International Journal of Business, Human and Social Sciences
ISSN: 2517-9411
Vol:5, No:11, 2011

Towards an Integrated Proposal for Performance Measurement Indicators (Financial and Operational) in Advanced Production Practices

José A. D. Machuca, Bernabé Escobar-Pérez, Pedro Garrido Vega, Darkys E. Lujan García

***Abstract*—**Starting with an analysis of the financial and operational indicators that can be found in the specialised literature, this study aims to contribute to improvements in the performance measurement systems used when the unit of analysis is the manufacturing plant. For this a search was done in the highest impact Journals of Production and Operations Management and Management Accounting , with the aim of determining the financial and operational indicators used to evaluate performance when Advanced Production Practices have been implemented, more specifically when the practices implemented are Total Quality Management, JIT/Lean Manufacturing and Total Productive Maintenance. This has enabled us to obtain a classification of the two types of indicators based on how much each is used. For the financial indicators we have also prepared a proposal that can be adapted to manufacturing plants' accounting features. In the near future we will propose a model that links practices implementation with financial and operational indicators and these two last with each other. We aim to will test this model empirically with the data obtained in the High Performance Manufacturing Project.

***Keywords*—**Advanced Production Practices, Financial Indicators, Non-Financial Indicators

I. Introduction

FROM the nineteen-eighties on, economic globalisation has led to thousands of companies having to change their manufacturing processes in order to increase their competitiveness through reductions in waiting times and costs and increased manufacturing flexibility [1]**.** This has resulted in firms explicitly including production management in their business strategy. This had not been the case previously, meaning that many American and European companies lost part of their market share and saw a fall in their productivity [2]-[3]. From that moment on, the need to link operations and strategic decisions became an obligatory challenge in the production area that had to be addressed by the management. This was known as the "revolution in world manufacturing" [4] which led to the development of Advanced Production Practices (APPs) and was hailed as the path to high performance in industrial plants [3].

Generally-speaking, APPs are implemented in manufacturing plants which then very frequently become the unit of analysis for studies in the industrial field as they are the units in which firms' production systems are organised and are the units ultimately responsible for producing the products. It is therefore not surprising that in this context the indicators used to measure a plant's performance have basically been of an operational nature [5]. For the very same reason, in most cases we find that financial indicators are not used to measure performance or, when they are, they are only used. There is therefore a gap between operations measurement, where non-financial indicators usually dominate, and performance measurement of the firm itself, as a whole, where the use of financial indicators predominates.

This is due to the fact that many financial indicators cease to be meaningful in the plant context as they focus more on the company as a single entity [6]. Nevertheless, we believe that financial indicators could be used in the plant context on many occasions, either as they are used in the company, or appropriately adapted where necessary. This would doubtlessly improve APP application evaluation by complementing the non-financial performance measurement aspect.

However, it should not be forgotten that financial performance is not only affected by operations management, but also by the other areas that make up the company (e.g., Finances, Marketing, Human Resources, etc.). Nonetheless, it would seem obvious that any improvement in the way the manufacturing plant works, and therefore also in operations, would then lead to improvements in financial performance. We would go so far as to say that, in keeping with other authors [7] [8], we believe that the very fact that non-financial indicators are used to measure performance (e.g., lead-time, on-time delivery, time cycle, etc.) should result in improvements in the company's financial performance. This is due to knowledge of these indicators would allow the operations system to be both controlled and corrected and improved and, therefore, likewise the company.

