

Benchmarking on Behalf of Management Systems Integration

Domingues, J.P.^{1),2)*}, Sampaio, P.¹⁾ and Arezes, P.M.¹⁾

¹⁾ Systems and Production Department, School of Engineering, University of Minho, Braga, Portugal.

²⁾ Laboratório Químico Marques Ferreira, Complexo Delphi-Bosch, Ferreiros, Braga, Portugal
email: pedrodomin@sapo.pt; paulosampaio@dps.uminho.pt; parezes@dps.uminho.pt

Abstract

The integration of management systems, to be effective, requires several organisational features. An integrating concept enabling a common language, a proactive approach, a holistic vision, sustainable objectives and consistence and coherence on action are among those features. All these features will be properly and efficiently achieved considering concepts linked to benchmarking, namely, teammanship, self-management, democracy in management and collaborative benchmarking. This paper is based on an ongoing research project focusing the development of a tool/methodology to assess maturity and effectiveness levels achieved by organizations that implemented an integrated management system (IMS) being its purpose to report and to enhance the potential synergies between benchmarking methodologies and management systems integration. The research, and implicit results, aims organizations that are considering an IMS implementation being the findings transferable to *in field* environment, being useful to practitioners willing to implement an IMS.

Keywords: management; integration; organisation; benchmarking

INTRODUCTION

We (all) are living times of changing... Concepts old time established are being shaken and, either, voluntary or compulsory updated and revised. *'It is a competitive world; everything counts in large amounts'* [1]. Organizations mirroring these sociological and cultural events face themselves under strategic challenges. Several reported studies predicted and felt this industrialisation to post-industrialism organisational change previously, and [2] to [13] are some examples from those studies.

Following Quality Management System (QMS), organizations proceeded with the implementation of several sub-systems addressing different stakeholders and requirements. The main reported sub-systems "inhabiting" in an integrated approach are QMS, Environmental Management System (EMS) and Occupational Health and Safety Management System (OHSMS). This newly organisational environment arouses and promotes interactions never experienced by strategic management responsible [14], [15]. Traditional management indicators, if suitable, allow mainly a discrete assessment from the integrated management system (IMS) status. The precise description of effectiveness and maturity levels achieved by an IMS should rely on a continuum based interactions assessment due to the following reasons and facts:

- Dimensions increase on a generic system requires new variables to be assessed in

order to completely describe newly existing status from the system.

- Similar to the intrinsic differences among vector and scalar quantities in an integrated environment the complete system status description is not possible based on a unique variable or dimension, and should be supported on dimensions identification, variables definition and on interactions assessment between *inputs/outputs* originated or derived from each management sub-system. This issue had been addressed by Domingues, Sampaio and Arezes [16]. Additionally the authors proposed a potential path for interactions assessment.
- Currently, top management should address stakeholders' requirements as well shareholders requirements (Fig. 1). This new focus orientation, repositioning organization role on the society, asks for a top management *inside out* perspective.

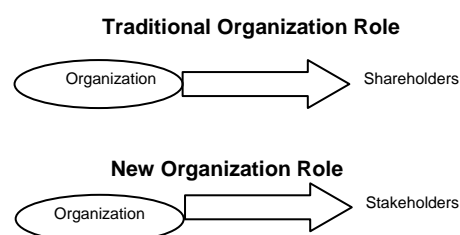


Fig. 1: Traditional *versus* New organization role on Society (Source: authors)

Benchmarking proved itself as a suitable tool for measuring competitiveness [17], methodology for quality function deployment [11], [18], key performance indicators definition and assessment [19], performance measurement during strategic change [20], innovation adoptions [21], critical factors for TQM definition [17], [22], efficiency usage of nodes in clusters determination [23] and in medium and small internal audit units [24]. Cutting edge management concepts have been focused also by the most prestigious journals on benchmarking and conceptually associated with it. Teammanship as a viable alternate methodology to leadership [25], self-managing teams supporting quality and/or technology management [26], democracy in management [2], sustainability and synergistic relationships [8], [27], six-sigma benchmarking [28], collaborative benchmarking [5], product development assessment [29] and knowledge management [30] are among those concepts.

