

Osmo Kauppila¹
Janne Härkönen
Seppo Väyrynen

INTEGRATED HSEQ MANAGEMENT SYSTEMS: DEVELOPMENTS AND TRENDS

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Abstract: *The integration of health and safety, environmental and quality (HSEQ) management systems has become a current topic in the 21st century, as the need for systems thinking has grown along with the number of management system standards. This study aims to map current developments and trends in integrated HSEQ management. Three viewpoints are taken: the current state of the main HSEQ management standards, research literature on integrated management systems (IMS), and a case study of an industry-led HSEQ cluster in Northern Finland. The results demonstrate that some of the most prominent current trends are the harmonization of the high level structure of management systems by ISO, the evaluation of IMS, accounting for the supply chain in HSEQ issues, and sustainability and risk management. The results of the study can be used by practitioners to get a view of the current state of HSEQ management systems and their integration, and by researchers to seek out potential directions for HSEQ and IMS related research.*

Keywords: *integrated management systems, ISO 9001, ISO 14001, ISO 45001, health and safety, environment, quality, HSEQ*

1. Introduction

Organizations' constant need to develop their operations, competitiveness and efficiency has resulted in the need for system thinking (Tervonen *et al.*, 2011). Living up to the diverse requirements of numerous stakeholders may require different approaches (Asif *et al.*, 2010). The increase of these requirements has emphasized the need for a systematic approach to handle them (Liu *et al.*, 2012). Increase in stakeholder requirements has led to a

dramatic increase in the development of management systems (Asif *et al.*, 2010). Different management systems provide an operating framework and procedure, while concurrently supporting continuous improvement (Zeng *et al.*, 2007).

An enterprise can however face some challenges when operating parallel systems (Zeng *et al.*, 2007). Integrated management systems (IMS) can provide a systematic approach to standardizing aspects including quality, environment, health and safety, social responsibility, and possibly others (Bernardo *et al.*, 2009, Steger, 2000). As integrated management systems commonly share stakeholders, resources, and processes, hence the integration of standards/systems is

¹ Corresponding author: Osmo Kauppila
email: osmo.kauppila@oulu.fi

important for organizations to save time, cost, and resources. The drivers for implementing IMS can be divided into regulatory, financial, marketing, operational and social (Rajkovic and Aleksic, 2009) and the most important motivations behind them include satisfying customer requirements, responding to government appeal and remaining competitive (Zeng *et al.*, 2010).

The most common management systems that are integrated include quality, environmental and occupational health and safety standards. Widely used standards of ISO 9001, ISO 14001 and OHSAS 18001 are often used as the basis as they include common characteristics that allow relatively easy integration (Jørgensen *et al.*, 2006; Zeng *et*

al., 2007). Integrated health and safety, environmental and quality management systems are discussed under several acronyms, including SHEQ (Holton *et al.*, 2010), ESSQ (Tervonen, 2010a), EHSQ (Ranängen and Zobel, 2014, Tervonen *et al.*, 2010b), HSE (Mitchison and Papadakis, 1999, Santos *et al.*, 2011) and HSEQ (Carter, 1999; Hamidi *et al.*, 2012, Väyrynen *et al.*, 2012).

This study aims to explore the current state and trends in integrated HSEQ management systems. Three viewpoints (Figure 1) are taken on the subject: developments in the main HSEQ standards, a review of current IMS literature and experiences from the Northern Finland HSEQ cluster.

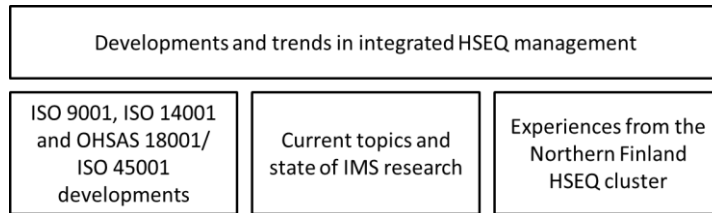


Figure 1. Outline of the study

The current developments in the field of the most used HSEQ standards have significant implications on future standard based management systems. These developments are reviewed through the available literature and ISO publications. The current state of IMS research is investigated through a review of the scientific publications from recent years. A third viewpoint is the experiences from a long-term research project of an industry-led HSEQ cluster in Northern Finland.

