

SHEFFIELD HALLAM UNIVERSITY

A Survey Analysis of Integrated Management Systems in the UK

by

Agnieszka I Katniak

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Supervised by Dr Malihe Shahidan

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Abstract

Purpose – The purpose of this dissertation is to analyse the integration of management systems (MSs) in UK organisations operating to multiple management system standards (MSSs) that have staff who are members of the Chartered Quality Institute (CQI) and the International Institute of Risk and Safety Management (IIRSM). The key issues include: which MSs are being integrated and to what extent, what are the barriers and benefits of integration, and the level of competence of integrated management system (IMS) practitioners.

Design/methodology/approach – The key issues relating to IMS were specified by the sponsoring organisations (the CQI and the IIRSM) and subsequently validated through a comprehensive literature review. They were then translated into research questions. A questionnaire was designed to provide response to the questions through an online survey. Results obtained from 184 organisations were analysed statistically.

Findings – It was found that most businesses plan to integrate their MSs or have already integrated them and that the integration is mostly internally driven. Although there is a widely held view that MSs should be integrated, several interpretations of what an IMS is were revealed and the survey reports that this lack of consensus is perceived as the number one barrier to integration. Most companies achieved partial integration. The research also shows that the large number and wide range of MSSs used by companies is not reflected in the IMS literature. However, the survey indicates that the number of MSSs adopted does not determine the integration policy, achieved degrees of integration or the number of difficulties in the integration process.

Research limitations/implications – The national context, subjective character of the data collected, small size of the sample of the participating companies and their limited diversity with respect to their size and sector all put constraints on the ability to generalise the conclusions. The research presents indications and provides only an overview of the actual picture which contains more complexity.

Originality/value – As the number and variance of MSSs is on the rise, the issue of their integration has grown in importance. There is no single definition of an IMS and the concept has been studied mainly from a theoretical point of view. The related empirical research, especially in the UK, has been scarce. In particular, no other studies were found which looked at the whole

MSSs landscape. The study aims to make the gap smaller and contribute to a more comprehensive understanding of IMS. While the focus of the survey on the members of the two Institutes suggests that the sample used may not reflect the true population of standard users, the findings are informative and are likely to be of interest to other organisations as well. Results will help the Institutes and other professional organisations seeking to facilitate the integration of MSs to better tailor their services. Furthermore, the findings will be useful to organisations implementing an IMS and will help scope further IMS research which will contribute to better policy and decision making.

Keywords – Integrated management systems, Management systems, Management system standards, Quantitative research

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Agnieszka I Katniak

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aggikatniak@yahoo.co.uk

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Abbreviations

BSI	British Standards Institution
CQI	Chartered Quality Institute
CQI IMSIG	Chartered Quality Institute Integrated Management Special Interest Group
CSRMS	corporate social responsibility management system
EFQM	European Foundation for Quality Management
EMS	environmental management system
ERM	enterprise risk management
FMEA	failure modes and effects analysis
IEMA	Institute of Environmental Management and Assessment
IIRSM	International Institute of Risk and Safety Management
IMS	integrated management system
IOSH	Institution of Occupational Safety and Health
ISO	International Organization for Standardization
ISMS	information security management system
MBNQA	Malcolm Baldrige National Quality Award
MS	management system
MSS	management system standard
OHSMS	occupational health and safety management system
QMS	quality management system
QUENSH	quality environment safety health
SME	small and medium enterprise
TQM	total quality management

Chapter 1: Introduction

1.1 Background to research

A system is a “set of interrelated or interacting elements” (ISO 9000:2005, p.8) and a management system is a “system to establish policy and objectives and to achieve those objectives” (*Ibid.*). There is nothing mystic about management systems. Whether acknowledged or not, they exist in all organisations because all organisations have a purpose and processes (ways) to achieve this purpose with a varying degree of success.

Management system standards (MSSs) provide requirements or give guidance on good management practice. Their development follows a formal process set out to ensure that the outcome will represent a consensus reached by the experts in the field (‘How are ISO standards developed?’, ISO [online]). Therefore, a management system which follows the model in a MSS is built on a firm foundation of the management state of the art.

Approximately 1.5 million businesses in almost 200 countries have implemented formalised management systems (MSs) based on standards (ISO, 2011). In particular, two ISO standards have achieved a truly global status: ISO 9001: quality management systems and ISO 14001: environmental management systems (*Ibid.*). Standards-based management is a well-researched field, but most of the studies concentrate on individual MSSs.

Many of the MSSs entail similar elements and these commonalities have prompted both practitioners and academics to discuss various aspects of integration. The idea behind the concept of an integrated management system (IMS) is that an organisation can manage its operations through one system instead of several individual management systems.

“There has long been a search for the “holy grail” of management systems: the fully integrated “business management system” (or “umbrella system”) that can link all the management standards and systems used by the organization.” (Pojasek, 2006)

However, with no universally accepted definition of IMS there is no consensus regarding how an IMS can be achieved. Several integration models exist which have been examined from a theoretical point of view. However, the related empirical research has been limited.