SURFING THE BENCHMARKING WAVE

Benchmarking concept has been labelled and badge, for too long, as a “*minor*” scientific and operational principle. Currently, and more than ever, the search and urgency for better performances within industrial or organisational processes is a critical feature focusing success. A set of rather generic potential strategies within simultaneously co-existing management sub-systems was identified earlier [31]. Those strategies, diffusively present even at the IMS genesis, are: the *divide et impera*, the *concordia discors* approaches and the rather naïf *e pluribus unum* approach. A deeper interpretation and analysis of management systems integration should be involved on a philosophical “misty scent”. Holism has been defined as a conceptual theory stating that ‘...parts of a whole are in intimate interconnection, such that they cannot exist independently of the whole, or cannot be understood without reference to the whole, which is thus regarded as greater than the sum of its parts’ [32]. In opposition to reductionism or atomism, holism takes into account inherently, an often “forgotten” feature from a generic studied system: interactions. Even the purists from the exact sciences, with an intellectual genetic aversion to holism embrace it elegantly and with a “Mona Lisa smile”, when defining “black box” phenomena.

The surge of interest in the transfer of private sector management practices to the public in the past decades [5], including benchmarking, illustrates the wide context where these ancient methodologies may reborn and prosper.

Looking out for techniques enabling quality improvement and rating an organizational performance against the World’s Best Class are the ultimate objectives of benchmarking methodologies [17], [33]. Several authors subscribed the opinion expressed by Sink (1993) that the overall performance of an organization is defined by seven criteria [2]:

- Effectiveness.
- Efficiency.
- Quality.
- Productivity.
- Quality of work life.
- Innovations.
- Profitability.

This rather narrowed and introspective vision on organizations role is now being challenge. These defined criteria seem to be insufficient by themselves when considering concepts like sustainability, gender equity, social accountability, globalization and knowledge management.

BENCHMARKING AND IMS

As stated earlier, a major *wake up call* on organizations self-awareness has rang. At the present, several stakeholders’ requirements should be met by organizations: quality, environmental, occupational health and safety, social responsibility and gender equity are among those requirements. Management systems integration may be faced, currently, as an organisational “earthquake” releasing tensions derived from this newly reposition of organizations in the society. Some organizations stood up firmly while others collapsed. Like in severe nature phenomena, organizations were scarcely prepared and after the “organisational dust settlement” it is time to rebuild. Prior bad and good management sub-systems performances and practices should be taken into account in order to achieve successfully organizations *New Order*, being benchmarking within management sub-systems, more than a viable alternate methodology but, a desirable central operational philosophy to accomplish this feature. Related to organizational management sub-systems, considering the latest available data from ISO Survey [41], it seems that organizations optioned by the ‘*Together we stand, divided we fall*’ [34] approach, that is, the integrated approach.

In 2002, Wilkinson and Dale [35] identified five key issues regarding management systems integration

based on available literature and integration models at the time. These issues were:

- Integration ways, levels and term definition.
- Compatibility.
- Sub-systems scope.
- Total quality approach.
- Organizational culture.

Benchmarking and the integration of management or operational practices have been recently linked and reported in several papers [36]- [39]. Braadbaart [5] stated that *'benchmarking has the potential... to enhance organizational efficiency and effectiveness for organizations...'*, which is too, an objective envisaged by management systems integration. Currently, a major open issue related to IMS is under management systems community attention. IMS effectiveness and maturity level assessment, which is, an implementation performance measurement, is not properly assessed due to the lack of tools or methodologies [40]. Performance measurement has been focused by Feurer and Chaharbaghi [20] stating that a suitable performance measurement system should comply with the characteristics enumerated on Table 1.

Table 1: Suitable and desirable characteristics for a performance measurement system (adapted from [20])

1	Evaluation of the internal and external environments of an organization.
2	Determination of the underlying causes behind the existing situation together with their interrelationships.
3	Identification of future trends and their implications to the organization.
4	Identification of organization goals in order to determine where to be in the future.
5	Knowledge acquisition regarding the relationship between action and goals.
6	Definition and communication of the new objectives throughout the organization.
7	Alignment of operations and supporting objectives for instituting a common purpose.
8	Development of a system for rewarding achievements which acts as a catalyst for motivating future change.