2. Different viewpoints on integrated HSEQ management

2.1. ISO 9001, ISO 14001, OHSAS 18001 and ISO 45001: developments and trends

ISO 9001, ISO 14001 and OHSAS 18001 are all currently undergoing significant

revisions and their revised versions are going to follow the so called Annex SL structure developed by ISO. It is a framework to provide identical structure, text and common terms and definitions for management system standards (MSS). It aims to ease the integration of MSSs and to ensure consistency among future and revised standards (Tangen and Warris, 2012) The Annex SL high level structure (Table 1) by ISO provides significant reformation by combining structures (Hotti, 2014; Pojasek, 2013). Some standards are already harmonized with the Annex SL, and all ISO aims to use the structure in all new and revised MSSs (Warris and Tangen, 2012). According to Pojasek (2013), the most significant changes for the users are requirements to define the organization and the internal and external context related to a MS, to identify the processes required for the MS, and to address risk and its effects.

Table 1. The ISO Annex SL high level structure for management system standards

| | |
|--|--|
| 1 Scope | 7 Support |
| 2 Normative references | 7.1 Resources |
| 3 Terms and definitions | 7.2 Competence |
| 4 Context of the organization | 7.3 Awareness |
| 4.1 Understanding the organization and its context | 7.4 Communication |
| 4.2 Understanding the needs and expectations of interested parties | 7.5 Documented information |
| 4.3 Determining the scope of the XXX management system | <i>7.5.1 General</i> |
| 4.4 XXX management system | <i>7.5.2 Creating and updating</i> |
| 5 Leadership | <i>7.5.3 Control of documented information</i> |
| 5.1 Leadership and commitment | 8 Operation |
| 5.2 Policy | 8.1 Operational planning and control |
| 5.3 Organizational roles, responsibilities and authorities | 9 Performance evaluation |
| 6 Planning | 9.1 Monitoring, measurement, analysis and evaluation |
| 6.1 Actions to address risks and opportunities | 9.2 Internal audit |
| 6.2 XXX objectives and planning to achieve them | 9.3 Management review |
| | 10 Improvement |
| | 10.1 Nonconformity and corrective action |
| | 10.2 Continual improvement |

One of the standards currently in the process of revision and harmonization is the ISO 9001. The aim of the ISO 9001:2015 revision is to maintain the relevance of ISO 9001, adjust to changes in its environment and to ensure it meets its key goal of delivering “confidence in the organization’s ability to consistently provide products that meets customer and applicable statutory and regulatory requirements” (Croft, 2012). The revision is based on three core concepts: the process approach introduced in ISO 9001:2008, a PDCA methodology superimposed on the system of processes and risk based thinking aimed at preventing undesirable outcomes (Lazarte, 2014). In November 2014, the ISO 9001:2015 Draft International Standard (DIS) was voted on and approved, and consequently the development of the revision moved on to the Final Draft International Stage (Lazarte, 2014). The publication of ISO 9001:2015 is

scheduled for September 2015 (Croft, 2012).

The ongoing ISO 14001 revision process is considered to be fundamental, involving a switch to a wider focus on sustainability (Herbert, 2012). The key changes proposed in ISO 14001:2015 include more specific responsibilities towards management and leadership, a wider perspective on the organization’s environmental impact across the supply chain and the life cycle of products, risk approach and the use of metrics in continuous improvement. (Lewandowska and Matuszak-Flejszman 2014; Westwood, 2014). The ISO 14001:2015 revision entered the DIS stage in July 2014 and is expected for release in the end of 2015 (Naden, 2014).

A new Health and Safety Management System standard named ISO 45001 based on OHSAS 18001 is currently under development and will be based on the Annex SL structure (ISO/PC 283, 2014). The

standard reached committee draft stage in July 2014 (Bird, 2014) and is planned for release in October 2016 (Kleinova and Szaryszova, 2014). According to D. Smith, the chairman of the committee responsible for the development of ISO 45001, some of the major differences between OHSAS 18001 and ISO 45001 are a stronger focus on the context of the organization including suppliers, contractors and other stakeholders and a requirement for health and safety aspects to be a part of an overall management system (Bird, 2014).

2.2. Integrated management systems: a review of current literature

IMS is a global phenomenon (Al-Darrab *et al.*, 2013; de Oliveira 2013; Khanna *et al.*, 2010, Manzanera *et al.*, 2014), and IMS implementations face similar issues regardless of the organizations' geographical location (Simon and Douglas, 2013). Integration is justified by the benefits such as improved HSEQ performance and competitiveness, reduced duplication in tasks and documentation, elimination of overlapping roles and structures, reduction in audit time and costs, and improved transparency (Hamidi *et al.*, 2012; Khanna *et al.*, 2010; Kraus and Grosskopf 2008; Simon *et al.*, 2013; Zeng *et al.*, 2011).