J.A.D. Machuca is Professor GIDEAO Research Group Departamento de Economía Financiera y Dirección de Operaciones Facultad de Ciencias Económicas y Empresariales Avda. Ramón y Cajal 1 41018 – Sevilla (Spain) University of Seville, Phones: +34954557627 +34954557610; Fax: +34954557570; jmachuca@cica.es

Bernabé Escobar-Pérez is Professor Chair SICpG Research Group Departamento de Contabilidad y Economía Financiera Facultad de Ciencias Económicas y Empresariales Avda. Ramón y Cajal 1 41018 – Sevilla (Spain) University of Seville, Phone: + 34954557608; bescobar@us.es

Pedro Garrido Vega is Associate Professor GIDEAO Research Group Departamento de Economía Financiera y Dirección de Operaciones Facultad de Ciencias Económicas y Empresariales; Avda. Ramón y Cajal 141018 – Sevilla (Spain); University of Seville; Phone: +34954556968 Fax: +34954557570; pgarrido@us.es

Darkys E. Luján García Scholarship is Holder Facultad de Ciencias Económicas y Empresariales; Departamento de Economía Financiera y Dirección de Operaciones; Avda. Ramón y Cajal 1; 41018 – Sevilla (Spain); University of Seville; Phone: + 34-954 557 205; dlujan@us.es

Given all the above, we have embarked on a line of research in the framework of the international High *Performance Manufacturing -HPM-* project in which this study is framed (and on which we comment below) with two fundamental objectives:

1) To propose both financial and operational indicators for APPs application and for the measurement of performance in industrial plants drawn from the wide range and large number that appear in the literature. In this paper we shall present the proposal for financial indicators that we have arrived at thus far. At the moment we can only present an initial classification of operational indicators: APPs application indicators and non-financial indicators and anticipate finalising the proposal for the dates that the Conference will be held.

2) To propose a model using both operational and financial indicators that enables any relationships that might exist between the use of APPs and plant performance to be established. This model will also consider the possible affect of the use of operational indicators on the value of the financial indicators. Once this model has been devised it will be tested empirically against data taken from the International HPM Project to which we referred previously.

Due to not have empirical data, we focus on the first of the objectives.

The following section provides comments on the methodology used to conduct the study and a brief description of the HPM Project. The findings to date are then presented, to be precise, the proposal based on APP application indicators and non-financial and financial indicators. Finally, it outlines the proposed model is to test empirically in a future extension of this work.

II. Methodology

To achieve our first objective a search strategy was established for selecting the scientific works for analysis using ABI/INFORM as the main database complemented by Scopus.

To be precise, the following key words were taken into account to select the articles for analysis: "Non-Financial Measures ", "Non-Financial Performance Measures ", "Non-Financial Performance Indicators ", "Non-Financial Indicators ", "Financial Measures", "Financial Performance Measures", "Financial Performance Indicators", "Financial Indicators " in combination with the APPs: Just in Time; Total Quality Management, Total Productive Maintenance and Lean Manufacturing. The reasons for selecting these three practices are commented below.

The articles chosen from the 135 that were retrieved were, basically, those published in high impact journals in the following areas: Management Accounting and Productions and Operations Management according to [10]-[11], respectively.

We also included in our analysis some articles and doctoral theses that had been referenced by the majority of the articles published in the above-mentioned journals which refer to at least one of the chosen APPs (for further detail on the methodology, see [2]. In total we selected and examined 89 articles that refer to at least one of the chosen APPs.

It was from these studies that APP application and non-financial and financial indicators were taken that would be the basis for our proposal.

These will be commented briefly in this study as we shall focus more on identifying and preparing an initial classification of the APPs application indicators and the non-financial indicators that we had not touched on to date, given that selection and proposal for financial indicators was stated in [9].

The second objective of this research is aimed at devising a model which will represent any relationships established between the APPs and the financial and non-financial indicators, as well as between these two last. We intend to test this model empirically in a later phase, and this is thus beyond the scope of this current study. Nevertheless, we would like to repeat that for this the database of the International High Performance Manufacturing (HPM) Project will be used.

