Service (Outsourcing) to the XPTO Brazil searched attending initially the purchasing necessities of: MRO (maintenance, repair and operations) for some of its plants. In the case of a success from pilot project will be expanded to other 9 existent plants. The activity objectives to reduce the charge of XPTO Brazil buyers and in the same time to provide a service with focused professionals in cost reduction and operational optimization regulated by a Service Level Agreement Index.

The (figure1) presents the first initial result got and shows the utilization of ERP in search of the excellence of the delivery level, excelling by the punctuality and the major customer satisfaction, the outcome presents an efficiency of 67% initially in a score from 0 to 100%. The result is provided by a system and it is based on references pre-established related to the planning and logistical control section focusing on JIT, where were noted several dispersed and geographically overlapping points.

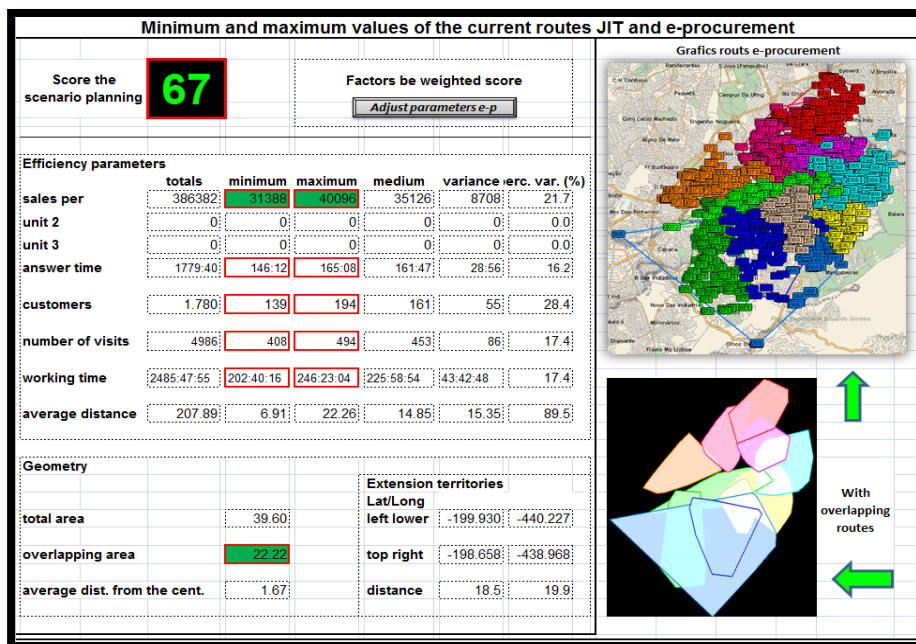


Fig. 1. Scenario of the areas and routes

Next, it has been resized the routes, according to (figure 2), that optimized the routes in order to reduce the delivery distances purposed to respective sale outlets. The results departed from 1.032,77 meters to 588,31 meters, getting a reduction of 444,46 meters in a distance to be covered a month.