IMS integration can take place on different levels of (Bernardo *et al.*, 2009, Domingues *et al.*, 2014), and realization of the benefits depend on whether integration takes place on a documental level, on a partial integration level or on a full integration level (Abad *et al.*, 2014; Jørgensen *et al.*, 2006). Generic guidelines and models for IMS implementation have been suggested by researchers (de Oliveira, 2013; Garengo and Biazzo, 2013; Rebelo *et al.*, 2014), as well as standardization bodies (ISO 2008, BSI 2012). To successfully integrate MSs, the initial implementation must take place carefully and it needs to address the recognized success factors such as management and commitment, sufficient

knowledge and/or previous implementation of individual MSs and their interdependencies, incremental PDCA-like adoption, change management, proper resourcing and project management (Almeida *et al.*, 2014; Bernardo *et al.*, 2012; Gianni and Gotzamani, 2014; Khanna *et al.*, 2009; Manzanera *et al.*, 2014; Satolo *et al.*, 2014, Simon *et al.*, 2012; Zeng *et al.*, 2007). More consistent integration occurs when the drivers are internal, however in practice they often seem to be external (Domingues *et al.*, 2014). Information to support integration can also be gained by studying the experiences of other companies (Bernardo *et al.*, 2011).

An IMS can be viewed from the points of level, extent and scope (Abrahamsson *et al.*, 2010). A full IMS should issue the whole supply chain and have a process of addressing the stakeholder aspects that affect the organisation's IMS performance (Abrahamsson *et al.*, 2010; Rebelo *et al.*, 2014b). The linkage between IMS and sustainability and corporate social responsibility is has also been studied.

In the stage where an IMS has been established it should be assessed and improved – both on a MS level and regarding integration, while accounting for all stakeholders (de Oliveira 2013; Karapetrovic, 2003; Rebelo *et al.*, 2014a). The use of the EFQM excellence model in self-assessment and improvement can support IMS implementation (Garengo and Biazzo, 2013; Manzanera *et al.*, 2014). Using a set of key performance indicators or a balanced scorecard has been suggested (de Oliveira, 2013; López-Fresno, 2010; Manzanera *et al.*, 2014) and a set of metrics have been proposed by Rebelo *et al.*, (2014b).

Firms who have implemented IMS are likely to integrate their MS audits as well (Karapetrovic *et al.*, 2010; Simon *et al.*, 2014). As well as IMSs, their internal and external audits can be integrated in various ways (Kraus and Grosskopf 2008; Simon *et al.*, 2014). ISO 19011:2011 (ISO 2011)

provides some guidance on how management systems audits can be conducted. Finding auditors qualified to assess all IMS aspects and understand the whole can be challenging (Kraus and Grosskopf, 2008; Nowicki *et al.*, 2013).

2.3. The HSEQ cluster and supplier evaluation in Northern Finland

The HSEQ cluster of process industry companies has its roots in a chain of collaborative projects beginning in 1994 between the University of Oulu, the local process industry and other stakeholders. The cluster is an industry-led network originally consisting of five process industry companies operating in Northern and central Finland (employing ~10 000 people in total) and their supplier network comprising of hundreds of companies. Currently the active members of the cluster also include companies from the energy industry and systems, equipment and service provision. The cluster is open to any principal company that accepts the membership terms. The history is described in more detail in Väyrynen *et al.*, (2012). The collaboration started by focusing on challenges relating to shared working environments between the companies and their suppliers, and was initially the key driver in the creation of the national Finnish Occupational Safety Card system (Väyrynen *et al.*, 2008). Starting from 2003, the need and the idea of holistic HSEQ systems for supplier partners, especially at shared sites, were identified. This resulted in a series of projects resulting in developing further the HSEQ cluster and the creation of the HSEQ AP (Assessment Procedure). The aim of HSEQ AP is to improve the HSEQ capability of the participating organisations, to encourage the development of systematic modes of operation, to improve the management and well-being at work, to assist in supplier selection, and to increase competitiveness of

participating suppliers. The HSEQ AP was developed in collaboration between the University of Oulu, the cluster companies and the training and development organisation POHTO.