There is a growing tendency of developing standards and specifications not only for particular sectors and industries (automotive, food, laboratories, etc.) but also about specific aspects of organisational management or specific stakeholders (for example, health and safety, information security, business continuity, social responsibility and enterprise risk management).

As the number and variance of management system standards (MSSs) is on the rise, the problem of achieving compliance with them has grown in importance. Many companies are now under increasing pressure to demonstrate that they address the needs of all their stakeholders in an equitable manner. Therefore, it becomes even more relevant to explore the subject of integration.

The dissertation's purpose is to contribute to IMS knowledge through practical exploration of the definitions and degrees of integration in the UK organisations. The research aims to examine key aspects of an IMS as well as try to understand some of the constraints and determinants. It is hoped that through the use of objective and systematic approaches to problem solving this study will increase the understanding about an IMS.

The author has worked in the area of IMS for over ten years and personally experienced challenges resulting from the lack of agreement about what integration is and how it should be achieved. These challenges were universal regardless of whether the author worked as an internal IMS advisor, external consultant or a certification body auditor assessing IMSs of other companies.

Therefore, the author has gladly accepted the invitation to join forces with two UK-based prominent organisations, the Chartered Quality Institute (CQI) and the International Institute of Risk and Safety Management (IIRSM).

Established in 1919, the Chartered Quality Institute (formerly the Institute of Quality Assurance) is the chartered body for quality management professionals. The CQI exists to benefit the public by advancing education in, knowledge of and the practice of quality ('About us', CQI [online]).

The International Institute of Risk and Safety Management (IIRSM) was established in 1975 as a professional membership body that provides recognition, information, support and enhancement

for health and safety professionals and specialist members related to the health and safety field. The Institute's main objective is to advance professional standards and public education in accident prevention and occupational health ('About the Institute', IIRSM [online])

Ian Dalling, the chair of the CQI Integrated Management Special Interest Group (IMSIG) and Barry Holt, Director of Policy and Research at the IIRSM endorsed the study and expressed particular interest in the results expecting that they will help them tailor services to better address IMS-related opportunities and challenges their members face.

The conclusions of this research are also likely to be of interest to companies considering the implementation of an IMS, practitioners whose job is to integrate systems as well as other relevant institutions who support them (e.g. IEMA and IOSH).

Finally, this dissertation may help certification bodies further develop their certification and training strategies to meet the needs and expectations of their customers.

1.2 Research objective and research questions

The main objective of the research, formulated in consultation with the CQI and the IIRSM, is to understand:

- *the extent to which companies have considered integration of their existing and proposed formalised management systems;*
- *the extent to which companies have achieved the integration;*
- *the source of main drivers for the integration process;*
- *benefits and barriers in relation to IMS; and*
- *the level of IMS-related competency among the respondents.*

A number of associated research questions have been established to help achieve this objective, as follows:

- RQ1. How many formalised management system standards (MSSs) are included in the IMS and what are they?*
- RQ2. Do bigger companies operate to more MSSs?*
- RQ3. What are the organisations' approaches to integration?*

- RQ4. To what degree has the integration been achieved and are the results reflecting the integration policy?*
- RQ5. Does the number of MSSs impact on the decision whether to integrate or not or on the degrees of integration achieved?*
- RQ6. Is there a relationship between the structure of support functions and the degrees of integration achieved?*
- RQ7. Where do the main drivers for integration come from?*
- RQ8. What are the main barriers to integration?*
- RQ9. What are the key benefits of integration?*
- RQ10. How do the IMS professionals assess their IMS competence?*

1.3 Structure of the dissertation

The rest of this dissertation is structured as follows.

Chapter 2 gives an overview of the literature and models that are related to the research questions. This chapter will introduce the notions of a management system, a management system standard and the concept of an IMS. It will discuss various aspects of an IMS, including: what to integrate and why, definitions of an IMS, degrees of integration, integration methodologies together with their benefits and disadvantages as well as IMS benefits and barriers.

Chapter 3 explains in detail the methods and procedures used in this research and how they are linked with the research questions. It describes what evidence was collected, how it was collected and the methods and procedures which were used to analyse the evidence that was obtained.

Chapter 4 contains a descriptive and graphic presentation of the survey's results based on statistical analysis.

Chapter 5 summarises conclusions based on the findings described in the previous chapter. It also reflects on the benefits and limitations of the research and suggests aspects for further study.

The questionnaire used in the survey as well as detailed results of the statistical data analyses performed are reproduced in appendices.

Chapter 2: Literature review

2.1 Management systems and management system standards

In every organisation there exist a number of formal or informal management systems, e.g., accounting or production which are necessary for its survival and profits. Seghezzi (2000) calls them “partial management systems”. Organisations create these systems based on the requirements of their respective areas (Karapetrovic and Willborn, 1998b).

