

INTEGRATED OHS MANAGEMENT SYSTEMS: IS IT THE *FINAL FRONTIER* REGARDING OHS?

Pedro Domingues^{a,b*}, Paulo Sampaio^b, Pedro Arezes^b and Gabriela Ramos^b

^aChemical Laboratory Marques Ferreira, Braga, Portugal

^bUniversity of Minho, Production and Systems Department, Guimarães, Portugal

Abstract: Undoubtedly, we are living in an age of a superb technological potential not even foreseen by the most daring science fiction writers. Organizations embraced furiously this technological *overdose* aiming to improve their internal and external communicational performance and processes control. In this pseudo-futuristic environment, managers have been challenged to achieve excellence in organizational issues. In the late eighties of the past century, the first organizations were ISO 9001 (Quality Management System) certified. A few years later environmental (ISO 14001) and Occupational Health and Safety (OHSAS 18001) certifications were achieved by organizations founding themselves with several management sub-systems implemented. Time proved that co-existing management sub-systems with *no strings attached* between them was a poor path aiming newly developing concepts, namely, globalization, sustainability and *stakeholderability*. So, management systems integration emerged as the subsequent apparent logical step on organizational development. The lack of an international standard ruling the implementation of an integrated management system (IMS) challenge responsible proceeding on their own experiences awakening academic curiosity. In fact, currently, management systems integration is a promising and developing open issue among academic community. In this paper it is intended to report the partial results of an ongoing project aiming the development of a maturity and efficiency assessment tool focusing integrated management systems. Based on a survey, the Portuguese context regarding organizations with an integrated management system will be unveiled. Some conclusions, based on available results, relate with the role-play by OHS management systems in an integrated environment.

Keywords: Integrated Management Systems, OHS, Survey.

1. INTRODUCTION

1.1 IMS Background

ISO 9000 quality standards series released in 1987 benchmarked further management subsystems implementation and certification, namely, ISO 14000 (environmental standards series) in 1996 and later (1999) OHSAS 18001 (health and safety reference standards) (Stentzen, 2000; Proto and Supino, 2000; Zeng *et al.*, 2005; Rasmussen, 2007; Sampaio *et al.*, 2008; Domingues *et al.*, 2011). Several studies pointed out the impact of management systems certification over non-certificated management systems (Sampaio *et al.*, 2010; Vinodkumar and Bhasi, 2011). Today, other management systems implementation standards (SA 8000, ISO 22000) focusing several stakeholders and their specific requirements are available. Management systems integration had been since, mainly, late nineties and it is, currently, a topic covered by a large number of papers from several authors. This fact is partially related with the non existence of an international standard ruling this organizational phenomenon encouraging managers and companies to discover unsuspected implementation paths. Thus, researchers' attention had been focused on how organizations are dealing with this organisational upgrade derived from novel stakeholders and their requirements increase. From initial theoretical and conceptual models regarding management systems integration to data supported proposals in our days, several bibliographic streams had been identified by researchers, namely, (Asif *et al.*, 2010). Quality management system (QMS) is, usually, the genesis management system from which the IMS is built up (Domingues *et al.*, 2011). Other reported implementation strategy is the *all in*, that is, the simultaneous implementation of several management sub-systems. QMS should systematically enhance a proactive management considering new customer requirements. A change of organizational vision, from a solely customer perspective to a Society customer approach, is demanded focusing a successful integration process. The different approaches that QMS may adopt acting as the genesis management system had been focused earlier by (Domingues *et al.*, 2011), optioned by the *concordia discors* approach as the most suitable focusing an effective management subsystems integration.

1.2 Worldwide data on IMS

Data regarding wide spreading of ISO 9001 and ISO 14001 certified companies worldwide is regularly provided by ISO. Unfortunately, no similar data regarding IMS ruled companies is currently available. Hence, several authors proposed the ratio defined in equation 1 as a viable indicator to assess macro evolution of IMS certified organizations.

$$IMSratio = \frac{N^{\circ} \text{ of ISO14001 certificates}}{N^{\circ} \text{ of ISO9001 certificates}} \quad (1)$$

In 2011, Domingues *et al.* (2011) presented data related to this ratio till the year 2009. In December 2011, ISO released the late edition from ISO Survey offering data from ISO 9001 and ISO 14001 among others certifications from 1999 till 2010. The following figures updates the results of the paper cited above with data concerning 2010 results. Figure 1 presents IMS ratio evolution (1999-2010) worldwide.