The purpose of this project is to determine the reasons why implementing the same range of APPs in a given sector leads to high performance in some plants while in others only standard performance is achieved. We use an extensive survey to analyse the factors that contribute to the success of high performance manufacturers and attempt to ascertain how these factors affect plant performance [12-]-[14]-[15]. The survey was conducted among a wide international range of manufacturing plants in the machinery, electronics and automotive components sectors. With three rounds having now been completed (carried out in 1991, 1997 and 2005 [12]-[15], we are currently in the 4th Round of the HPM project. Taking active part in this 4th Round are 15 research groups and 480 companies in 16 developed and emerging countries[1]. The following APPs are being studied in this round: *Just Time (JIT)/Lean Manufacturing (LM), Information Systems/Information Technology (IS/IT), Total Quality Management (TQM), Technology (T), Human Resources (HR), New Product Development (NPD), Supply Chain Management (SCM), Total Productive Maintenance (TPM) and Theory of Constraints (TOC), Environment/Sustainability (E/S), Business Services (BS)*.

Our study focuses on TQM, JIT/LM and TPM due to their recognised importance for high performance companies, and also because of similarities in their goal of creating a more efficient and effective production system through continuous improvement and the elimination of wastage to enable the production rate to be increased [15-[16]. Furthermore, since the simultaneous application of these APPs has a positive impact on several different company areas as the strong correlation between them contributes valuable results in various aspects at the plant level, such as: improved customer satisfaction, reduced production cycle, shorter delivery times and better supplier selection, to mention only some [5]-[[15]-[17].

[1] United States, Canada (Rounds 1, 2, 3 and 4); Germany, Japan, Italy (Rounds 2, 3 and 4); United Kingdom (Rounds 2 & 4); Austria, Korea, Spain, Finland, China and Sweden (Rounds 3 & 4); Brazil, Taiwan, Israel and Singapore (Round 4).

III. Results

The main findings regarding the identification, analysis and classification of indicators found in the chosen articles are presented in the following.

A. Operational Indicators: APPs Application Indicators

The indicators or performance measures that evaluate the degree to which APPs are applied are found in production environment control systems. These indicators are closely linked with the principles that govern the way that APPs work. It should be borne in mind that APPs represent wide concepts related to production activity and that there is no consensus on each APP's definition [15]. It should be remembered in this respect that each APP is characterised by a series of aspects, which some authors refer to as techniques (e.g., [15]-[17]), that have become standardised over the years. This is one of the reasons why the level or degree to which these aspects have been achieved is measured to evaluate the degree to which the various APPs have been implemented. For example, in the case of TQM implementation, the existing levels of management by processes, customer involvement, supplier quality management, etc. can be measured [15].

JIT, meanwhile, is evaluated by equipment layout, the Pull production system, etc. [15]. In the case of Lean Manufacturing, the application of cellular manufacturing and employee participation are mentioned [19]. Finally, for the degree to which the final APP, TPM, is implemented, the level of autonomous and planned maintenance can be observed, along with the emphasis put on technological activity [15].

In the analysis we found 133 indicators which were used to measure the degree of implementation of the APPs under analysis. It should be stated that it was not an easy task to choose these indicators. Firstly, because there is no consensus among researchers about which are the most appropriate for measuring the application of each of the APPs, and secondly operational difficulties were encountered when recording them (the authors analysed did not always give them the same names or define them in the same way).

In this section we shall carry out an initial classification of the measures that evaluate the degree to which the APPs have been applied. These APP application indicators are generally comprised of indicators that are statistically referred to as "latent variables" and are basically measured using the *Likert* scale.

Table I shows those that have been used at least in 5 of the publications examined. They have been organised into four groups. (1) Common to all the APPs, (2) those used for three APPs, (3) those used in two APPs, and (4) those only used in one APP.

Table I only provides a simple classification; without going in depth into the scales used for each indicator, which it is hoped will be addressed in future research. Apart from a proposal for each of the APPs, bearing in mind that although there are close links between them, each is pursuing its own objectives, it therefore becomes necessary to have a set of measures that control their 'real' application with greater precision.

TABLE I
INDICATORS USED IN THE LITERATURE TO EVALUATE APPS APPLICATIONS.