ISO defines management system as a “system to establish policy and objectives and to achieve those objectives” (ISO 9000:2005, p.8). ISO also notes that “[e]very organization possesses (whether consciously or not, and whether documented or not) an overall management system through which the organization’s objectives are set, executed and controlled” (ISO Guide 72:2001, p.8).

In 1997 Uzumeri reported that “[f]or three decades, managers and scholars shared the belief that organizations need customized management systems and strategies. In the late 1960s, landmark studies conclusively showed that management practice was too diverse for simplistic solutions. (...) Nonetheless, a few legal, regulatory, and standards-making bodies continue to seek general principles”.

In the 1960s and 70s several attempts were made to create general management standards in a number of fields, e.g., US Department of Defense's MIL-Q-9858A Quality Program Requirements or Ford's QI Preferred Quality Award.

However, it was not until the late 1980s that a breakthrough was achieved in form of management system standards for managing quality (the ISO 9000:1987 series) and internal controls (COSO Framework). Uzumeri and Tabor (1997) coined a term “metastandard” to describe these new management system standards which were converging toward a common definition for key principles of management system design.

“Metastandards for management systems represent the design specification for acceptable management systems. The standards specify “what” systems should exist rather than detailing “how” they should operate” (*Ibid.*) The new metastandards applied to a broad range of organisations and were flexible enough to allow them find reasonable ways to comply.

The ISO 9000 family of standards was first published in 1987 by the International Organization for Standardization (ISO) in Geneva. It was based on the refined BS 5750 national standard developed by the British Standards Institution (BSI) in 1979.

ISO 9000 gained major popularity when the European Community (EC) adopted it to replace the different factory certification standards that its twelve member countries were applying to the manufacture of safety-sensitive products such as pressure vessels, toys, computer monitors, and medical devices. As exporters to Europe began to see value in compliance, other nations adopted the standard. (Eicher, 1992)

The standard has been subject to a number of revisions and the most current edition is the ISO 9001:2008. ISO 9001 remains to date the most used standard in the world with over 1.1 million 9001 certificates issued in 178 countries up to the end of 2010 (ISO, 2011).

Building on the success of ISO 9001, BSI developed a national standard for environmental management system, BS 7750:1994, which was later adopted by ISO and published as the international standard ISO 14001 in 1996. ISO estimates there are over 250 thousand organisations in the world certified against ISO 14001, making it the second most used standard (ISO, 2011). Interestingly, the number of new ISO 14001 certifications is growing faster than for ISO 9001.

The first revision, ISO 14001:1996 contained similar management processes and elements as ISO 9001:1994 with the linkages given in Annex B of the ISO 14001:1996.

Since then, many other standards and specifications have been developed covering various aspects of management (e.g., BS8800 and OHSAS 18001 for occupational health and safety, SA 8000 for social accountability, ISO/IEC 27001 for information security, and ISO 31000 for risk management) or sectors (e.g., ISO/TS 16949 for automotive sector, ISO 13485 for medical devices, and ISO 22000 for food safety) addressing needs of every possible stakeholder an organisation may have. As Karapetrovic (2003) states, “This is the world of mushrooming management system standards (MSS), where for each such stakeholder there is at least one MSS”. The increasing plethora of the management system standards can give managers Hitchcock-style nightmares

(*Ibid.*) or at least leave managers “faced with a bewildering choice” what to implement (Marshall, 2006).

It is the integration of these metastandards and partial formal management systems that is the principal subject of this research.

2.2 Integrated management systems

The notion of integrated management systems attempting to comply with more than one MSS is relatively new. It has first emerged in the early 1990s and gained popularity after publication of the standard for environmental management ISO 14001 in 1996. The degree that organisations were using a single formal documented management system earlier than this to manage multiple aspects of performance is not known.

A number of organisations which had already implemented ISO 9000 by then looked to add the new environmental standard to their portfolio. Karapetrovic and Willborn (1998a) stated: “The standards for environmental control (ISO 14000) already confront management with new challenges that cannot be overlooked any longer”.

Also in 1996, in the absence of any developments at ISO level (Zuckerman, 1997), BSI published BS 8800:1996 Health and Safety Management Guidance Standard.

Weiler *et al.* (1997) reported at the time, “Many professional EH&S managers are struggling to keep abreast of these newer developments and find that in their companies these programs and initiatives are often layered on top of existing ones. (...) These newer programs are not being fully embraced because they are (...) not seen as being aligned with other corporate initiatives, (...). Most companies have not used a holistic approach to ensure that the diverse programs are aligned and integrated to assure maximum efficiency and effectiveness.”

Many authors published articles highlighting synergistic links between the flagship standards resulting from common elements (in particular, policy, documentation, audit and management review) and similarity of structures to make a case for their integration or alignment (e.g., Ahsen and Funck, 2001; Beechner and Koch, 1997; Block and Marash, 2002, pp.7-51; Culley, 1998, p.35; Griffith, 2000; Karapetrovic and Willborn, 1998c; Puri, 1996; Whitelaw, 2004, pp.132-136). Some created matrices based on the links between subclauses of the standards.