In an integrated management system, each management sub-system adds peculiar features intrinsically linked to its own nature. Despite the common structure (Deming cycle), the major add value to achieve under an integrated context should be the benchmarking of these features by other management sub-systems. Fig. 2 illustrates these desirable peculiar features from each management sub-system.

Desirable "Benchmarkable" features from QMS, EMS and OHSMS

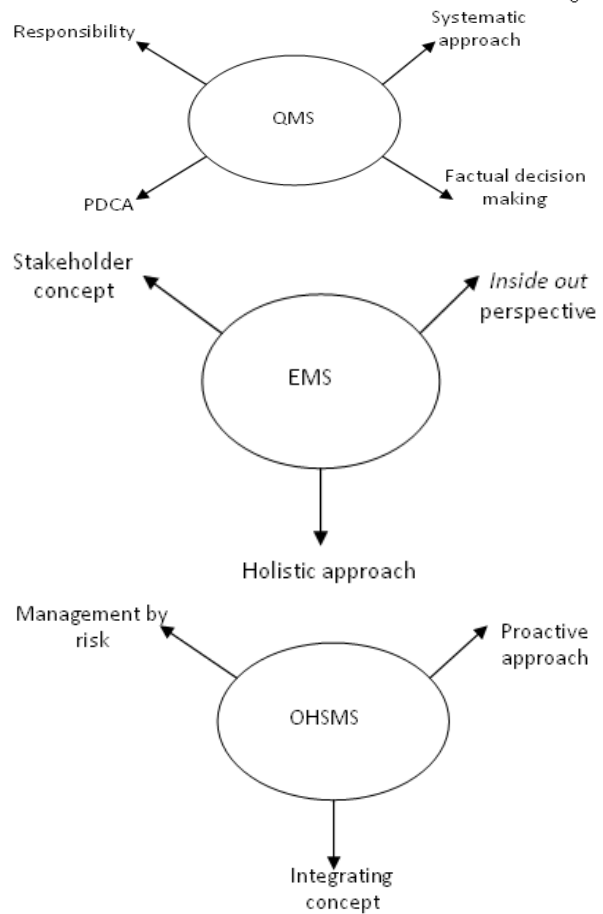


Fig. 2: Benchmark features from each management sub-system (Source: authors)

CURRENT STATUS ON MANAGEMENT SYSTEMS: THE ISO SURVEY DATA

Information provided by last issued ISO Survey [41] suggests that ISO 9001 is acting as a benchmark to other referentials, providing a sustained ground and enabling the implementation of other organisational standards, focusing new requirements and stakeholders.

Based on Tables 2 and 3 we are able to conclude that, with honourable exceptions, the mostly involved countries on ISO 9001 certification are also involved on ISO 14001 certification. An integrated analysis of both ISO 9001 and ISO 14001 data suggests the following conclusions:

- China, Japan, Italy, Spain, UK, Germany, USA and Republic of Korea are deeply involved on both ISO 9001 and ISO 14001 certification.
- India is mostly involved on ISO 9001 certification.
- Romania and Czech Republic are mostly involved on ISO 14001 certification.

Tables 2 and 3: Top 10 countries for ISO 9001 and ISO 14001 certificates

Table 2- ISO 9001		Table 3- ISO 14001	
1	China	1	China
2	Italy	2	Japan
3	Japan	3	Spain
4	Spain	4	Italy
5	Russian Fed	5	UK
6	Germany	6	South Korea
7	UK	7	Romania
8	India	8	Germany
9	USA	9	USA
10	South Korea	10	Czech Rep.

Tables 4 and 5 illustrate that, currently, the most ISO 9001 and ISO 14001 active countries are China, Japan, Italy, Romania and Russian Federation.

Tables 4 and 5: Top 10 countries for ISO 9001 and ISO 14001 certificates growth

Table 4- ISO 9001		Table 5- ISO 14001	
1	Russian Federation	1	China
2	China	2	Japan
3	Italy	3	Romania
4	Japan	4	Hungary
5	Romania	5	Italy
6	Czech Republic	6	United Kingdom
7	Viet Nam	7	Czech Republic
8	Poland	8	France
9	Israel	9	Thailand
10	Iran	10	Russian Federation

It should be mentioned that Tables 2 to 5 rely on raw data not being weighted by demographical or macro economical parameters.