APP application indicators	TQM	JIT	TPM	LM	Total
GROUP 1					
Continuous improvement	19	5	2	3	29
Training/ Cross-functional training	9	12	2	6	29
Committed leadership	12	3	1	1	17
Customer involvement	9	2	1	3	15
Job security/ safety	3	2	1	6	12
Information and feedback	7	3	1	1	12
Vendor performance-product quality	2	5	1	3	11
Autonomous and planned maintenance	1	1	2	2	6
Quality of product conformance	3	3	1	1	8
Employed empowerment	5	1	1	2	9
Vendor performance On-time delivery	2	3	1	2	8
Reengineering production process	4	3	1	3	11
Management Process	7	2	1	1	11
Cross-functional product design	6	3	1	1	11
GROUP 2					
Customer satisfaction	18	5		8	31
Pull System/ Kanban		13	4	4	21
Employee Involvement	8	3	2		13
Focused-factory production Systems		8	1	1	10
Cellular manufacturing	3	2		4	9
Communications	7	1		1	9
Process strategic planning	6		1	1	8
Shop-floor involvement	1	3		2	6
Technology emphasis		4	1	1	6
Process type layout/ equipment layout		3	1	2	6
Responsiveness to customer	3	1		2	6
Overall maintenance		2	3	1	6
Agile manufacturing strategic		2	1	2	5
Product mix flexibility/ product variety		3	1	1	5
GROUP 3					
Employee satisfaction	9			3	12
Rewards and recognition	9	1			10
Product and service quality performance	7	1			8
Development of new products	7		1		8
Schedule adherence		6	1		7
Design characteristics		4	1		5
Productive Maintenance		2	3		5
Materials flow		3		2	5
GROUP 4					
Benchmarking.	8				8
Quality improvement –process and product		10			10
Labour flexibility		7			7
Statistical quality process	8				8
Customer focus	7				7
Training of quality	14				14
Quality improvement/ quality				6	6
Methods problems-solving	5				5
Awards	5				5
Quality levels	5				5
JIT purchasing/ improved purchasing function		5			5

This individual proposal for each of the practices will help the relationships between the APPs, the non-financial indicators and financial performance to be disaggregated and better understood. It will be possible to know in detail what elements are having a direct influence on the financial results of the plants and the company as a whole.

B. Operational Indicators: Non-financial Indicators

Non-financial performance indicators are very valuable in production as they enable factors to be measured at a level of detail which financial indicators cannot achieve [6]. They therefore complement financial indicators well as studying them enables a firm's economic results to be better understood. Their prospective nature also facilitates decision-making [8].

However, choosing the right performance indicators is also one of the biggest challenges that companies face as they play a key role in the development of plant strategy by enabling the achievement of the organisational objectives to be evaluated and managers' financial compensation to be set [6].

Non-financial indicators are those that are directly linked with evaluating correct or incorrect APP implementation and the results of their application, as well as the results of their application.

Non-financial indicators are referred to statistically as "observed variables", which are sometimes measured using the quantitative data stated in the different measurement units, such as hours/finished product, amount of waste, etc.

We found a total of 114 of these in our research. Some of the non-financial indicators found in the literature are given in Fig. 1 using the same criterion as was used for APP application indicators. They were classified into two groups: *(1)indicators common to all APPs, and (2) indicators for each separate APP.*