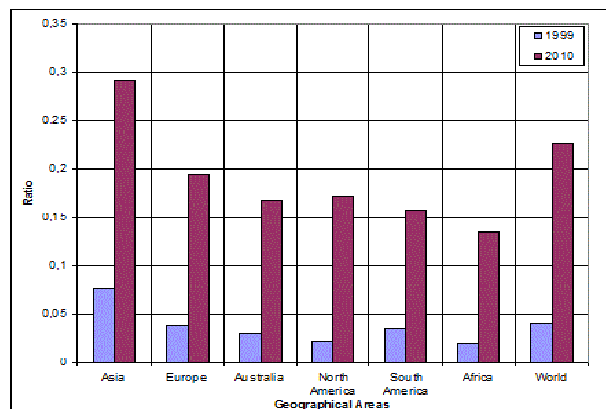


Figure 1. Ratio evolution

Figure 1 results agreed with empirically experience, that is, a major number of companies have opted by certification of several management sub-systems integrating them into an unique system. ISO Survey analysis allows us to highlight another indicator related to IMS: the ISO 9001 plus ISO 14001 relative number of certificates. Time evolution (1999-2010) of this indicator may be seen in Figure 2.

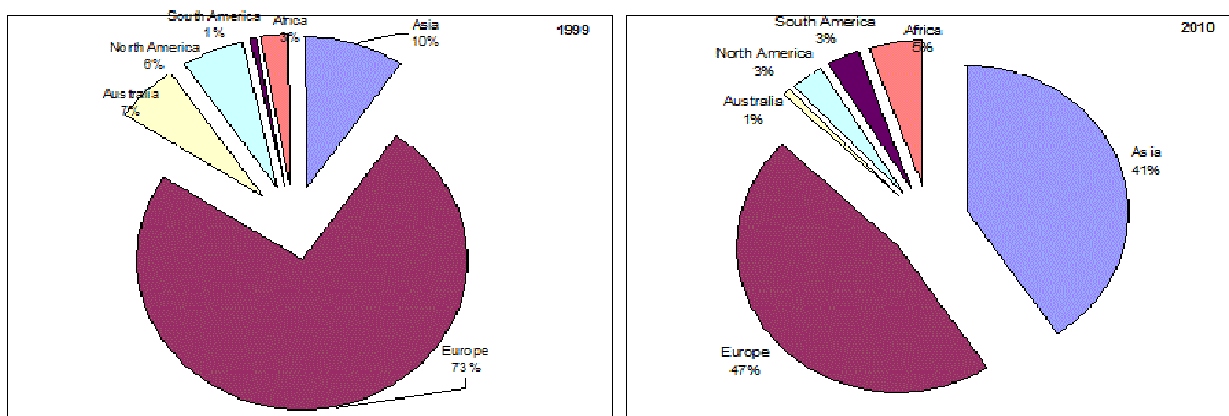


Figure 2. ISO 9001+ISO 14001 evolution (1999-2010)

Figure 2 results emphasize the major evolution achieved by Asia on behalf of all other regions but, namely, of Europe. On Figures 3 to 14 we may see detailed evolution (1999-2010) of the ratio along with the relative evolution of the ISO 9001 and ISO 14001 number of certificates which may explain the relative maximum and minimum detected on the Ratio/Time evolution figure.