Others (Byrnes, 1996; Sissell, 1996) focused on pointing out differences and argued that “[t]here is no real connection between BS 7750 and ISO 9000, just some structural resemblance” (Byrnes, 1996). Renzi and Capelli (2000) claimed that integration of QMS and EMS is not entirely feasible from operational point of view. Hillary (1997) reasoned that it is better to develop stand-alone systems as “integration before the new system matured could disrupt existing systems”. Riemann and Sharratt (1995) also found that separate systems were a better start to reduce confusion and focus effort.

Calls for integration were however prevalent and along with the first series of articles advocating integration of management systems, researchers and practitioners started to develop integration strategies.

To date, an overwhelming majority of the published work concentrates on the integration of either two or all the three most used systems: QMS, EMS and OHSMS (e.g., Beechner and Koch, 1997; Culley, 1996; Douglas and Glen, 2000; Griffith, 2000; Gupta and Upadhyay, 1996; Karapetrovic and Willborn, 1998a; Weiler, 1997). However, it is also possible to find examples discussing integration of other standards, specifications, programmes or initiatives in various sectors (e.g., Asif *et al.*, 2011; Bamber *et al.*, 2000; Beckmerhagen *et al.*, 2003; Castka *et al.*, 2004; Chan *et al.*, 2002; Corcoran, 1996; Grosskopf *et al.*, 2007; Ibrisim and Gokhun, 2005; López-Fresno, 2010; Surak, 2007; Tranmer, 1996).

Various aspects of IMS have been studied both theoretically and empirically. This literature review is structured around main themes identified in literature, such as:

- *What is integration*
- *Degrees of integration*
- *What to integrate and how*
- *Benefits of integration (expected and achieved), and*
- *Barriers to integration*

2.2.1 What is integration?

A number of differences have been identified in the interpretation of what integration means with regards to management systems and management systems standards.

Wilkinson and Dale (1998a) write “It is clear that integration is viewed in a number of different ways, from the implementation of a system throughout the whole organization, to the combining of two or more systems through similarities in their structure, to companywide integration of all systems with the policy and objectives of each system aligned to the overall company policy.”

For Karapetrovic and Willborn (1998a) two systems are integrated when they are linked “in a way that results in a loss of independence of one or both”.

Beckmerhagen *et al.* (2003) define integration of management systems as “a process of putting together different function-specific management systems into a single and more effective integrated management system (IMS).”

The CQI Integrated management special interest group (IMSIG) has adopted the following formal definition of an integrated management system.

“An Integrated Management System is a single integrated system used by an organisation to manage the totality of its processes, in order to meet the organisation's objectives and equitably satisfy the stakeholders.” (Dalling, 2007)

Conti (1999) and Rocha *et al.* (2007) distinguish between two meanings of integration, the first being integration of a sub-system into the overall business strategy and the second – integration of a company's sub-systems.

Some authors (e.g. Karapetrovic, 2002; Beckmerhagen *et al.*, 2003) also draw a line between integration of standards and integration of management systems, with the former based on the similarities of the standards.

In the relatively short history of IMS, there has been a never-ending quest for one management system standard, which could cover some or all other *metastandards*.

Following industry surveys in the UK, MacGregor Associates prepared a report for BSI (MacGregor Associates, 1996) which concluded that having one standard covering various management systems was not a practical proposition. Instead, it advocated future alignment of the management system standards, in particular introduction of common terms and structure.

It is perhaps worth noting that some of the conclusions in the report were dismissed by Wilkinson and Dale (2000) as “unreliable” owing to the wording of one the two questionnaires used by MacGregor Associates to gather the results. Wilkinson’s and Dale’s own survey (2001) raised further doubts about the validity of the claim by MacGregor Associates (*Ibid.*) that alignment rather than integration was the approach preferred by practitioners.

A technical advisory group (TAG) 12 set up by ISO looked into the idea of integrating ISO 9000 and ISO 14001 and also came to the conclusion that the two standards should not be merged but instead made more compatible (ISO, 1998)

ISO/TAG 12 (*Ibid.*) and MacGregor Associates (*Ibid.*) make an important distinction between the systems integration and systems alignment. Integration is “a single top level management ‘core’ standard with optional modular supporting standards covering specific requirements” while alignment means “parallel management system standards specific to an individual discipline, but with a high degree of commonality of structure and content” The two definitions are illustrated by the models in Fig. 1, although judging by the definition provided, one may be forgiven for thinking that in the integration model the “Core” section is split into separate sections by mistake.

In 2001 ISO published Guide 72 aimed at MSSs writers to ensure uniform vocabulary and methodology as well as greater mutual compatibility of the standards to facilitate integration.

Although the recommendations of the abovementioned reports and Guide 72 have been accepted, they have not been fully implemented in the subsequent revisions of the standards. Wilkinson and Dale (2002) looked at the impact of ISO 9001:2000 on the key issues of integration and concluded that the then new version of the standard did not change the approaches to integration, nor did they make a big step towards a greater compatibility. In particular, they believed the adopted “process approach” was not helpful.

