RESEARCH ARTICLE

ORGANIZATION AND MANAGEMENT OF COMPANIES
Organization of production

# OPERATIONS STRATEGY FOR COMPETITIVE ADVANTAGE. FRAMEWORK AND CASE STUDY

Pablo Soriano López

Gerente de Consultoría en IMP Consultores. MBA. PMP. Ingeniero Industrial. Escuela Superior de Ingenieros de Sevilla. Universidad de Sevilla.

Received: 4/Apr/2017—Reviewing: 21/Apr/2017--Accepted: 6/Nov/2017-DOI: http://dx.doi.org/10.6036/MN8399

TO CITE THIS ARTICLE:
SORIANO-LOPEZ, Pablo. OPERATIONS STRATEGY FOR COMPETITIVE ADVANTAGE. FRAMEWORK AND CASE STUDY . DYNA Management, Enero-Diciembre 2017, vol. 5, no. 1, p.[10 p.]

**ABSTRACT:**

***Companies face nowadays to a high level of competitiveness, which means that they need to improve their performance continuously. This article presents a framework that companies can apply to improve their competitiveness, mainly Small and Medium Enterprises (SME's). The framework is based in different methodologies used in operations management and for the construction of the framework, a review of the state of the art has been done.***

***The framework is a structured approach that let the companies to improve their competitiveness according to their priorities. Thus, the first step of the methodology is the identification of the strategic priorities of the company. Later, an internal assessment of the operations of the company is done, in order to compare the current situation of the company with a theoretical optimal situation. This will be done by answering a questionnaire that analyzes different aspects of the company and will let to identify improvements opportunities or gaps that are concreted in actions. This actions form the operations strategy of the company.***

***Finally a case study for the implementation of the framework is presented. The case correspond to a Spanish company of the aeronautical sector, manufacturer of metallic components. Results after the implementation show an important productivity improvement together with a reduction of the delivery time to customer.***

**Keywords:** ***Lean manufacturing, competitive advantage, operations strategy***

**RESUMEN:**

Las empresas se enfrentan hoy en día a un elevado nivel de competitividad, lo cual exige que tengan que mejorar de manera continua. Este artículo presenta un modelo de negocio que las empresas pueden aplicar para mejorar su competitividad, especialmente las pequeñas y medianas empresas (PYMES). El modelo de negocio se apoya en diferentes metodologías de gestión de operaciones, para lo que se ha realizado una revisión del estado del arte.

El modelo propuesto es un enfoque estructurado que permite a las empresas mejorar su competitividad a partir de sus prioridades estratégicas. Así, tras identificar éstas, se lleva a cabo un diagnóstico interno, cuyo objetivo es comparar la situación presente de la compañía respecto a una hipotética situación teórica óptima. Esto se lleva a cabo a partir de la realización de un cuestionario que analiza diferentes aspectos de la compañía y que permitirá identificar oportunidades de mejora que se concretarán en acciones. El conjunto de acciones constituirá la estrategia de operaciones de la empresa.

Finalmente se muestra la implantación del modelo en una empresa. Corresponde a une empresa española del sector aeronáutico, fabricante de componentes metálicos. Los resultados muestran una importante mejora de la productividad, junto con una reducción en el plazo de entrega.

**Palabras clave**: Lean manufacturing, estrategia de operaciones, diseño de un modelo de negocio para ventaja competitiva. Modelos de aplicación para la mejora continua.

## 1.- INTRODUCTION

In the changing, complex and globally competitive environment that companies are currently facing to, it is necessary to have operations systems that allow companies to adapt to these circumstances, and to find out solutions for the competitiveness problems they are exposed to.

Operations management let the companies to obtain competitiveness advantages through the improvement of strategy processes (7), (15). Many authors, then talk about operations strategy, which we could define as' the set of decisions that configure the capabilities of the company's operations in the medium and long term; and its contribution to the strategy of the company; thus reaching the desired market requirements and properly using the resources of the



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com

company (29). Operations management include many specific methodologies, as lean manufacturing, supply chain management, 6 sigma, Theory of constrains, processes re-engineering, …, among others. Although the principles of the methodologies described are clearly defined, transferring them to concrete improvement actions for the company is not immediate, and sometimes it is especially difficult, which can generate high failure rates, especially in small and medium-sized companies, or well that the results are not as expected.