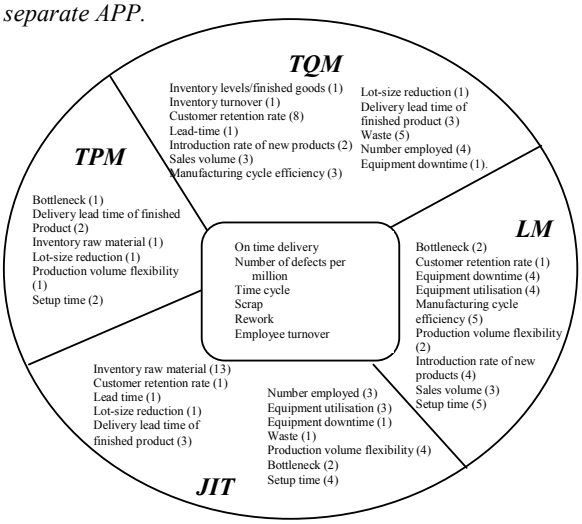

Fig. 1 Non-financial indicators used for APPs

An initial classification was made by APP. This classification is important because it helps to establish the closer relationships between the non-financial indicators and the financial indicators for each APP. In this case, due to time constraints no analysis of the scales used or of the mathematical expressions used to find coincidences between the indicators was attempted. It might occur that some non-financial indicators are expressed 'literally' in a different way and are measured using the same scale. The opposite is also true; different scales could be used for the same indicator.

C. Financial indicators

Meanwhile, 103 financial indicators were found to have been used to assess the previously selected APPs: TQM, TPM, JIT/LM.

Bearing in mind the wide dispersion found in the literature, we opted for proposing indicators to analyse the financial performance of APP implementation based on two main criteria. Firstly, that these should be indicators of a general nature, i.e., that have been used to assess at least two of the APPs considered. Secondly, they must be financial indicators that have been used in at least 10 of the articles analysed (which means over 10% of these). This would show that they enjoy an appreciable consensus with respect to the financial assessment of APPs implementation.

When these selection criteria were applied, the following indicators were obtained:

- ROA (Return on Assets) *(36%)*.
- Manufacturing Cost *(24%)*.
- Market Share *(19%)*.
- ROS (Returns on Sales) *(18%)*.
- Profit *(17%)*.
- ROE (Return on Equity) *(12%)*.
- Labour Productivity *(10%)*.
- Inventory Turnover *(10%)*.
- Total Assets *(10%.*

Given the economic-financial characteristics, the selected indicators are perfectly applicable in studies in which the unit of analysis is the company, whether single-plant or multi-plant.

However, an additional consideration has to be made in other empirical studies where the unit of analysis is the manufacturing plant (Fig. 2). The above-selected indicators could also be used in these plants in two specific cases: a) when the companies in question posses only one plant (single- or mono-plant companies); and b) when, even though the plant in question belongs to a multi-plant company, it is a Profit Centre in nature, as in both these cases the sales magnitude and, therefore, the result and the performances calculated on this basis, make complete sense.

However, when the plants are Cost Centres belonging to a multi-plant company, a different proposal will need to be made. This is due to the nature of its accounting where sales cannot be talked of, exactly, but of internally valued transfers. Consequently, the figure for the result and the performances that can be calculated are not strictly comparable with the other plant group. Therefore, of the proposed indicators, the only ones that would be directly applicable are Manufacturing Cost and Total Assets. The remaining indicators: ROA*, ROS*, Profit*, Labour Productivity*, and Inventory Turnover* require a different type of calculation (which is why their analysis has been marked with an *) as in this type of plant, dealing in one's own property, Net Sales do not exist

since the plant itself cannot set sales prices as they are imposed by the parent company (headquarters). We therefore propose that Sales Value of Production be used instead for the corresponding calculations. The calculation of ROE and Market Share does not make sense in this type of plant.

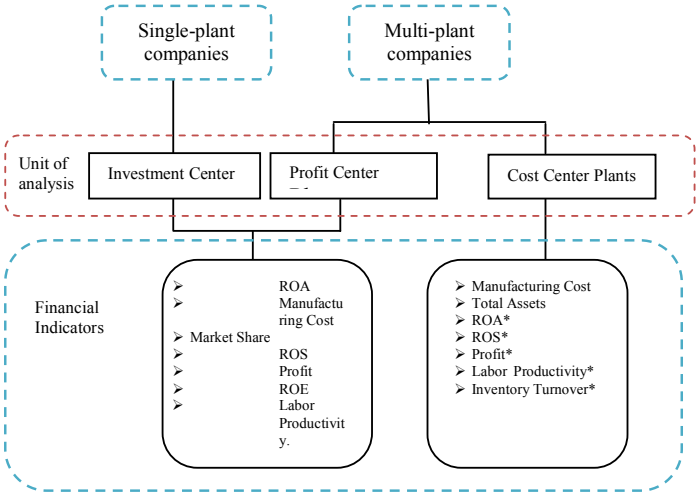

Fig. 2 Financial Performance Indicators for the different units of analysis [9]