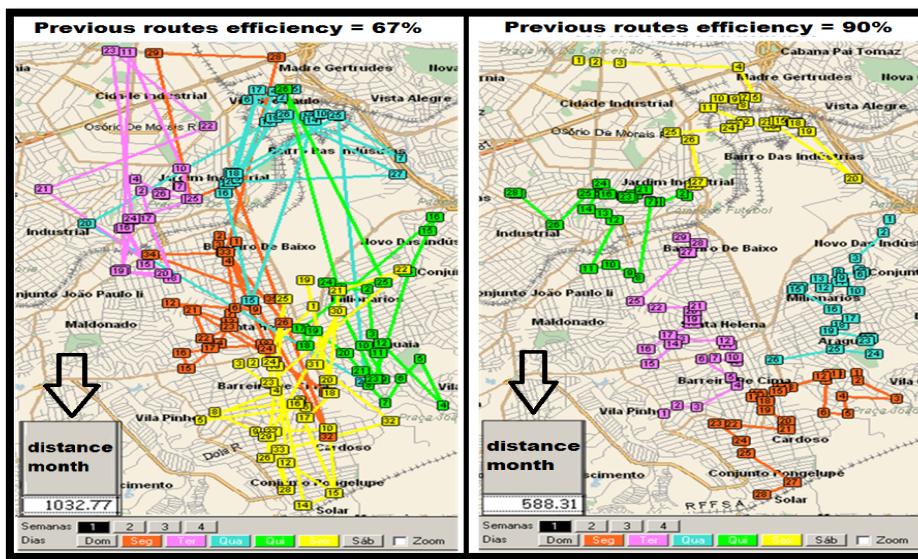


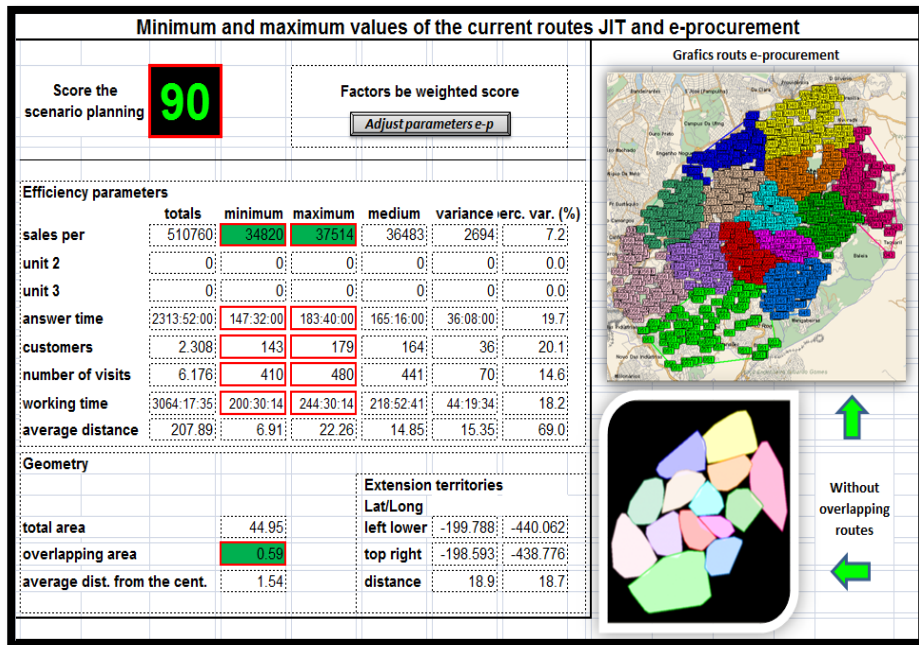
Fig. 2. Scenario routes restructured

It is noted as results gotten through the warehouse layout reorganization:

At the beginning, the total available area for warehousing occupied 1.104 m<sup>2</sup> being 594 m<sup>2</sup> occupied by end products warehouse area and after the bibliographic research was implemented an improvement with the collaboration of a new layout in which the total warehouse area pass through disposing of 1.284 m<sup>2</sup>, being 714 m<sup>2</sup> intended to warehouse area according to the purchasing planning planned by e-procurement.

This way, the gain of physical space is of 180 m<sup>2</sup> and 120 m<sup>2</sup> through the Warehousing Physical Planning that provided a distribution more balanced of areas and installations allowing a possible cost reduction, as well as it avoided a regression on the flow of processing materials.

The (figure 3) presents the improvements after the suitability of control references, the improvement of efficiency reached to 90% validating one of the JIT objectives, after the utilization of ERP and the e-procurement platform in the search of delivery level, excelling for punctuality and the major customer satisfaction.



**Fig. 3.** Scenario restructured areas and routes

The results are in accordance with the 3 objectives outlined in this case study because it resulted in a gain in efficiency of 13 % for the company searched. Note that the integration of SAP and e-procurement resulted in creating value for customers and stakeholders.

## 5 Conclusions

Lean Production and Just in Time philosophy associated to an e-procurement application has provided to the multinational company a remarkable improvement in its lead time, optimizing the return of purchasing process and the planned routing company.

This structural change was supported by the adoption of the best practices in the supplies area, in other words, automatize the purchasing system of all the group of American multinational.

With the implementation of the e-procurement Platform linking ERP (Enterprise Resource Planning) SAP with the supplies area, aiming at the lead time optimization as possible to observe competitiveness gains in supplies area and the company passed through evaluating in a systemic way its business, adapting to the present view of Corporate Logistics and aligning its core business.



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