For this reason, the implementation of certain frameworks can help practitioners within the companies to deploy the methodologies with a higher success rate (8), (31), (19). In this sense, the objectives established are:

- Make a state of the art about methodologies for competitivity improvement in operations management.
- Identify the good practices related to competitivity improvement based in frameworks design and implementation.
- Validate the proposed methodology, by implementing it in a real case under certain circumstance (22). This is normally known as *case research.*

## 2.- METHOD

### 2.1.-STATE OF THE ART

Taking into account the concept of operations strategy, some authors have relied on reengineering or process innovation (10), (18) to develop models that allow the company to improve its competitiveness, such as the one proposed by (2) . Other authors have relied on benchmarking as a methodology for improving competitiveness (3); and have compared and / or proposed models for the improvement of processes and the consequent improvement of results (36).

They are also many authors who have taken the Lean Manufacturing or JIT philosophy as methodologies to improve companies results, such as (1), (8), (20), (23), (31), (36); among others. Other authors have analyzed the 6-sigma methodology as a proposal to improve competitiveness, or others that include the consideration of lean and 6 sigma principles: lean-sigma. Contribution of lean-sigma with respect to existing methodologies has been studied (24), stating that the contribution of 6 sigma to lean is equivalent to the one that at the time involved the TQM (Total Quality Management) to JIT (Just in Time).

On the other hand, other authors have based on the Supply Chain Management, with an approach that allows integrating the management of suppliers and customers as key elements in the operations management itself (12), (16) Others have proposed improvement models based on the concepts and methodology of TOC (Theory of Constrains) (17), (28).
The business model proposed in this article is based mainly on Lean, including TOC and Supply Chain Management considerations. In addition, the model follows the spirit of the PDCA continuous improvement cycle (Plan-Do-Check-Act) (9), (34).

### 2.2.-MODEL DESCRIPTION.

The model has been divided in following phases:

- **Phase I. External and internal analysis.**

The external analysis will consist of the identification of the competitive variables that are considered key for the company to compete in the market (6). Example of these factors can be: variety in product range, personalization, delivery time, low prices strategy, etc. The variables will be selected by a multidisciplinary work team of the company.

The internal analysis will consist in determining the state of the company's operations. For this, it is proposed to make a diagnosis to compare the current situation of the company with a certain situation that could be considered ideal, thus identifying gaps and opportunities for improvement (32). Some authors that have carried out operations assessments based on lean methodology are (20), (31).

Proposed model makes an assessment by evaluation of following perspectives or aspects:



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com

A. Customers integration.
B. Suppliers integration.
C. Production planning and control.
D. Equipment management & flexibility.
E. Products and processes design.
F. Quality.
G. People involvement.

For the evaluation of each of the aspects, a series of questions have been determined, which are scored according to the degree of compliance in the company and can vary from level 0 (aspect not implemented or considered) to 5 (aspect implemented and generalized in the company).

- **Phase II: Operations strategy.**

Once the assessment has been done, actions for improvement must be concreted. This set of actions forms what we call the company's operations strategy. Criteria to be considered for this strategy definition are:

  - The gap between the current situation and the standard, for each aspect.
  - Other aspects to consider for the selection of the actions, considering:
    - Strategy priorities established by the management.
    - Quick wins or improvements to achieve in the short term.
    - No more than 2/3 actions to develop at the same time.
    - Actions that have been agreed among the members of the participating team.
    - Actions compatible between them.

- **Phase III. Actions implementation and results evaluation.**

Once the set of actions has been established and agreed upon, they must be deployed. In order to carry them out successfully, it is necessary:

  - Identify actions accountable. The aim of this person will be:
    - Actions follow up.
    - Coordination with responsible for each action.
    - Update actions resume document, with responsible and deadline for the actions
  - Identify a deadline for each action. If possible, it would be positive the identification of quick wins (5).
  - Changes sometimes need a minimum of 6 months, till 2 years, considered for many authors as the average for lean implementation (27).
  - Communicate the objective, actions and expected results.
  - Make the actions follow up, according to actions Schedule (5).

Finally, it is necessary to establish indicators to measure the actual performance achieved. In order to determine the indicators, it will be necessary (8):

  - Align indicators with company strategy.
  - Indicators need to represent measure performance level achieved.
  - Indicators need to be agreed between involved people in the company.

## 2.3.-CASE STUDY.

In this point, an implementation of the methodology in an industrial company is shown. Competitiveness of the company wasn't as requested by the, particularly in terms of delivery times and productivity. After revision of the model by the managers, it is decided to carry out framework deployment. An explanation of the implementation is done:

- Current situation.