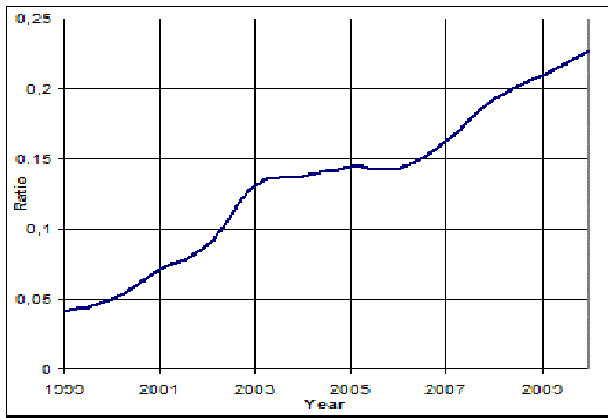


Figure 3. Ratio evolution worldwide

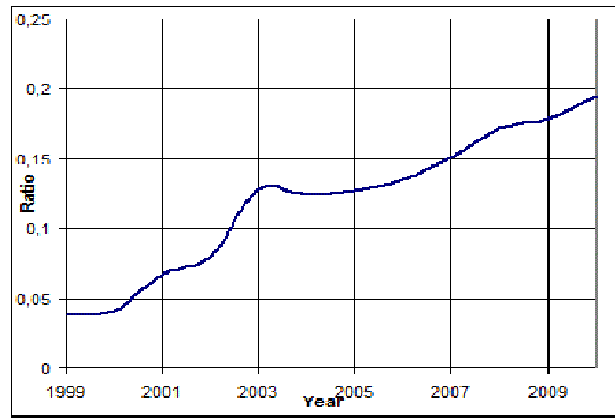


Figure 4. Ratio evolution Europe

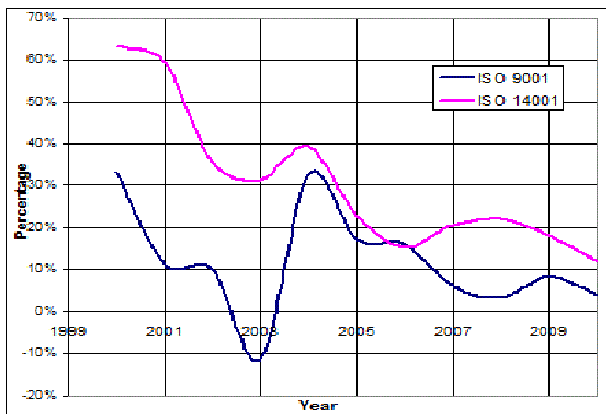


Figure 5. Certificates evolution worldwide

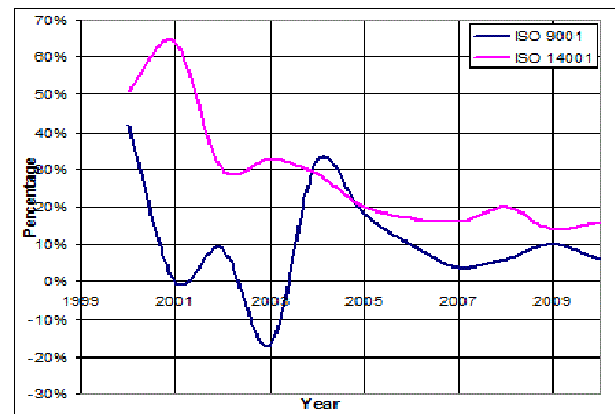


Figure 6. Certificates evolution Europe

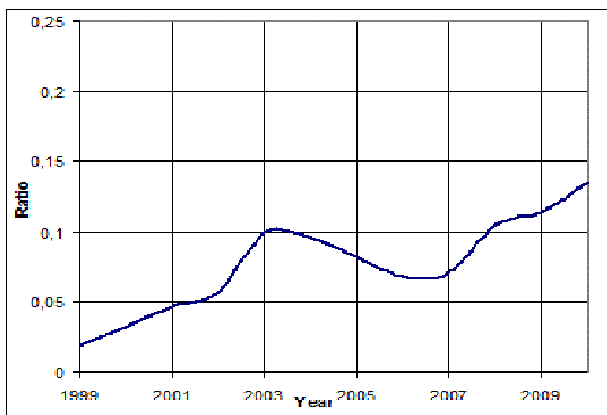


Figure 7. Ratio evolution Africa

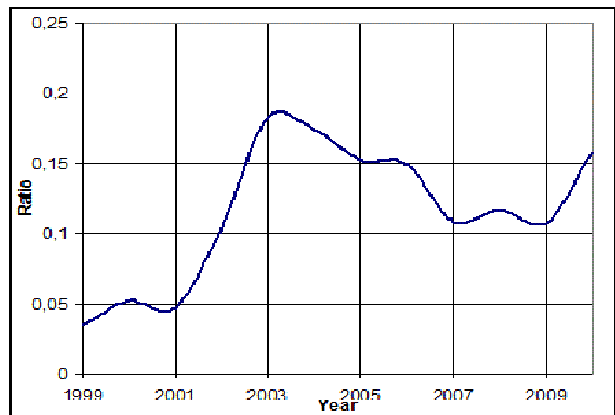


Figure 8. Ratio evolution South America

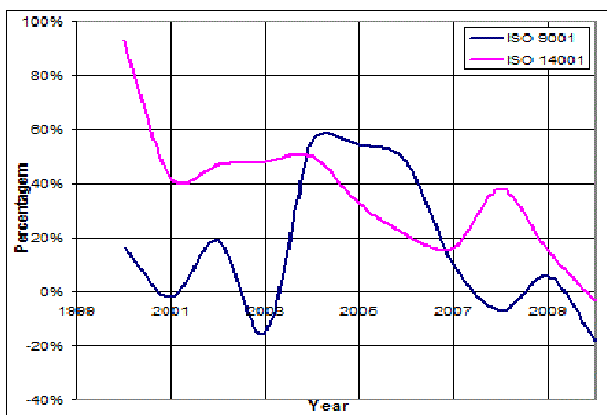


Figure 9. Certificates evolution Africa

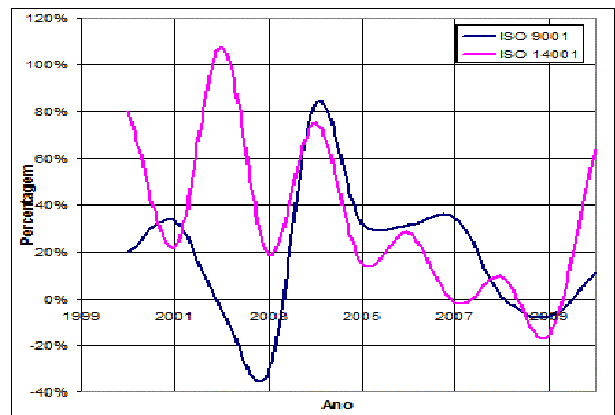


Figure 10. Certificates evolution South America

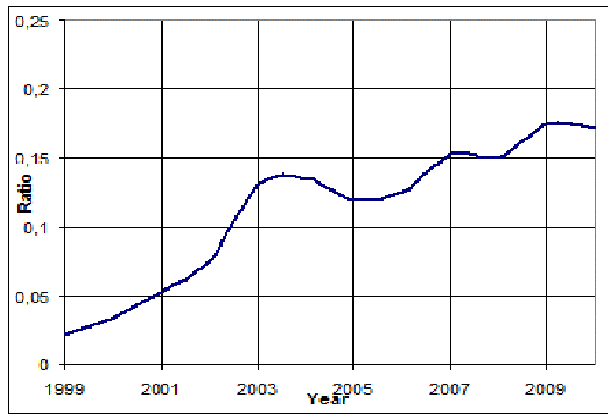


Figure 11. Ratio evolution North America

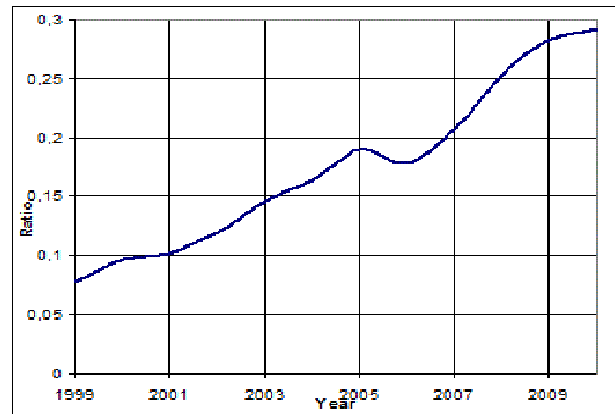


Figure 12. Ratio evolution Asia

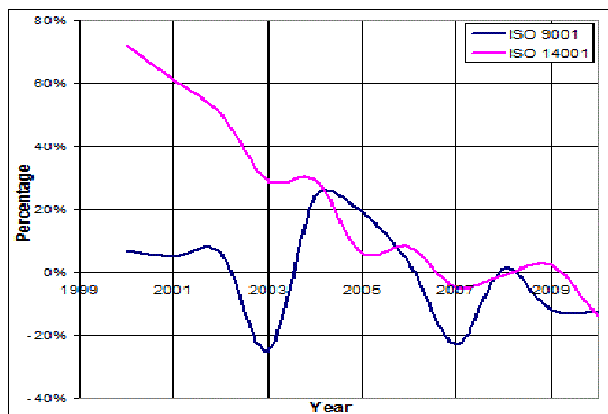


Figure 13. Certificates evolution North America

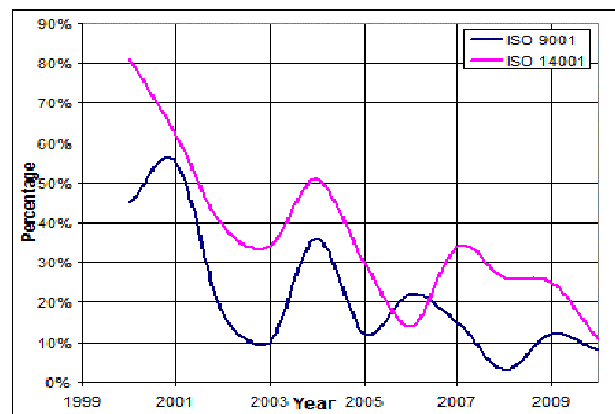


Figure 14. Certificates evolution Asia

Exception made for Asia, all region present an IMS ratio relative maximum at the year 2003. This fact is mainly related with a decrease on the number of ISO 9001 certified companies and not with an increased of ISO 14001 certified companies. This fact is probably related with ISO 9001 year 2000 revision and consequent adaption period. A considerable percentage of the companies optioned by not renewal their certification on the new requisites imposed by the revision or, could not demonstrate at the renewal audit competence for embrace the newest requisites. Again, results converge with empirically sense, that is, economically more developed areas (Europe, Asia and North America), focusing continuous improvement and with financial availability to achieve it, present higher IMS ratio (0,19; 0,29; 0,17) considering 2010 results.

2. MATERIALS AND METHODS

An online survey with 30 statements was held focusing Portuguese organizations with more than one certified management sub-system according to the following standards: ISO 9001, ISO 14001 and OHSAS 18001/NP 4397. The survey was conceptually supported on a Likert type scale, categorical and multiple option answers. A pre-test performed on three companies was used to validate the questionnaire (Table 1). The results reported in the present paper were supported on 52 validate answers given by management systems responsible during the period between 01-07-2011 and 01-11-2011.

