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Jorge Luis García-Alcaraz
Aidé Aracely Maldonado-Macías

Just-in-Time Elements and Benefits

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Just-in-Time Elements and Benefits

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*Perhaps writing the book was not as difficult as writing something simple in this dedication. I wish to dedicate this work to the pillars and loves of my life:
To GOD for everything
To my wife, Ana Blanca Rodríguez Rendón, because she supports my projects.
To my son, Jorge Andres García Rodríguez, because he is given me the greatest lessons of my life.
To my daughter Mariana Odette García Rodríguez, who teach me that love is infinite.
Just when I thought my life is complete, I realize that is not true, a new angel comes into my life and be born within seven months. For him or her, I dedicate this work.
We are waiting for you. We love you.*

Jorge Luis García-Alcaraz

*To my parents, husband, and sons who have always supported me in all possible ways to pursue my dreams.
To my students to encourage me for being better every day.*

Aidé Aracely Maldonado-Macías

Foreword

García-Alcaraz, Ph.D., became part of our research group at Universidad La Rioja, Spain, during a two-month stay in 2012 and also in 2014 during six months. At this time, we used to discuss on several projects that we had in mind with the collaboration of Aidé Aracely Maldonado-Macías, Ph.D., and other fellow researchers and professors. Their team aimed at the creation of a research network focused in industrial processes optimization, which would be financially supported by the National Council of Science and Technology (CONACYT) of Mexico. It is thus with pride that I see this work as the result of that research network that they managed to create and to which I belong.

Unquestionably, this book entitled *Just in time, its elements, benefits and reasons for low implementation: some structural equation models* is a response to the increasing manufacturing industry currently developing in Mexico, especially in Ciudad Juarez, the eighth largest city in the country, located in the border with the USA. These companies are characterized by importing their commodities and exporting the products thereby manufactured to other countries. However, this work also constitutes a guide with a high empirical content about the situation of the just-in-time (JIT) technique in the local industry.

The book is divided into thirteen chapters, which I briefly describe below:

Chapter 1 makes a review of the background of JIT and its origins in Japan; other aspects are defined and discussed such as concepts and evolution, its position within the set of tools of slender manufacturing, and also three cases of success of its application in Western industry.

Chapter 2 describes the JIT elements, which refer to the plans and programs that must be present in order to guarantee its successful implementation. This chapter contains a wide literature review that justifies each one of the above-mentioned elements, which are divided into three categories: the ones associated with human resources, the ones associated with the process and, finally, the ones associated with the product and its characteristics.

In Chap. 3, the benefits obtained from a proper implementation of JIT are discussed. These benefits are divided into six categories: benefits attributed to

human resources, benefits attributed to production processes, benefits attributed to engineering, benefits attributed to quality, benefits attributed to management of materials, and finally, economic benefits. Furthermore, as in Chap. 2, a thorough literature review of each of the benefits is presented.

Chapter 4 presents a study of the causes and reasons of the slow implementation of JIT, which are most of the times due to the lack or absence of one of the required elements. This chapter is one of the most important, due mainly to the existing bibliographical bias, where most of the times the success cases are the only ones reported, and the failures and their causes are avoided or not mentioned.

Chapter 5 describes the methodology followed to associate JIT elements to the benefits obtained, as well as the causes for its low implementation. It can be seen that the theoretical foundation lies in the factorial analysis as information reduction technique and on structural equation modeling to generate the causal models. It is interesting to read about the process of creating the questionnaire applied in the local manufacturing industry, which enriches this book as it is full of empiric and real cases of industrial application.

Once the questionnaire was applied in the local maquiladora industry, Chap. 6 makes a description of the research sample. Statistical data of 144 cases are reported, out of which 118 are companies with more than 500 employees; among them, the medical and car industry were the ones that participated the most in the study.

The questionnaire applied had to be answered in a Likert-based scale, based on the experience of those polled, as explained in Chap. 7, which reports the central tendencies and dispersion measures, and presents a description of the JIT elements. It is worth mentioning that the analysis is univariable, and no relations or associations of the variables are made.

In the same way that the elements have been defined, the benefits of JIT in the environment are analyzed in Chap. 8, and the measures of central tendency and deviation are also reported. It can be stated that a better use of resources is one of the most reported benefits, as well as the increase of efficacy of the production process. Chapter 9 is similar to the two previous chapters except that it describes the causes of the low implementation of JIT.

The causal analyses appear from Chap. 10 onwards. They are proposed models, where, by means of the use of structural equations, a series of relations between latent variables is solved with algorithms of partial minimum squares.

Last but not least, just as a brief summary, I sincerely consider that this book will be of great use, not only to those who wish to know how to successfully implement JIT in industry, but also, due to its high empiric content, it can be used as an example in academia and research.

Emilio Jiménez Macías
University of La Rioja, Spain

Preface

Mexico is a developing country and member of the North American Free Trade Agreement (NAFTA) together with United States of America (USA) and Canada. This commercial agreement has favored the establishment of a large number of companies from other countries in the northern border of the Mexican land due to tariff preferences. These companies are usually known as maquiladoras, since they import all raw materials and export the finished product.

The arrival of this type of manufacturing companies has led to the implementation of lean manufacturing techniques, especially just in time (JIT), in order to increase efficiency in their production processes and minimize waste. JIT emerged in Japan, a country with social and cultural characteristics different from those present in Mexico. However, the significance of this technique lies precisely on its impact over the processes of import of raw materials, production, and export of finished products.

Based on cases reported by Kumar (2010); Panchal et al. (2012, 2013) in India, this book researched the elements needed for the implementation of just in time, its benefits, and those factors that cause its slow implementation, and addressed this information for the Mexican environment. To achieve this, a questionnaire was designed and applied to 144 companies located in the northern region of the country. Then, a univariate descriptive analysis was performed in order to propose models to relate these three categories researched.

On the one hand, some models proposed associate every JIT element with the benefit it can bring. These models could allow managers and other personnel responsible for the decision making in companies to identify and focus on critical factors that could guarantee benefits pursued. On the other hand, other models relate the same JIT elements with the causes of its slow implementation in order to identify those factors that prevent a successful operation of the approach.

However, this book is not only targeted at supervisors and managers, it is also dedicated to graduate and undergraduate students in the fields of engineering and business management, since it is hoped that its empirical content will be useful to them.

The book includes thirteen chapters divided into five parts. The first part addresses general information of JIT that describes its timeline, discusses its origins, and details its implementation in Western companies. The second part describes the JIT elements identified, its benefits, and the causes of its slow implementation. This part refers to an extensive literature reviewed, which readers are welcome to consult.

On the other hand, the third part of the book defines the methodology used to generate and propose the casual models previously mentioned. It discusses the design of the questionnaire as well as the processes to debug and analyze data. It is worth mentioning that data analysis is based on factor analysis and structural equation modeling techniques (SEM).

In addition, the fourth part includes the descriptive analyses of the sample, which discusses the manufacturing sectors surveyed and the position of respondents of the survey as well as their seniority. Finally, the fifth part describes the models generated from data gathered where JIT elements of companies surveyed are associated with the benefits that these organizations have obtained.

We sincerely hope this work is useful to readers.

Jorge Luis García-Alcaraz
Aidé Aracely Maldonado-Macías

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