CQI (2012) attributed the failure of various attempts to get better alignment between ISO 9001 and ISO 14001 to the lack of synchronisation of their review cycles and rivalry between different technical committees.

Several national standardisation bodies have tried to fill the gap by developing IMS guidelines, the most notable being: the Norwegian Draft Standard (NTS, 1996), the joint Australian and New

Zealand standard AS/NZS 4581 (SAI Global, 1999), the Danish Standard DS 8001:2005, the Spanish UNE 66177 (AENOR, 2005) or PAS 99 in the UK (BSI, 2006).

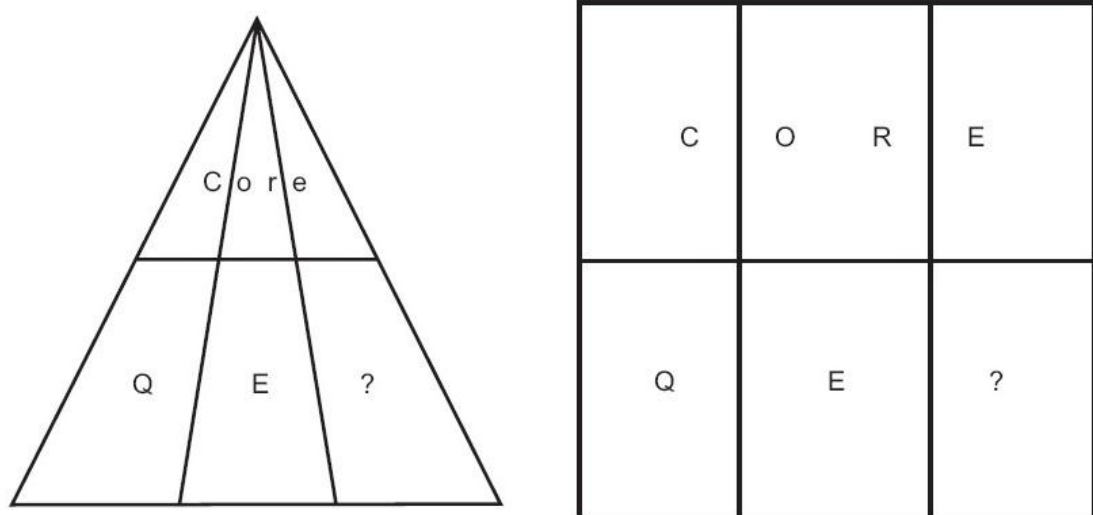


Figure 1. Model of an integrated standard (on the left) versus aligned standards (on the right). (Based on: MacGregor Associates, 1996)

Although some of the above standards and specifications were written on the basis of ISO Guide 72:2001, compliance with them does not ensure conformity with any other MSSs.

Various bodies have also attempted to publish sectoral standards for IMS, e.g. GS-R-3 for the nuclear industry (IAEA, 2006) or the Canadian TP 14693E for civil aviation (Transport Canada, 2007).

Among the calls for one standard, Karapetrovic (2002) argued that the availability of an integrated MSS is not a requirement for a successful integration of MS. He and Jonker postulated that what standard users require is not an integrated MSS, but “a model that is able to accommodate the inclusion of any current and future MSS” (2003). Karapetrovic (2003) believes that “many

standards, one system” is a better goal than “one standard, one system”. With the trend of new standards and their revisions published every year, the goal of one standard is simply not viable.

In 2010 work began on yet another ISO Guide intended for standards writers to simplify the implementation of IMS. Final Draft ISO Guide 83:2011 was sent out for comments in May 2011 but as of 30th April 2012 the project was deleted.

2.2.2 Degrees of integration

Integration, combination, harmonisation, consolidation, addition, unification, parallelism, compatibility, assimilation, amalgamation, blend, alignment, fusion, merger – these are just a few terms used in the literature to describe theoretical and practical levels of integration.

Integration is perceived by many (see below) as continuum ranging from no integration (two independent systems) to partial integration to full integration with most organisations situated somewhere in between.

Dalling (2007) enlists features of an IMS versus non-integrated systems:

	Integrated	Non-Integrated
1	Single Policy Statement structure covering all relevant aspects in a generic way without unnecessary replication. This may include subordinate subsections addressing specific topics e.g. equal opportunity.	Separate policy statements for quality, health, safety, environment, security, finance, ethics and sustainability etc.
2	A single description (management manual) describing the formal management arrangements unless specific stakeholder requirements such as licensing and regulation prohibit it.	There are separate management manuals covering aspects such as quality, health, safety, etc. often written in different styles.
3	The totality of the control of people issues, such as organisation, responsibility, authority, competency and organisation/project employment life-cycles, is defined in an integrated logical structure and promotes integrated processes.	Discrete arrangements for managing different aspects of organisation, responsibility, authority, employment, competency and other people specific issues.
4	Process controls are developed such that opportunities and all aspects of risks are simultaneously addressed.	Separate discrete assessments are conducted for quality, health, safety, environment etc. resulting in non-integrated and potentially non-optimal controls.