Table 1- Questionnaire Scheme

Section	Main topics
Company Characterization	Q1-Q4: Activity sector, n° of employees, geographic location and IMS typology.
Likert Scale perceptions assessment regarding common sub-systems requirements	Q5-Q20: Policy, top management commitment, integration concept, bureaucracy, goals and methodologies alignment, vision, management procedures, sub-systems interactions, integration

	process guideline, documental integration, OHS and Environmental responsible authority, add-value IMS, integrated objectives, IMS authority, indicators and integrated indicators.
Perception assessment between non-integrated to integrated performance	Q21-Q23, Q25: Add-value, performance comparison, integration levels.
Specific company characterization regarding IMS	Q24: audits typology, Q26: Integration sequence
	Q27: Non-integrable items identification
Motivations, benefits and Obstacles	Q28-Q30: Motivations, benefits and obstacles

3. RESULTS AND DISCUSSION

3.1. Companies Description

The parameters chosen to characterize the surveyed organizations were their dimension (Figure 15), geographic location (Figure 16), IMS typology (Figure 17 and 17a) and main activity sectors (Figure 18). Results collected match partially the Portuguese certified organizations reality described by Sampaio and Saraiva (2011).

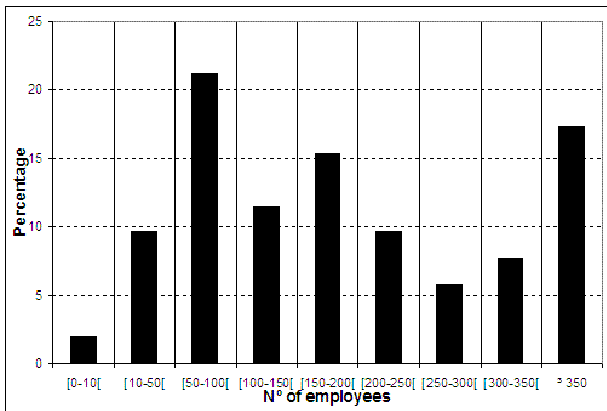


Figure 15. Companies dimension (n° of employees)

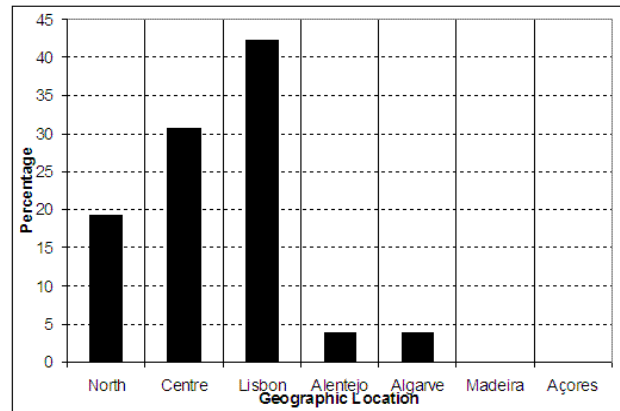


Figure 16. Location per NUT II region

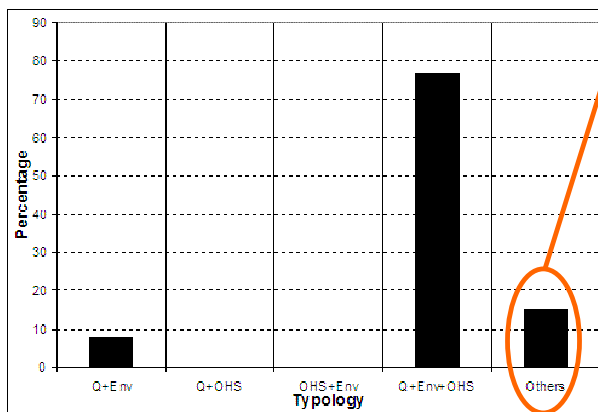


Figure 17. IMS Typology

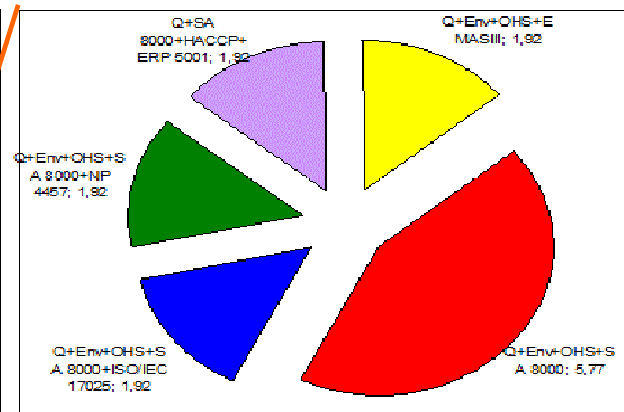


Figure 17a. Other reported IMS

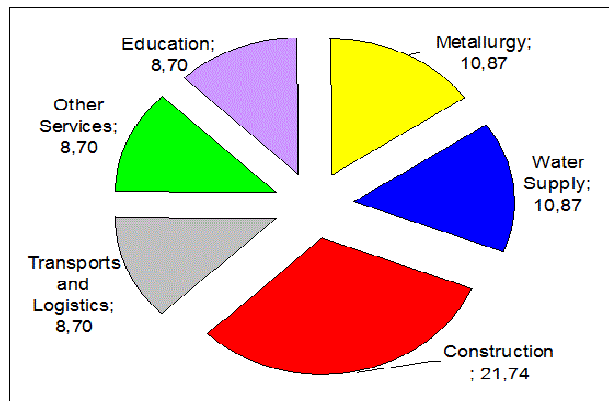


Figure 18. Main activity sectors

3.2. Motivations, Obstacles and Benefits

Motivations pro integration, obstacles found during implementation process and benefits derived from integration are focused by almost IMS researchers using survey methodology. In the present work companies were asked to classify their motivations/obstacles/benefits according to the following scale:

- 1- Internal
- 2- Mainly Internal
- 3- External
- 4- Mainly External

A minimalistic approach (object oriented analysis) will be conducted in order to treat the motivations/obstacles/benefits data. Mathematically, useful information regarding n -dimensional spaces and their related objects may be achieved by using the permutations and combinations concepts. Combinations consider the combination of n objects taken r at a time without or with repetitions (Eq. 2).

$$C_r^n = \frac{n!}{r!(n-r)!} \quad (2)$$

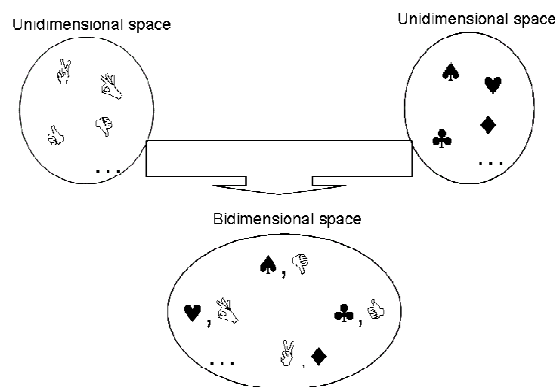


Figure 19. Generic unidimensional based bi-dimensional space

As example, we may consider a bi-dimensional space Motivations-Benefits (M-O) derived from management systems integration reported by the surveyed companies. The original unidimensional objects are the reported answers related to the motivations and benefits derived from IMS implementation (Figure 20).

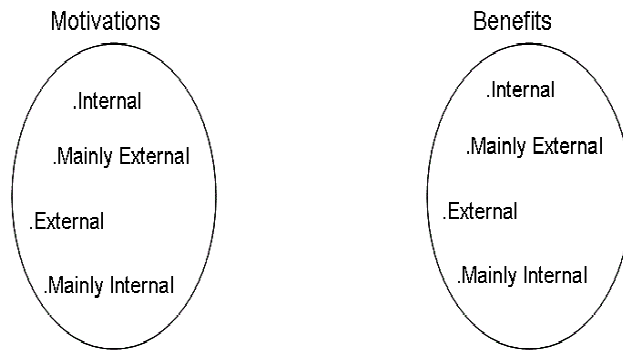


Figure 20. Motivations and Benefits unidimensional objects in unidimensional spaces (Source: Made by authors)

Figure 21 presents the relative occurrence of tri-dimensional Motivations-Obstacles-Benefits (M-O-B) objects on the online survey. As an example, we may see that object (2,1,2) was the object presenting the highest percentage of occurrence, that is, almost 22% of companies reported mainly internal motivations and internal obstacles and mainly internal benefits. Figure 22 show a detailed diagram of M-O-B space considering 46 answers.

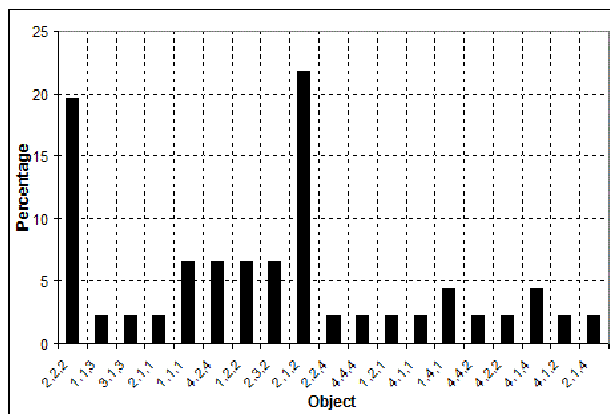


Figure 21. M-O-B objects relative occurrence

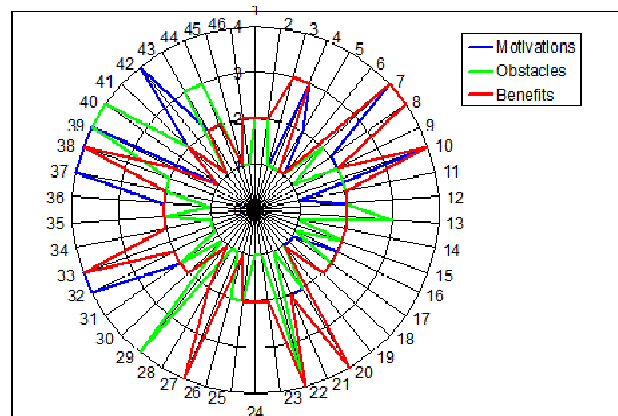


Figure 22. M-O-B diagram

Considering Eq. 2, $n=4$ (internal, mainly internal, external, mainly external), and a tri dimensional space M-O-B the space dominium to consider equals,

$$C_1^4 = \frac{4!}{1!(4-1)!} x C_1^4 = \frac{4!}{1!(4-1)!} x C_1^4 = \frac{4!}{1!(4-1)!} = 64.$$

So theoretically, there are 64 possible combinations (64 M-O-B objects). Survey results (Figure 21) only collect approximately 30% (19 combinations) suggesting that some M-O-B combinations are more probable to occur than others in practice. Field results show that 70% of the theoretically space dominium “is not allowed” to occur which is very useful information when developing a model to assess IMS maturity and efficiency.