2.3.1. The HSEQ Assessment Procedure

The HSEQ cluster deploys the assessments, supervises and is responsible for the development of the HSEQ AP. The assessments are performed by assessors from a third company auditing company along with assessors from the principal companies, trained in HSEQ AP. Suppliers can choose to participate in the assessment, the results of which are saved on the HSEQ AP website (www.hseq.fi). The register is maintained by an impartial administrator (currently POHTO). The principal companies decide how they use the results of assessments. The cluster participants are able to see the results from the online database, and evaluated organisations can share the results outside as well. Currently, approximately 120 suppliers have been assessed (Väyrynen *et al.*, 2014). The assessment procedure is illustrated in Figure 2.

The assessment procedure begins with a statement of interest to the third party auditing organisation. The cluster companies suggest suppliers for assessment, and suppliers can also state interest themselves. The auditing organisation contacts the suppliers and agrees on a date for the assessment. Information about the HSEQ AP, assessment requirements and a web-based assessment tool covering HSEQ areas and based a series of statements grouped according to the EFQM criteria are sent to the supplier. The supplier assesses each statement based on a four-level maturity scale based on EFQM's RADAR logic, and sends the self-assessment to the assessor team. The team consists of a trained head assessor and assessors from ideally two of the cluster companies.

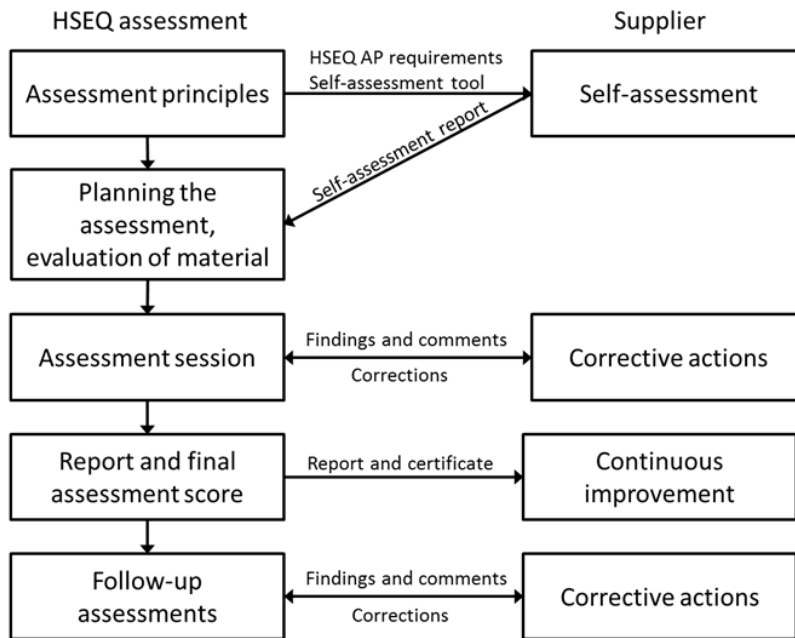


Figure 2. The HSEQ AP assessment procedure (HSEQ, 2013)

The assessment session is a ½-1 day event during which the self-assessment is discussed and the premises in which work takes place are visited. In preparation the supplier ensures that the documents specified in the requirements are available, and specified key personnel participate. Based on the self-assessment, supplementary documents, discussions and observations the assessor team can suggest immediate corrections as well as long-term improvement ideas. After possible corrections the supplier receives the scoring and an assessment report, and the scores are saved in the online register. The cluster companies can view the results if the supplier allows it, and the suppliers are free to use them for their own purposes. The overall scores are also anonymously available on the HSEQ AP website, and in December 2014 over a hundred scores can be found.

The assessment is valid for three years, after which a re-assessment takes place according to the process described above. The HSEQ

AP has reached the maturity stage in which a number of follow-up assessments have already taken place.

2.3.2. Results of the HSEQ AP project

Since its beginning, the HSEQ cluster has grown; new principal companies have joined the cluster and the amount of assessments has increased. The effects of the HSEQ AP project have been evaluated through metrics, as well as through “softer” means, such as surveys and interviews. Väyrynen *et al.* (2012) compared the accident frequency indices of the principal companies and the suppliers in HSEQ AP to the national industry average during the timespan 1996-2010. The decrease in accident frequencies of the principal companies outperformed the national trend quite clearly. It was also noted that for some observed suppliers working on-site at some of the principal companies the accident frequency had significantly decreased during the period 2007-Q1/2011.