	Integrated	Non-Integrated
5	Notwithstanding any specific stakeholder requirements such as licensing and regulation, management controls at company and project level are defined in a single coherent set of documentation such as generic plans, procedures, work instructions and forms e.g. an event reporting form would cover any issue such as a complaint, personnel or environmental accident etc.	Management controls are covered in multiple documents. There is a need to consult several documents to control a process.
6	Reactive Monitoring (customer feedback, accidents, and incidents etc.) managed via a single integrated process. The resulting analysis covers all issues in an integrated way. Everything contained in one database.	Discrete processes for dealing with different types of feedback related to quality, health, safety, environment, finance, security etc. Data generally in separate databases.
7	Proactive Monitoring (audits, inspections, surveys, benchmarking etc.) are managed together in a coherent way to effectively and efficiently optimise the management system and the organisation's processes.	Discrete proactive monitoring processes addressing issues such as quality, health, safety, environment etc. Additionally different types of proactive monitoring such as auditing, inspection and benchmarking etc. do not necessarily take account of each other.
8	All types of change are managed through the same formal process.	Change is managed via multiple discrete processes.
9	The Management Review process covers all aspects of the operation of the organisation and shorter term review cycles are logically embedded into longer term review cycles to form an integrated hierarchy of management review processes appropriate to the size and complexity of the organisation.	Discrete Management Review processes which do not review all aspects of data in a coherent and integrated way. A typical example is agreeing a company budget separately from quality, health, safety, environmental and other training for the coming year.
10	Aim to apply management tools and approaches generic way to achieve improvement e.g. integrated risk assessment.	Tendency to not apply management tools generically for achieving improvement e.g. use of diverse methods of risk assessment or different risk rating scales.

Table 1. Features of an integrated versus non-integrated management system (Source: Dalling, 2007, p.5)

However, Okrepilov (2010) argues that there is no zero on the integration scale because any organisation which implemented two or more management systems standards has an IMS, "as these sub-systems are a part of the company's overall management system and, consequently, their interactions are inevitable." He defines the term of "integration level" as the "degree of

achieving unification of systems elements in the implementation of two or more management system standards”.

Many authors have attempted to conceptualise the levels of integration as presented by the useful summary created by Bernardo *et al.* (2009) shown in Fig. 2 below.

Jonker and Klaver (1998) propose a framework of five different integration levels:

- (1) *policy integration – management must decide to go for integration,*
- (2) *conceptual integration – choosing a model (e.g., EFQM) on which integration will be based,*
- (3) *system integration – building a system based on the chosen model,*
- (4) *normative integration – at the standards level, must address the differences between the standards, and*
- (5) *pragmatic integration – at the documentation level to ensure clear instructions for employees.*