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com

- Company of industrial sector, manufacturer of components for aerospace companies.
- Number of employees: 120 in the moment of the analysis.
- Main problems identified. After a meeting with managers of the company, main problems identified are:
  - Delays in most of the deliveries.
  - Poor productivity levels and decrease of profit and margins for some of the products.
- Manufacturing process. Production area of the company is organized by work centres (WC), as shown in Figure 1. Each work centre has resources, persons and machines. Number of machines of the work centre might be different. Thus, WC5 has 4 machines, while WC 6 has just one. Products are transformed along different WCs.

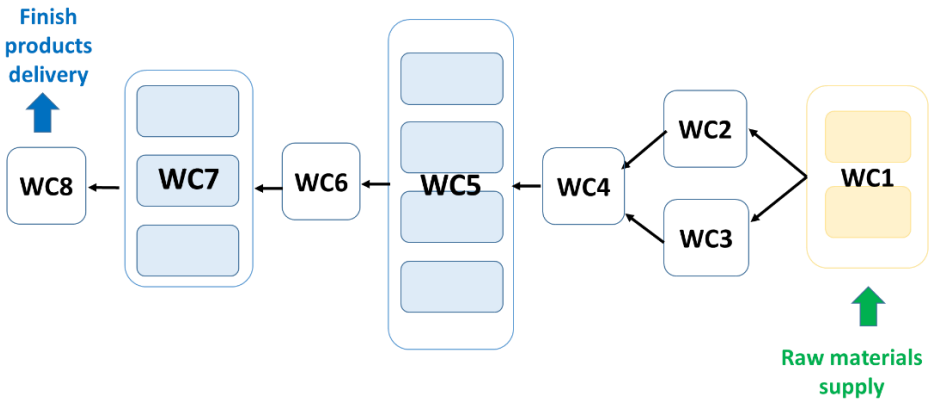



*Figure 1. Schema of production area*

- Phase I implementation. Internal and external analysis.

Meetings with management of the company are hold. The aim is to identify competitive factors, according to following criteria:

- Key factors in the sector of the company.
- Which factors are the most value for current and potential clients.
- Current strong and weak points within the company.

Main competitive factors identified are following ones. These factors are to be pursued by the company in the short and medium term:

- Lower delivery time than average in the sector.
- Flexibility to adapt to customers demand, especially considering products change.
- Cost reducing, specially to gain in competitiveness.

- Phase II implementation. Operations strategy and actions definition.

Once key variables have been identified, an internal operations assessment must be done. This will let us to specify a strategy, with actions to deploy. Figure 2 shows the result after operations assessment:



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com

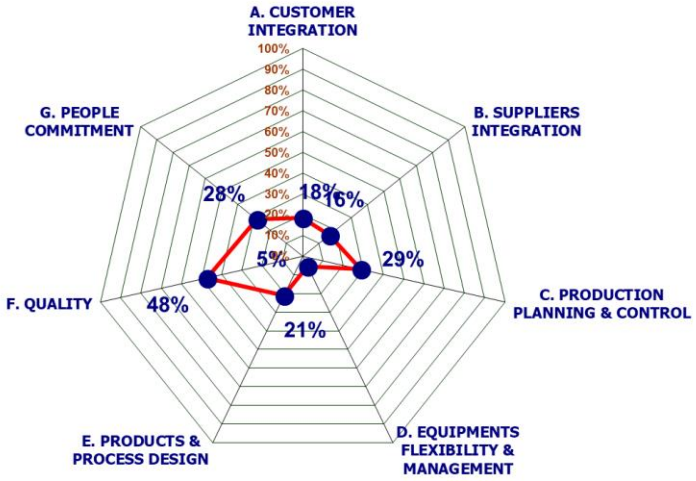



*Figure 2. Operations assessment result*

Evaluation for each perspective is shown (customer integration, suppliers integration, production planning & control, equipment flexibility & management, products & process design, quality and people commitment). For each of the perspective, other specific aspects have been evaluated from 0 to 5 depending on the degree of implementation (0-nothing implemented; 5-totally implemented). In total, 132 aspects have been evaluated. A brief explanation for just some of the most important is done below:

- Perspective C. Production and control planning. Some aspects evaluated within this one:
  - Resources work load evaluation. These are shown in Table 1. In the table it is shown the capacity of the work centre (in hours), the work load in hors and the work load in percentage (calculated by dividing the work load in hours by the capacity).