The views of the assessors from principal

companies (N=15) and representatives of the assessed suppliers (N=24) were investigated through a survey during 2008-2009 (Väyrynen et al. 2012). The perceptions were positive and in particular the suppliers thought the assessment has been useful and suitable for their line of operations. The findings of Pikkarainen (2014), who interviewed a sample of representatives of both cluster companies (N=5) and suppliers (N=10) on the perceived business benefits of the supplier assessments were similar. The suppliers stated that the assessment procedure achieved its goals and helped the suppliers to develop their operations, and also to improve their quality level.

The reliability of the HSEQ AP assessment was analysed by Latva-Ranta *et al.* (2012) using Cohen's kappa to gauge the inter-rater agreement of eight evaluators using the assessment instrument consisting on 49 questions and a four tiered assessment scale. The results showed that the assessors were mostly in agreement, and only in one of the 49 questions there was a single difference causing a range of two in the assessment for that particular question.

3. Discussion

A change that will definitely have an effect on both practice and scientific research on integrated management systems and HSEQ management will be the release of the "main" HSEQ management system standards (ISO 9001:2015, ISO 14001:2015, OHSAS 18001/ISO 45001:2016) revisions in accordance with the Annex SL. Having all the systems in a similar format intuitively should ease integration – and statements from ISO representatives also point towards this hope. Looking at integration from a three level model of documentation harmonization, partial systems integration and full integration (Jørgensen et al. 2005), the Annex SL may well be helpful in organizing the first level. It remains to be seen if harmonizing MS formats comes with any downsides and what challenges they

pose to the management systems. This could be a fruitful future research ground. Having a common format could provide a basis for new versions of guidance and processes on how to integrate MSs.

A decade ago Karapetrovic (2003) stated that the next target for IMSs is comprehensive business excellence. Both current literature and practical experiences from the Northern Finland HSEQ cluster support this view through applications of the European excellence model. In the less researched area of assessing and/or evaluating IMS both as a whole and considering its different dimensions, the holistic view of the European excellence model can be beneficial. Maturity level based assessment of HSEQ systems has been seen in Finland, both in the HSEQ AP and the CMMI based Toddlergrade assessment tool presented by Tervonen (2010a).

Another topic visible in both ISO revisions and the HSEQ cluster findings and to some extent in IMS literature is accounting for the supply chain, or in the cluster case even the business network; in the planning, operations and assessment of integrated HSEQ management systems. The Annex SL puts weight on clarifying the operational context of a management system, and the HSEQ cluster case demonstrates that synergetic advantages can be achieved by collaborating on HSEQ activities.

Sustainability and addressing risk are also visible topics in ISO developments, as well as in the HSEQ cluster case and to some extent in the IMS literature. Von Ahsen (2013) points out some research gaps in the current literature such as the actual cost of integration against the benefits and that the existing body of IMS research has mostly stayed away from established findings of organizational research. As IMS research continues to mature, it should become more grounded on what could be called "grand theories" related to the subject.

4. Conclusion

The integration of HSEQ management systems has been a popular topic both in industrial practice and scientific research following the rise in the use of management system standards. This study shows the current state and some future trends in this area through a review of the current state of the main ISO HSEQ standards ISO 9001:2015, ISO 14001:2015, OHSAS 18001/ISO 45001:2016, research literature on integrated management systems and a case study of a Northern Finland industry-led HSEQ cluster.

From an integrated HSEQ management viewpoint, the harmonization of the high level structure of management systems by ISO is a significant change and potentially

helpful in future IMS implementation by unifying the structure and terminology of MSs. Involving business excellence models and maturity-based thinking can provide an answer to the issue of evaluating IMSs. Potential benefits can also be gained from taking a supply chain view on HSEQ systems and their evaluation.

This research supplies both practitioners and researchers with a current view on integrated HSEQ management systems. More research and practice is required to demonstrate whether the themes and trends suggested in the study are the correct direction of in which HSEQ management is headed, and what the impact of the ongoing changes will be regarding the future of integrated management systems.

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Osmo Kauppila

University of Oulu,
Finland

osmo.kauppila@oulu.fi

Janne Härkönen

University of Oulu,
Finland

janne.harkonen@oulu.fi

Seppo Väyrynen

University of Oulu,
Finland

seppo.vayrynen@oulu.fi
