

Chapter 21

A Review of the Main Options of Tools for Optimizing Operations (in Companies, Manufacturing, and Supply Chains)

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ABSTRACT

Investigated methods for optimizing manufacturing operations are diverse as the theories and hypotheses that have developed over time. There have been different types of studies, using different methods, theories and hypotheses. All aimed at determining what the best methods would be more or less impact on the further optimization of processes and operations in manufacturing companies. This paper concludes that at least there are 8 methods that are most used to optimize operations and in this study are shown which ones are used most frequently and which are used moderately and which never used by the respondents. And depending on the situations to optimize, you can identify and / or develop different algorithms for optimization of operations (in companies, manufacturing and supply chains). And some examples of applications are shown.

1I. INTRODUCTION

With the internationalization of markets and open borders has forced companies' public or private order to seek and apply various methods that allow optimizing operations, that, should be more efficient to deal and l challenge global competitiveness.

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A Review of the Main Options of Tools for Optimizing Operations

Here are some options for the definition of operations research, which was first used during World War II to the conduct of military operations are defined. Later those ideas were adapted to improve productivity and efficiency in the civil sector. At present, this discipline is a necessary tool for decision making (Taha, 2004):

Lazat (1996) defines operations research as a group of methods and techniques to solve operational problems of systems.

According to Wittenberg (2000), operations research is a method to find the optimum ratios that best operate a system, given a specific objective.

And Moya (2003) defines operations research as a teaching unit. The development and application of quantitative techniques (Scientific Procedures) for solving problems and making decisions that managers face both public organizations and private organizations.

Meanwhile, Hillier and Lieberman (2010) state that the Operations Research is the application of scientific method by interdisciplinary teams to problems involving the control and management of organized systems (interaction between man and machine); in order to identify the best solutions to help the purposes of the system (or company) as a whole, framed in decision-making processes.

Preliminary Review of the Literature

In studies Forgionne (1983), it is mentioned that the methods used for optimization of operations are (see table 1):

As shown in the table above, this study is eight the most used methods for optimizing operations and shows, which are the most and least used.

And reviewing some examples of its application are the following:

A model study and mathematical simulation in mechanical drying of parchment coffee Parra, A.; Roa, G. and Oliveros, E., (2008), was based on the programming language Microsoft Visual Basic 6.0, based on models Thompson of the University of the State of Michigan.

Diaz and Perez (2012) on the work of optimizing inventory levels in supply chain optimization studies inventories joint supplier-buyer, compared to traditional non-collaborative policies, analyzing the advantages of this approach in the overall costs of inventories in the supply chain.

Table 1. Use of methodologies of management science and operations research frequency of use (% of responses)

	Never	Moderate	Frequent
1. Statistics	1.6	38.7	59.7
2. Computer Simulation	12.9	53.2	33.9
3. PERT/CPM	25.8	53.2	21.0
4. Linear programming	25.8	59.7	14.5
5. Queuing theory	40.3	50.0	9.7
6. Nonlinear Programming	53.2	38.7	8.1
7. Dynamic Programming	61.3	33.9	4.8
8. Game Theory	69.4	27.4	3.2

Source: Forgionne (1983).

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