Table 6 shows that the same top 3 industrial sectors are involved both on ISO 9001 and ISO 14001 certification.

Table 6: Top 5 industrial sectors on ISO 9001 and 14001 certificates

Top five industrial sectors for ISO 9001 certificates 2009		Top five industrial sectors for ISO 14001 certificates 2009	
1	Construction	1	Construction
2	Basic metal & fabricated metal products	2	Basic metal & fabricated metal products
3	Electrical and optical equipment	3	Electrical and optical equipment
4	Machinery and equipment	4	Wholesale & retail trade; repairs of motor vehicles, motorcycles & personal & household goods
5	Wholesale & retail trade; repairs of motor vehicles, motorcycles & personal & household goods	5	Rubber and plastics products

Figures 3a and 3b analysis suggests that both ISO 9001 and ISO 14001 certified organizations are increasing worldwide. If the saturation level has been reached (Figures 3a and 3b), namely on the number of ISO 9001 certifications, is still an

appealing, lingering, open and active discussion among management system community at the moment.

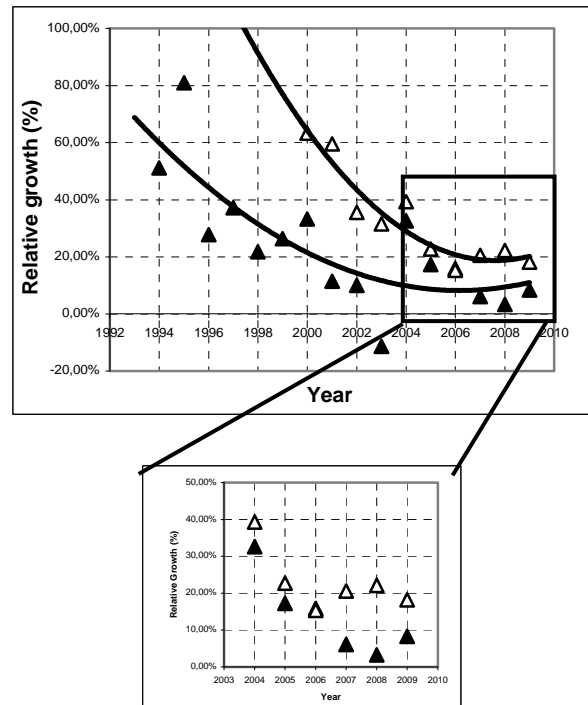


Fig. 3a,b: Relative ISO 9001 and ISO 14001 growth

The time evolution of demographical weighted data (number of certificates per 1000 inhabitants), presented in Figure 4 and the ratio between ISO 14001 and ISO 9001 number of certificates (Fig. 5), shows that the number of ISO 14001 issued certificates is increasing more than ISO 9001 issued certificates.

Nevertheless objective data over IMS are not provided by ISO. Hence, the increase on both ISO 9001 and ISO 14001 certified organizations, certainly also implies an increase on IMS.

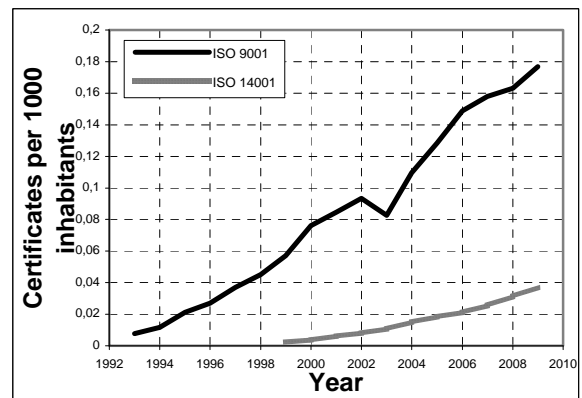


Fig. 4: ISO 9001 and ISO 14001 certificates per 1000 inhabitants (worldwide)