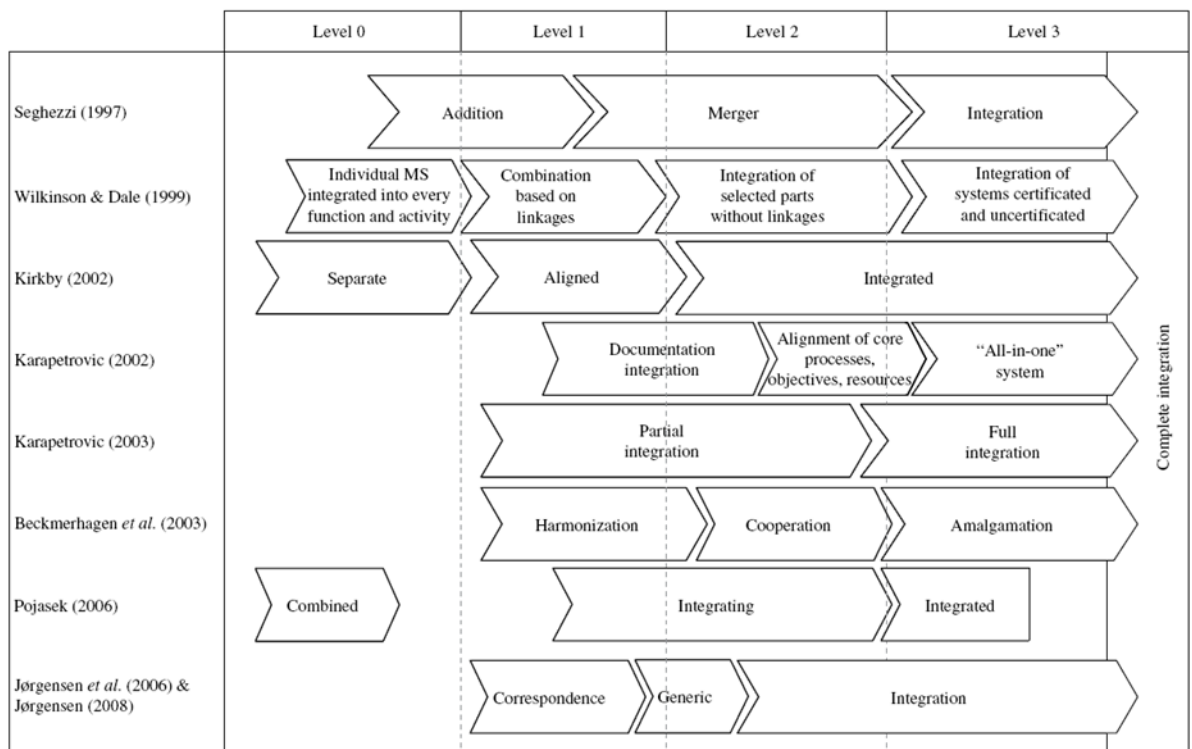


Figure 2. Degrees of integration according to some authors. (Source: Bernardo *et al.*, 2009)

Zeng *et al.* (2007) propose a multi-level synergetic model for implementing an IMS as shown in Fig. 3. They argue integration should take place at three levels: (1) strategic, (2) structural, resource and culture, and (3) documentation.

Additionally, Okrepilov (2010) describes a recently developed systematic method for assessing the integration level of management systems based on PAS 99 (BSI, 2006). The method results in an indicator for the integration level (K) being calculated for each assessed IMS. Depending on the value of K, IMS is at one of four integration levels: from elementary to excellent.

At the other end of the continuum there is the utopian complete, true or full integration.

Many share the view that the ultimate goal is for IMS to cover the totality of the organisation's processes and certificated and uncertificated sub-systems (including e.g. finance, information, etc.) regardless whether they are based on formal models and standards or not (e.g. Hoyle, 1996; Hall, 1998; Wilkinson and Dale 1999a; Seghezzi, 1997 and 2000; Griffith, 2000; Dalling, 2002 and 2007; Beckmerhagen *et al.*, 2003).

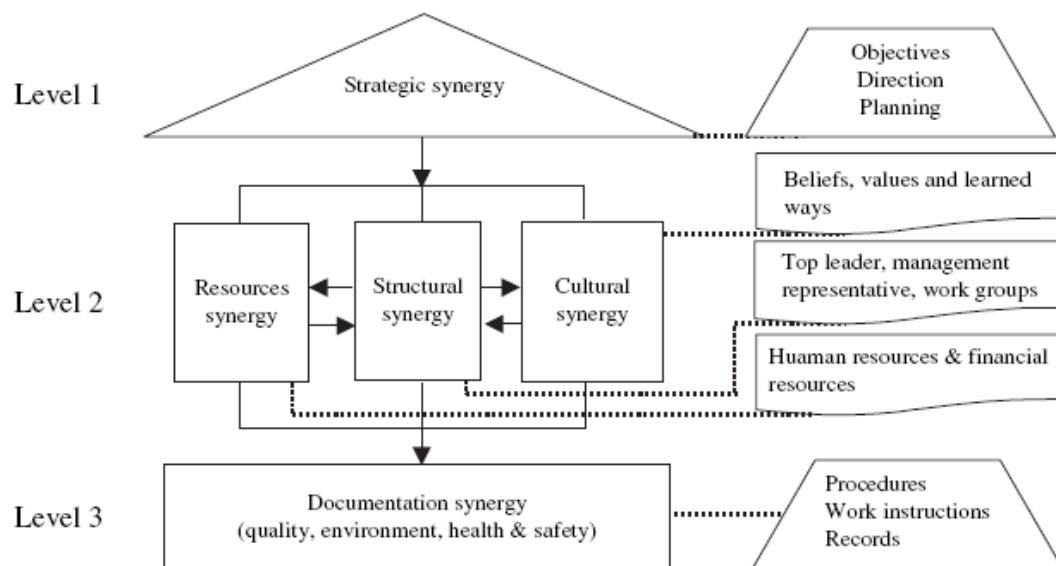


Figure 3. A synergetic model for IMS (Source: Zeng *et al.*, 2007)

As Riley (2007) jokingly put it, “Why only QUENSH [Quality, Environment, Safety and Health]? Why not FiSH (Finance, Safety & Health), HaRSH (Human Resources, Safety & Health) or RaDiSH (R&D, Safety & Health)”.

Still, it is to be stressed that none of the organisations identified in the literature appeared to adopt this total approach. Wilkinson and Dale (1998a) argued that few companies are in fact planning full integration, and those that do are likely to have extensive experience in introducing TQM initiatives.

Some authors also recognise that integration, like excellence, is a journey that never ends because the needs of the organisations continually change (Rocha *et al.*, 2007; Dalling, 2002). Dalling (*Ibid.*) believes that “the only perceived limits to integration are the points where integration ceases to add value and the creativity of the leaders, managers and employees”. In his view, “Fully integrated management naturally embraces all management activity. However, this does not mean that in a fully integrated organisation everything is integrated - it means that it will be optimally integrated. Integration and the necessary diversity must harmoniously coexist and it is important to remember that integration must cease when there is no value being added. There is no magic formula for determining this point - it is a matter of initial judgement and continual reviewing of performance.”