IV. Final Considerations and Further Research

Manufacturing plants are often taken as the unit of analysis for studies in the industrial field. This is why operational indicators have mainly been used for performance measurement in this context [5]. For the same reason, the use of financial indicators to measure performance is either not found or only to a limited extent. However, in our opinion, it is possible for them to be more widely used, although in certain cases they might have to be adapted. There is, therefore, a gap between operational performance measurement, where non-financial indicators and APPs application indicators predominate, and company performance as a whole.

In order to remedy what we believe is a shortcoming that can be remedied; we have embarked on a line of research in the field within the framework of the International High Performance Manufacturing Project. The first objective of our research is to propose a model of both financial and non-financial indicators for measuring performance in industrial plants based on information in the specialised literature.

The findings of the study so far are presented in this paper and show that there are large numbers of publications that evaluate APPs implementation, as well as a large number and wide variety of performance indicators in general terms. The variety of constructs and scales found is even greater for APP application and non-financial indicators than for financial indicators, which makes the right choice of the former for each of the APPs analysed an even more complex affair. The added difficulty regarding financial indicators comes from their having to be adapted to the nature of the unit of analysis, the manufacturing plant. Despite this complex context we have been able to propose financial indicators for the measurement of manufacturing plant performance that takes into account the nature of the plant's accounting. We have also prepared an initial classification of APP application and non-financial indicators. Despite all these difficulties, we have also proposed a model of relationships which, when tested statistically, will show the impact of APP application on both non-financial and financial indicators at the manufacturing plant and also the overall company levels.

Even in this complex context we have been able to prepare a proposal for financial indicators to measure the performance of manufacturing plants which takes into account the nature of the accounting at the plants. We have also completed an initial classification of non-financial indicators.

In our opinion the study done, which considers APP application indicators and non-financial and financial indicators at the plant level, while taking into account the specific characteristics of the different units of analysis, is a significant advance for providing more precise information on APP implementation performance. This is especially important in the case of financial performance, which has to date not been sufficiently considered in empirical studies that have the production plant as their unit of analysis.

Due to a lack of time we have not been able to finish the proposal for non-financial indicators and have arrived at an initial classification without having been able to look at each in detail or study the scales themselves. Perfecting the analysis of the non-financial indicators and arriving at a consistent proposal in this respect is still a matter of ongoing research. In future research we shall likewise examine the effect of their combined use with the proposed financial indicators in greater depth for two reasons: on the one hand, because of the acknowledged importance of non-financial indicators for measuring the performance of plants that use APPs as a competitive weapon, and on the other hand, because the joint use of the two indicator types would enable us to obtain fuller and more precise information about APP implementation and to analyse any effect that the use of non-financial indicators might have on financial performance. Even though it is beyond the scope of this study, when it is presented at the Conference we expect to present at least a preliminary model that relates the APPs analysed with the various types of indicators, both non-financial and financial (adapted to the characteristics of the plants).

Acknowledgment

This study is part of the Spanish Ministry of Education and Science National Programme of Industrial Design (DPI 2009-11148) and the Junta de Andalucía (Spain) PAIDI (Andalusian Research, Development and Innovation Plan) Excellence Projects (P08-SEJ-03841).

References

[1] B. Maskell, "Performance Measurement for World Class Manufacturing - 3". *Management Accounting*, 1989, Vol.67, No.7, pp .48.
[2] B. Flynn, R.G. Schroederand, E.J. Flynn, "World class manufacturing: an investigation of Hayes and Wheelwright's foundation". *Journal of Operations Management*, 1999, Vol.17, No.3, pp. 249-269.