| Work Center | Capacity (hrs) | Work load (hrs) | Work load (%) |
|---|---|---|---|
| **CT1** | **923** | **1522** | **164%** |
| **CT2** | 1260 | 880 | 69,8% |
| **CT3** | **654** | **671** | **103%** |
| **CT4** | **599** | **647** | **108%** |
| **CT5** | **589** | **1866** | **317%** |
| **CT6** | 723 | 195 | 27% |
| **CT7** | **943** | **1250** | **133%** |
| **CT8** | 718 | 149 | 21% |

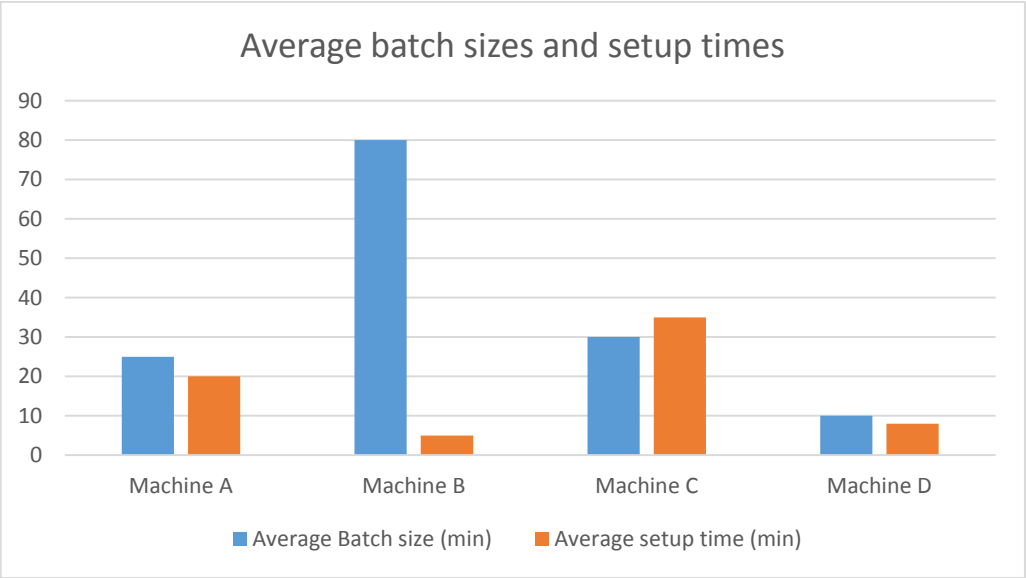
*Table 1. Work load per WC.*

Resources with Work Load higher than 100% are supposed to be bottlenecks and they will have to be considered for the planning process.

- Perspective D. Equipment flexibility and management. Relation between average batch sizes and setup times has been analysed (Graphic 1). This analysis was done by the machines of the WC5 (the work centre with the highest work load). A higher need of flexibility is needed (because of the relation between batch size and setup times), specially for machines A, C and D.



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com




*Graphic 1. Average batch sizes and setup times*

- Phase III implementation: Actions deployment and performance measurement.

According to strategic priorities (already mentioned) and considering the operations assessment, meetings to define actions were hold. Final selected actions were:

- Increase capacity of the resources 'bottlenecks'. Specific actions to increase capacity consisted don elimination of wastes in those resources, eliminate reworks because of quality problems or avoid waits because of lack of materials.
- Decrease setup times by deployment of SMED methodology (*Single Minute Exchange of Die*).
- Adequate batch sizes to setup times. Batch sizes were finally stablished between 6 and 10 times the setup time. As the times of change were improving, work lots were adapted.

Actions deployment had a duration between 6 and 9 months. Indicator selected for performance measurement were:

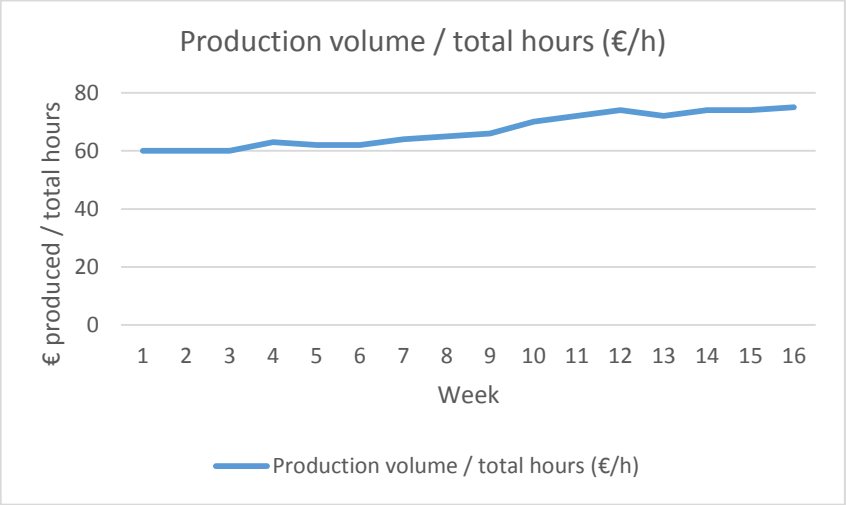
- % of customer orders in delay.
- % Productivity improvement achieved (measured in production volume achieved / use of resources).

## 3.- RESULTADOS

Results have been very positive. Percentage of orders in delay was drastically decreased and productivity ratio was increased as shown in graphic 2, where evolution of production volume per total hour is shown



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com




*Graphic 2. Productivity evolution*

As a resume, following results have been achieved:

- Productivity improvement, as shown above.
- Decrease of average delivery times, because of the decrease of the percentage of orders delayed.
- Manufacturing cost reduction, because of the productivity improvement.

## 4.- CONCLUSIONS

Proposed framework has a scientific interest. Main contributions are:

- This paper proposes a framework for competitiveness improvement in manufacturing companies of different sectors. In many cases, authors propose frameworks for specific sector applicable for just one area or machine (25), (11), (23).
- The framework includes consideration of strategic priorities of the company, by selecting the appropriate variables to compete in the market. This aspect, despite considered a key aspect for improvement frameworks has not been included by many authors as shown in the state of the art (21), (33).
- Other contribution corresponds to the operations assessment. None of the authors analysed considers this global assessment, which includes not only internal aspects of lean manufacturing but other important related to supply chain, as customer and suppliers integration (20), (31), (24).
- Framework has been implemented in an industrial company, obtaining improvements in terms of productivity and reduction of delayed orders.

In addition, possible continuation lines for the future are indicated:

- Adapt the framework according to the sector of the company.
- Incorporate other additional aspects operations management to the framework, such as project management. This can be very useful for companies that work under projects environment.

## 5.- BIBLIOGRAFÍA

(1) Abdulmalek, F.A., Rajgopal, J., Needy, K.L. (2006) A classification scheme for the process industry to guide the implementation of lean. EMJ -Engineering Management Journal,18, 2,15,25,1.

(2) Adesola, S., Baines, T. (2005) Developing and evaluating a methodology for business process improvement. Business Process Management Journal, Vol. 11 No.1, pp.37-46.

(3) Ahmed, P.K., Rafiq, M. (1998) Integrated benchmarking: a holistic examination of elect techniques for benchmarking. Benchmarking for Quality & Technology, Vol. 5 No.3, pp.225-42.



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com

(4) Behrouzi, Kuan Wong. (2011) Lean performance evaluation of manufacturing systems (a dynamic and innovative approach) Procedia Computer Science 3 (2011) 388–395

(5) Bateman, N., David, A. (2002) Process improvement programmes: A model for assessing sustainability. International Journal of Operations and Production Management 22 (5), 515-526.

(6) Boyer, K.K., Lewis, M.W., (2002) Competitive priorities: investigating the need for trade-offs in operations strategy. Production and Operations Management 11 (1), 9–20.

(7) Chase, Richard. Jacobs, Robert. Aquilano, Nicholas (2006) Operations Management for competitive advantage. 11th edition. McGraw-Hill International Edition.

(8) Colin Herron, Paul M. Braiden (2006) A methodology for developing sustainable quantifiable productivity improvement in manufacturing companies. International journal of production economics 104, 143-153

(9) Cuatrecasas, Ll. (2010) Lean Management: La Gestión Competitiva por Excelencia, Barcelona: Profit.

(10) Davenport, T.H. (1993), Process Innovation: Reengineering Work through Information Technology, Harvard Business School Press, Boston, MA.

(11) Doolen, Maria E. Hacker. (2005) A Review of Lean Assessment in Organizations: An Exploratory Study of Lean Practices by Electronics Manufacturers. Journal of manufacturing system. Vol 24. Nº 1.