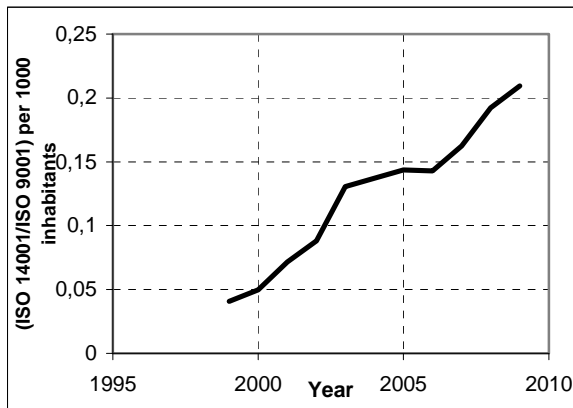


Fig. 5: ISO 14001 to ISO 9001 certificates per 1000 inhabitants ratio (Worldwide)

Figures 6 and 7 illustrate the time evolution (1999-2009) of ISO 14001 to ISO 9001 ratio among several countries in Europe. We may conclude that this ratio has increase in all selected countries suggesting an increase on IMS.

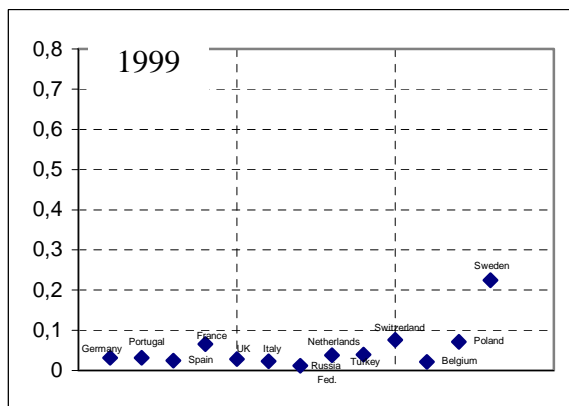


Fig. 6: ISO 14001 to ISO 9001 certificates per 1000 inhabitants ratio in 1999 (Europe)

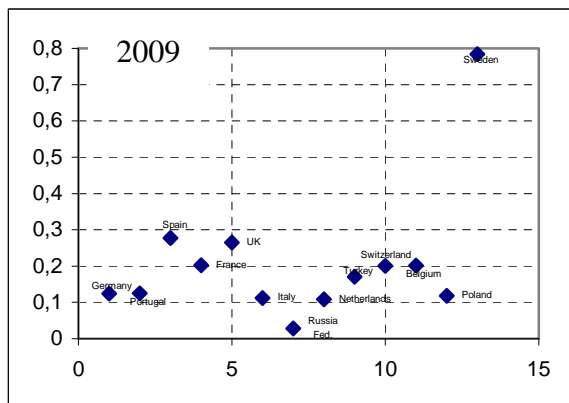


Fig. 7: ISO 14001 to ISO 9001 certificates per 1000 inhabitants ratio in 2009 (Europe)

QUID PRO QUO

The benchmarking concept is understood (still) to be an act of imitation and copying [33]. The above mentioned on the present article has mainly been focused on which features could be enhanced in management systems integration by adoption of benchmarking methodologies. If we look around, Nature tell us that symbiotic relations are more sustainable, addressing several ‘stakeholders’ requirements by establishing mutual advantageous interconnections. Potential benefits for management systems integration were discussed and exposed. So, the ultimate main question raised by the appliance of benchmarking methodologies through management systems integration is:

Which are the expected benefits for the benchmarking concept?

Conceptual reborn and elevation to a proactive philosophy degree may be expected on benchmarking concept after a symbiotic relationship with IMS. Recalling the currently “Hall of Fame” of management practices or concepts, namely, TQM, QFD, Deming cycle, Six-sigma, EFQM and Risk Assessment we may see how these concepts prevailed until our days. Benchmarking on behalf of management systems integration would guarantee to benchmarking concept a deserved place among these honourable concepts.