[3] R.H. Hayes, and G.P. Pisano, "Beyond world-class: The new manufacturing strategy". *Harvard Business Review*, 1994, Vol.72, No.1, pp.77- 85.
[4] L. Zurawski, "Changing times for e-business". Control Engineering, 2001, Vol.48.No.4, pp. 38-41.
[5] A. B. Abdel-Maksoud, D. Dugdale, and L. Robert, "Non-financial performance measurement in manufacturing companies". *The British Accounting Review,* 2005, Vol.37, No.3, pp. 261-297.
[6] C. D. Ittner and D. F. Larcker, "Innovations in performance measurement: Trends and research implications". Journal of Management Accounting Research, 1998, Vol.10, pp.205-238.
[7] M.A. Abernethy and A.M Lillis, "The impact of manufacturing flexibility on management control system design". Accounting, Organizations and Society, 1995, Vol.20, No.4, pp. 241-258.
[8] R.R. Fullerton, C.S. McWatters and C. Fawson. "An examination of the relationships between JIT and financial performance". *Journal of Operations Management*, 2003,Vol.21, No.4, pp. 383-404.
[9] B. Escobar, J.A.D. Machuca and D. E. Luján, *Financial performance indicators used in the analysis of TQM, TPM and JIT/LM advanced production practices: literature review and proposal*, Conference EurOMA 2011, Cambridge.
[10] K. Chan, G. Seow, and K. Tam, "Ranking accounting journals using dissertation citation analysis: A research note". *Accounting, Organizations and Society*, 2009, Vol.34, No.6, pp.875-885.
[11] P. Hsieh, and P. Chang, "An assessment of world-wide research productivity in production and operations management". *International Journal of Production Economics*, 2009, Vol.120. No.2, pp. 540-551.
[12] C.H. Ortega, J.A.D. Machuca, and P. Garrido, "Interrelación Estrategia de Operaciones-Tecnología y su Efecto Sobre el Rendimiento de la Producción: un Análisis Empírico Sectorial en el Proyecto HPM Internacional". Sevilla: *Universidad de Sevilla*, 2007.
[13] M. Hallgren, and J. Olhager, "Lean and agile manufacturing: external and internal drivers and performance outcomes". International Journal of Operations & Production Management, 2009, Vol.29, No.10, pp.976-999.
[14] R. Schroeder, and B. Flynn, "High performance manufacturing". John Wiley and Sons. New York, 2001, pp 3-12.
[15] K.O Cua, K. E. McKone-Sweet, and R. G Schroeder. "Improving Performance through an Integrated Manufacturing Program". *The Quality Management Journal*, 2006, Vo13, No.3, pp 45-60.
[16] M. Camacho-Miñano, J. Moyano-Fuentes and M. Sacristan Diaz, *Assessment of the results in the adoption of Lean Management: designing a model"*. EurOMA, 2009. Groningen-Netherlands.
[17] B.B. Flynn, S. Sakakibara, and R.G. Schroeder, "Relationship between JIT and TQM: Practices and performance". *Academy of Management Journal*, 1995.Vol.38, No.5, pp.1325-1360.
[18] R.S. Kaplan and D.P. Norton, "The balanced scorecard: measures that drive performance". Harvard Business Review, 1992, 71–79.
[19] R. R. Fullerton and W.F. Wempe "Lean manufacturing, non-financial performance measures and financial performance". *International Journal of Operations & Production Management*, 2009, Vol.29, No.3, pp.214-240.