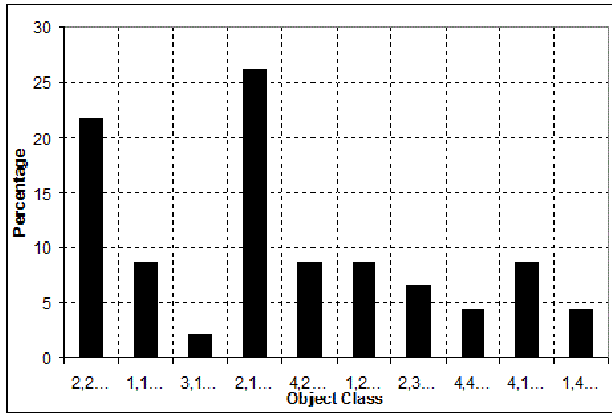


Figure 23. M-O objects relative occurrence

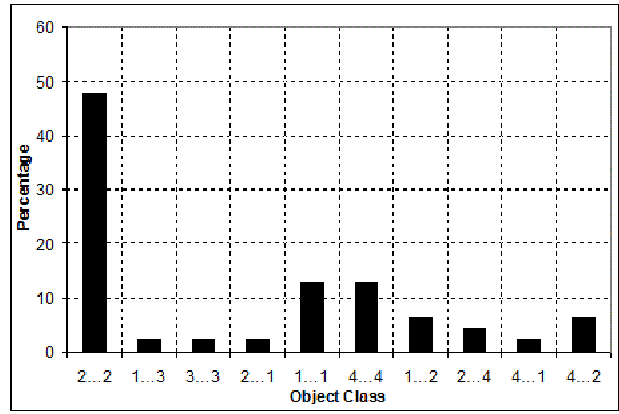


Figure 24. M-B objects relative occurrence

Figures 23 and 24 shows the relative occurrence of bi-dimensional objects M-O and M-B, respectively. Figure 24 suggest that motivations definition strongly influence the outcome of expected benefits, that is, if a company is driven by mainly internal motivations (2) it is expected that the benefits would be mainly internal (2) or if a company is driven by internal motivations (1) it is expected that the benefits would be internal (1).

3.3. Results concerning Occupational Health and Safety in an Integrated Environment

Online survey statements 15 and 18 were related to Environmental and/or OHS responsible authority and clear definition of an IMS responsible.

Statement 15: “Environmental and/or OHS responsible authority is residual.”

Statement 18: ”Exists and it is formally nominated an IMS responsible”

Figures 25 and 26 analysis suggests that an IMS responsible is clearly present and it is identifiable at the organization. OHS and/or Environmental responsible or manager do not assume only a residual responsibility but contributes actively, being identified on the chain of command. So, it seems that IMS responsible act as a coordinator receiving inputs from all other sub-systems managers. Further studies should be performed to assess the nature of this micro organizational structure.

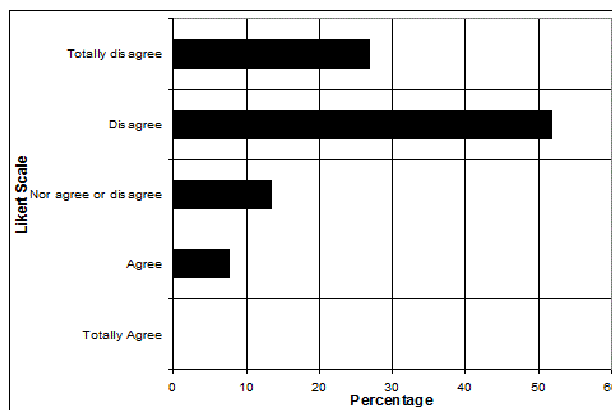


Figure 25. Statement 15 answers

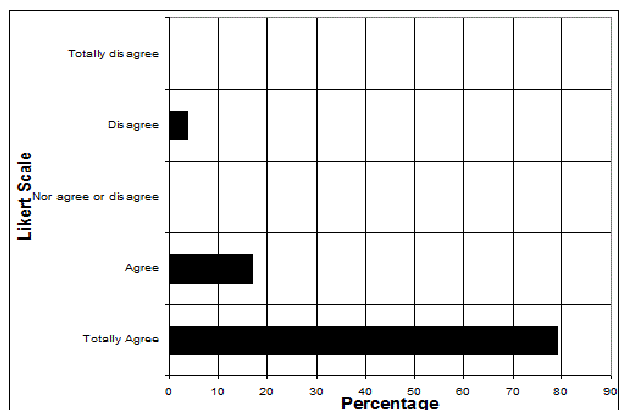


Figure 26. Statement 18 answers

Figure 27 and 28 present the results related to processes control and assessment (Figure 27) and policies definition (Figure 28). According to figure 27, companies do use integrated indicators in order to monitor their processes, that is, indicators incorporating Quality, Environmental and Occupational and Health and Safety metrics. Not surprisingly, figure 28 almost every respondent companies agreed that their Quality, Environmental and Occupational and Health and Safety policies were integrated.