FINAL REMARKS AND CONCLUSIONS

- ISO 9001 is, in our days, a benchmark pursuit by other management referentials.
- Based on the latest ISO Survey, the number of integrated management systems is increasing worldwide. Objective data should be provided in order to quantify this assumption.
- Each management sub-system has their own fingerprinted “genetic” features that, desirably, should act as benchmarks for other management sub-systems. The systematic approach, factual decision making, responsibilities accountability and the PDCA cycle are inherently linked to Quality Management sub-system. The stakeholder concept understood under a holistic and *inside out* perspective is properly expressed by the Environment Management sub-system. The proactive approach and management by risk assessment, acting risk as a potential integrating factor enabling a common language are intrinsic characteristics from the Occupational Health and Safety Management sub-system.

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REFERENCES

- [1] Mode, D. (1983). Everything Counts. *Construction Time Again*. Mute Records.
- [2] Okkonen, J., *Democracy in management- the new coming of MBO via organisational dialogue*. Benchmarking: An International Journal, 2007, **14**(1), p. 7-21.
- [3] Saraiva, P. and Sampaio, P., *Integração de Sistemas de Gestão da Qualidade, Ambiente, Segurança e Higiene do Trabalho*. Proceedings of SHO 2010, 2010, Guimarães, Portugal, 23-28.
- [4] Sampaio, P., Saraiva, P. and Rodrigues, A. G., *A classification model for prediction of certifications motivations from the contents of ISO 9001 audit reports*. Total Quality Management, 2010, **21**(12), 1279-1298.
- [5] Braadbaart, O., *Collaborative benchmarking, transparency and performance: evidence from The Netherlands water supply industry*. Benchmarking: An International Journal, 2007, **14**(6), 677-692.
- [6] ^{b)}Domingues, J. P. T., Sampaio, P. and Arezes, P. M., *Management systems integration: An organizational milestone*. Proceedings of *Semana de Engenharia 2010*, 2010, Guimarães, Portugal.
- [7] Liao, S.-H., Chang, W.-J., Wu, C.-C., *An integrated model for learning organization with strategic view: Benchmarking in the knowledge-intensive industry*. Expert Systems with Applications, 2010, **37**, 3792-3798.
- [8] Mirchandani, D. and Ikerd, J., *Building and maintaining sustainable organizations*. Organizational Management Journal, 2008, **5**, 40-51.
- [9] Lahav, I., *Integrated management systems: many requirements-one system*. Management Systems Australia, 2008.
- [10] Okrepilov, V.V., *Scientific basis for assessing the integration level of management systems*. Proceedings of the 54th Congress of the European Organization for Quality- a heritage for the future, 2010, Izmir, Turkey, 26-27 October.
- [11] Miguel, P. A. C. and Carnevali, J. A., *Benchmarking practices of quality function deployment: results from a field study*. Benchmarking: an International Journal, 2008, **15**(6), 657-676.
- [12] Rocha, M., Searcy, C. and Karapetrovic, S., *Integrating sustainable development into existing management systems*. Total Quality Management, 2007 **18**(1-2), 83-92.
- [13] Grosskopf, J., Milliman, J. and Lando, D., *Using a unified risk management approach for EH&S and security: results of a pilot project*. Environmental Quality Management, 2007, **Autumn**, 3-16.
- [14] ^{a)}Domingues, J. P. T., Sampaio, P. and Arezes, P. M., *Integrated Management Systems: The vision from the perspective of the OH&SMS*. Proceedings of SHO 2011, 2011, Guimarães, Portugal.
- [15] ^{o)}Domingues, J. P. T., Sampaio, P. and Arezes, P. M., *Beyond "audit" definition: A framework proposal for integrated management systems*. Accepted for publication on the Proceedings of 61st IEEE Annual Conference and Expo, 2011, Reno, Nevada, USA.
- [16] ^{b)}Domingues, J. P. T., Sampaio, P. and Arezes, P. M., *Management Systems Integration: A 3-dimensional organisational perspective*. Proceedings of 12th International Symposium on Quality, 2011, Osijek, Croatia.
- [17] Zairi, M., *Benchmarking: The Best Tool for Measuring Competitiveness*. Benchmarking for Quality, Management & Technology, 1994, **1**(1), 11-24.