Dr. José A. D. Machuca (Seville, Spain), Dr.Industrial Engineering, Master in Business Administration and in Industrial Engineering. Professor of Operations Management, University of Sevilla (Spain). Director of GIDEAO Research Group, Former Head of Department (1982-1992) and Former Vice Dean (1983-1989), Vicepresident EurAfrica of POMS (Productions and Operations Management Society) and member of the EurOMA Board (European Operations Management Association). *Coordinator* of the European Thematic Network for Excellence in Operations and Supply Chain Management Education, Research and Practice (Thenexom).Has been Director of 3 European Projects, 7 National Projects and 2 Excellence Projects (Andalusian Research Plan). ***Editorial Advisory Board*** of Journal of Operations Management and International Journal of Operations and Production Management. ***Regional Editor*** Operations Management Research; ***Editorial Review Board*** of Production and Operations Management and International Journal Manufacturing Technology Management. ***Author/coauthor*** of 8 books and editor/coeditor of 8 Journal Special Issues, more than 50 articles and 60 book chapters. Has published in journals such as: JOM, POM, IJOPM, IJPE, JPR, HBR, Transportation Research and SDR.

Awards: *2001 Wikham Skinner Award honouring Teaching innovation achievements* (POMS), Nomination for the *2001 European IST Prize*, *2002 MED-Academy of Management-AEDEM Award* in Management Education, Honourable Mention *2002 Instructional Innovation Award (DSI), 2003 POMS and Indiana CIBER Best Case International Award*, *2005 Business Week/ECCH European Best Case in Operations Management Award, Honourary Doctorate* by the Universidad Privada del Norte (Perú); 2009 *Andalucia Research Award-Ibn Al Jatib*, 2009 *University of Sevilla FAMA Research Award*; *Outstanding Professor,* University of Sevilla (2003-2004, 2004-2005).

Dr. Bernabé Escobar Pérez, (Sevilla, Spain) European Doctorate in Economic and Business Science, University of Sevilla, and University Professor in Financial Economics and Accounting. Lead researcher of the SEJ-409 Research Group. Accounting Information Systems for Management. Visiting researcher at several overseas universities (Politecnico di Milano, Università Commerciale Luigi Bocconi and Institut Theseus). Co-coordinator of the Business Management Doctoral Programme, Quality Certified by ANECA (National Agency for Quality Assessment and Accreditation). Member of research team for numerous research projects in the framework of the European Union and also within Spain (Management Accounting in Europe - Engaging Research and Practice, A European Research Arena on Intangibles -E*KNOW-NET, High Performance Manufacturing, etc.). Co-author of numerous books, book chapters, articles in Spanish and international journals. Thanks to this we have been recognised with two research periods by the Ministry of Education and Science. Research topics: Management Accounting, Accounting Information Systems, Organisational Change, Social Corporate Responsibility.

Pedro Garrido-Vega (Seville, Spain), Dr. in Business Administration and Management. Associate Professor of Operations Management at the University of Seville. Coauthor of two books and a dozen chapters in books on Operations Management. Has published a variety of articles in scientific journals and other publications, and has presented over twenty papers and presentations at the main conferences in the area of Operations Management both in Spain and internationally. Reviewer and assessor for a number of conferences and Spanish and international journals. Member of several Spanish and international scientific associations. Research member of the GIDEAO research group, considered to be the group of excellence in the Andalusian Research, Development and Innovation Plan. Has taken part as a researcher in a range of competitive projects with European, national and regional funding of which three projects related to high performance manufacturing and one on transparent box simulation and case studies for improving competitiveness in supply chains stand out. Has undertaken a number of internships at other Spanish and European universities.

Darkys E. Lujan García (Sevilla, Spain) Industrial Engineer, 2003, Universidad Central "Martha Abreu" de las Villas, Villa Clara (Cuba), Master's degree in Management, 2006, Universidad Central "Martha Abreu" de las Villas, Villa Clara (Cuba), Master's degree in Advanced Business Management Studies, University of Sevilla (Spain). PhD. Student at the Department of Financial Economics and Operations Management,, University of Sevilla (Spain). Member of GIDEAO Research Group. Took part in the 3rd International Conference on Mechanical, Electrical and Industrial Engineering,, 2006, Villa Clara, (Cuba), 6th International Conference on Management and Public Administration, Havana,, 2008, (Cuba), EurOMA 2011, Cambridge, (England). Member of the *European Operations Management Association (EurOMA).*