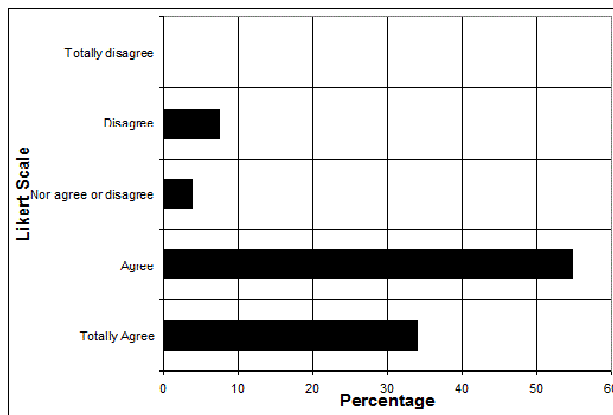


Figure 27. Integrated Indicators

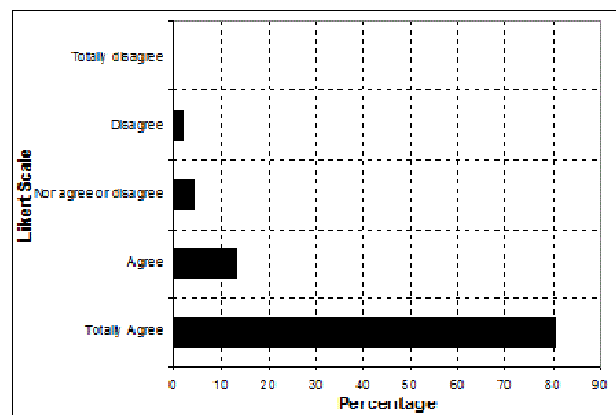


Figure 28. Integrated Policies

5. FINAL REMARKS AND CONCLUSIONS

IMS is currently a promising linkage between industry and academic research field. This fact is mainly related to the lack of an international standard ruling the IMS implementation by companies which drive them by “unexplored” paths awakening academic curiosity.

Worldwide data similar to that provided by ISO on *ISO Survey of Certifications* is not available for IMS. The ratio between the number of ISO 14001 certificates and the number of ISO 9001 certificates had been presented as a possible indicator of integration earlier and has been presented in this paper updated with 2010 results.

Results survey focusing Portuguese IMS ruled companies had been presented. Results collected match partially the Portuguese certified organizations reality.

Motivations, benefits and obstacles seem to be internal or mainly internal. The minimalistic approach data treatment used revealed that a *a priori* motivation precise definition strongly define the expected benefit.

Online survey focused also organizational Occupational Health and Safety issues. Results suggest that, in an integrated environment, an IMS responsible is clearly identifiable but an OHSMS do exist and its authority is not residual. Integrated indicators were used in order to monitor their processes. Their policies were fully integrated.

Not being the *final frontier regarding OHS*, management systems integration could be an opportunity to level Environmental and OHS related issues. Empowerment of these sub-systems and achieving the same status than Quality sub-system will grant sustainability, continuous improvement and leadership.

Acknowledgements

Acknowledgements are due to Delphi, Bosch Car Multimedia Systems Corporations and to the anonymous companies that answered to the survey.

References

- Proto, M. and Supino, S., (2000). Ecomanagement quality systems: ISO 14000: the state of the art in Italy. *Total Quality Management*, 11/4,5,6, 767-772.
- Zeng, S. X., Tian, P., Shi, J.J., (2005). Implementing integration of ISO 9001 and ISO for construction. *Managerial Auditing Journal*, 20/4, 394-407.

^{a)}Sampaio, P., Saraiva, P. and Rodrigues, A. G., (2008). ISO 9001 certification research: questions, answers and approaches. *International Journal of Quality & Reliability management*, 26/1, 38-58.

Sampaio, P. and Saraiva, P., 2011. “Barómetro da Certificação”. Edição 5.

Domingues, J. P. T., Sampaio, P. and Arezes, P. (2011d). Management Systems Integration: should “Quality” be redefined?. *Proceedings of 55th EOQ Congress, Budapest, Hungary* (pp. 1-14).
Published on CD.

Bernardo, M., Casadesus, M., Karapetrovic, S. and Heras, I. (2012). Do integration difficulties influence management system integration levels?. *Journal of Cleaner Production*, 21, 23-33.