- [18] Raharjo, H., Chai, K. H., Xie, M. and Brombacher, A. C., *Dynamic benchmarking methodology for quality function deployment*. Benchmarking: An International Journal, 2010, **17**(1), 27-43.
- [19] Wadongo, B., Odhuno, E., Kambona, O. and Othuon, L., *Key performance indicators in the Kenyan hospitality industry: a managerial perspective*. Benchmarking: An International Journal, 2010, **17**(6), 858-875.
- [20] Feurer, R. and Chaharbaghi, K., *Performance measurement in strategic change*. Benchmarking for Quality, Management & Technology, 1995, **2**(2), 64-83.
- [21] Azedagan, A. and Teich, J., *Effective benchmarking of innovation adoptions: a theoretical framework for e-procurement technologies*. Benchmarking: An International Journal, 2010, **17**(4), 472-490.
- [22] Dale, B.G., *Benchmarking on total quality management adoption: a positioning model*. Benchmarking for Quality, Management & Technology, 1996, **3**(1), 28-37.
- [23] Li, Y., Luecke, G.R. and Cuma, M., *Using benchmarking to determine efficient usage of nodes in a cluster*. Benchmarking: An International Journal, 2007, **14**(6), 728-749.
- [24] Balzan, L. and Baldacchino, P.J., *Benchmarking in Maltese internal audit units*. Benchmarking: An International Journal, 2007, **14**(6), 750-767.
- [25] Schonberger, R. J., *Total Quality: Teammanship over Leadership*. Benchmarking for Quality, Management & Technology, 1994, **1**(1), 38-47.
- [26] Roufaiel, N.S. and Meissner, M., *Self-managing teams: a pipeline to quality and technology management*. Benchmarking for Quality, Management & Technology, 1995, **2**(1), 21-37.
- [27] Jorgensen, T. H., *Towards more sustainable management systems: through life cycle management and integration*. Journal of Cleaner Production, 2008, **16**, 1071-1080.
- [28] Camgoz-Akdag, H., *Total quality management through six sigma benchmarking*. Benchmarking: An International Journal, 2007, **14**(2), 186-201.
- [29] Panizzolo, R., Biazzo, S. and Garengo, P. (2010), *New product development assessment: towards a normative-contingent audit*. Benchmarking: An International Journal, 2010, **17**(2), 173-194.
- [30] Lee, M.R. and Lan, Y.-C., *Toward a unified knowledge management model for SMEs*. Expert Systems with Applications, 2011, **38**, 729-735.
- [31] ^{o)}Domingues, J. P. T., Sampaio, P. and Arezes, P. M., *Management Systems Integration: should "Quality" be redefined?*. Accepted for publication on the Proceedings of 55th EOQ Congress, 2011, Budapest, Hungary.
- [32] Oxford Dictionary online.
- [33] Dattakumar, R. and Jagadeesh, R., *A review of literature on benchmarking*. Benchmarking: An International Journal, 2003, **14**(2), 186-201.
- [34] Pink Floyd, *Hey You*. The Wall, 1979, Harvest records Edts.
- [35] Wilkinson, G. and Dale, B.G., *An examination of the ISO 9001:2000 standard and its influence on the integration of management systems*. Production Planning & Control, 2002, **13**(3), p. 284-297.
- [36] Caniato, F., Golini, R. Luzzini, D. and Ronchi, S., *Towards full integration: eProcurement implementation stages*. Benchmarking: An International Journal, 2010, **17**(4), 491-515.
- [37] Hong, P.C., Dobryzkovski, D.D. and Vonderembse, M.A., *Integration of supply chain IT and lean practices for mass customization: Benchmarking of product and service focused manufacturers*. Benchmarking: An International Journal, 2010, **17**(4), 561-592.
- [38] Perego, A. and Salgaro, A., *Assessing the benefits of B2B trade cycle integration: a model in the home appliances industry*. Benchmarking: An International Journal, 2010, **17**(4), 616-631.
- [39] Kumar, A., Antony, J. and Dhakar, T.S., *Integrating quality function deployment and benchmarking to achieve greater profitability*. Benchmarking: an International Journal, 2006, **13**(3), 290-310.
- [40] Domingues, J. P. T., Sampaio, P. and Arezes, P. M., *IMS: a synergistic approach*. Proceedings of 13th Toulon-Verona Conference, 2010, Coimbra, Portugal.
- [41] ISO, *The ISO Survey of Certifications 2009*. ISO editions 2010.

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