(12) Flynn (2010) The impact of supply chain integration on performance: A contingency and configuration approach. Journal of Operations Management, 28, 58-71

(13) Flynn, B.B., Schroeder, R.G., Sakakibara, S. (1994) A framework for quality management research and an associated measurement instrument. Journal of Operations Management 11 (4), 339–366.

(14) Goldratt, E.M. and Cox, J. (1984) The Goal: An Ongoing Improvement Process, Gower, Aldershot.

(15) Greasley, Andrew. (2005) Operations Management. John Wiley & Sons, Ltd.

(16) Gunasekaran (2005) Build-to-order supply chain management: a literature review and framework for development. Journal of Operations Management, 23, 423-451 .

(17) Gupta, M.C., Boyd, L.H. (2008) Theory of constraints: A theory for operations management. International Journal of Operations and Production Management, 28, 10,991-1012.

(18) Hammer, M. (1990) Reengineering work: don't automate, obliterate. Harvard Business Review, Vol. 68 No.4, pp.104-12.

(19) Jaca García, M.C. Santos García, J. (2009). La mejora continua en las organizaciones. Análisis de su implantación en 30 empresas. DYNA, Vol. 84 nº2. 133-140.

(20) Li,S., Subba Rao,S., Ragu-Nathan,T.S., Ragu-Nathan, B. (2005) Development and validation of a measurement instrument for studying supply chain management practices. Journal of Operations Management 23 (6), 618–641.

(21) Martínez-Román, JA., Tamayo, JA., Gamero, J., Romero, J., Martín, R. (2014) Análisis exploratorio de la competitividad de las pymes del sector metal-mecánico en Andalucía. DYNA-Management.

(22) McCutcheon, D., Meredith, J., (1993) Conducting case research in operations management. Journal of Operations Management". Vol 11 (3), 239–256.

(23) Moacir Godinho, Filho & Clarissa F. Barco (2015) A framework for choosing among different lean-based improvement programs. Int J Adv Manuf Technol (2015) 81:183–197

(24) Naslund, Dag (2008) Lean, six sigma and lean sigma, fads or real process improvement methods. Business process management Journal. Emerald. Vol 14. Nº 3, 2008. Pp 269-287.

(25) Oliver Díez, Larrode Pellicer, Muerza Marín (2017). Desarrollo de estrategias de producción de competitivas en las empresas del sector de equipos y componentes de automoción. Dyna-Management. Vol 5.

(26) Pavnascar, S.J., Gershenson, J.K., Jambekar, A.b. (2003) Classification scheme for lean manufacturing tools. International Journal of Production Research 41 (13), 3075-3090.

(27) Prasad, B. (1995) JIT quality matrices for strategic planning and implementation. International Journal of Operations and Production Management 15 (9), 116-142.



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com

(28) Rahman (1998) Theory of constraints A review of the philosophy and its applications. International Journal of Operations & Production Management, Vol. 18 No. 4, 1998, pp. 336-355, © MCB University Press, 0144-3577

(29) Rytter, N.G., Boer, H., Koch, C. (2007) Conceptualizing operations strategy processes. International Journal of Operations and Production Management 27,10, 1093-1114.

(30) Shah, R., Ward, P.T., (2003) Lean manufactufing: Context, practice bundles, and performance. Journal of Operations Management 21, 129-149.

(31) Shah, R., Ward, P.T. (2007) Defining and developing measures of lean production. Journal of Operations management 25, 785-807

(32) Slack, N. and Lewis, M. (2002), Operations Strategy, Prentice-Hall, Edinburgh.

(33) Slack, N., Lewis, M. and Bates, H. (2004) The two worlds of operations management research and practice: Can they meet, should they meet?. International Journal of Operations and Production Management, Vol. 24, No. 4, pp.372–387.

(34) Womack, J., Gemba Walks, Cambridge MA (2011). Lean Enterprise Institute.

(35) Yang, Paul Hong, Sachin B. Modi. (2011). Impact of lean manufacturing and environmental management on business performance: An empirical study of manufacturing firms.

(36) Zairi, M., Ahmed, P.K. (1999) Benchmarking maturity as we approach the millennium. Total Quality Management, Vol. 10 No.4/5, pp.S810-6.



Publicaciones DYNA SL -- c) Mazarredo nº69 -4º -- 48009-BILBAO (SPAIN)
Tel +34 944 237 566 – www.dyna-management.com - email: info@dyna-management.com