Asif *et al.* (2009) echo this view and propose that “an IMS that works well for one organisation may not work for another; a true IMS would therefore be one that has been designed specifically for that organisation”.

Empirical studies show that for most companies integration is a gradual effort and they opt for a partial integration, typically covering the most similar elements of the systems, such as policy, documentation, objectives and internal audits (e.g., Ahsen and Funck, 2001; Beckmerhagen *et al.*, 2003; Chan *et al.*, 1998; Douglas and Glen, 2000; Renzi and Capelli, 2000; Wilkinson and Dale, 2000).

Only in two surveys of companies in Italy (Salomone, 2008) and in Spain (Bernardo *et al.*, 2009) majority of companies (73% and 79% respectively) declared they had totally integrated systems. However, Bernardo *et al.* (*Ibid.*) detailed analysis of the responses revealed that many of the companies who reported they had fully integrated system, had in fact partly integrated documentation or separate functions for quality and environment, which is a clear indication that

the lack of unified understanding of integration among researchers is matched by similar confusion among practitioners.

In particular Bernardo *et al.* (*Ibid.*) found that “those organizations which partially integrate do so mainly in the more strategic aspects of the organization, leaving the more operational areas such as “product realization” for either later, lesser integration or no integration.”

Bernardo *et al.* (*Ibid.*) essentially identified three distinct levels of integration of management systems among the organizations which reported having an integrated management, i.e. strategic, tactical, and operational. Asif *et al.* (2010a) operationalised these levels as shown in Fig. 4. According to them, “Whereas the strategic level concerns integrated planning and resources deployment; the tactical level concerns the design of IMS and monitoring the execution of IMS; and the operational level concerns the execution of activities in an integrated fashion”

Bernardo *et al.* (2011) also found later that “on average, as the level of integration of standardized MSs increases, so does the level of integration of internal audit components, and thus the integration of the internal audits themselves.”

In their study of the UK construction sector Griffith and Bhutto (2008) discovered that while companies recognise similarities in the separate standards-based management systems and use them to build IMSs, they lack clear methodology how to do it.

Take the concept of “integrated documentation” as an example. After detailed examination of the literature it becomes evident that “an integrated manual” may range from superficially integrated (separate documents listed together under one heading; e.g., Chan *et al.*, 1998) to partially integrated (e.g., Hall, 1998; Renzi and Capelli, 2000) to fully integrated (e.g., Mackau, 2003). It is apparent that not all organisations understand that “[p]utting separate systems into a single manual of policies and procedures is not integrating them.” (Wilkinson and Dale, 1998a)

Similarly, Helpert and Lazarine (2009) complain that while many organisations think they conduct “integrated audits”, in fact these are often joint audits with distinct audit teams producing discrete findings packaged in one report. This view was empirically confirmed by Bernardo *et al.* (2010) in their study of audits of IMS in Spain in which only about 50% of respondents carried out fully integrated internal audits.

Degree of integration
<p><i>Strategic level</i></p> <p>Full integration: An integrated policy exists. The organisational objectives relate to effective management of stakeholder requirements – such as quality, environment, health and safety, and social responsibility Organisational plans are clear to achieve stated goals and objectives. There is complete alignment between organisational policy, goals, and plans to achieve these goals</p> <p>Partial integration: Organisational policy, objectives, and plans are mutually aligned to some degree They describe to some extent how the organisation will achieve its objectives</p> <p>No integration: Organisation has policies, objectives, and plans, which are aligned neither to each other nor to the operations They give no clue to how the organisation will achieve its goals regarding various stakeholder requirements</p> <p><i>Tactical level</i></p> <p>Full integration: Managers have combined duties for various functions Managers develop integrated management manual and procedures Managers emphasise the need of integrated operations, documentation, records, and overall working in their directions, training, and other formal/informal means of communication and implementation Most of the time the managers from various functions interact, collaborate, and arrive at mutually acceptable outcomes Integrated audits are carried out.</p> <p>Partial integration: Managers have combined responsibilities to some extent. They are primarily concerned with getting their specific job done well. Only sometimes do managers interact, collaborate, and arrive at mutually acceptable outcomes Performance evaluation is based on getting their specific job done well (such as meeting production targets or savings in procurement) rather than integrated functioning Audits and corrective action reports are partially integrated</p> <p>No integration: Most of the time managers do not interact, collaborate, nor do they reach mutually acceptable outcomes There are separate procedures for each department which promote little collaboration In general individual functions are considered the responsibility of separate departments Separate auditing is carried out for each function</p> <p><i>Operational level</i></p> <p>Full integration: Most of the work instructions, records, checklists, and data collection sheets are integrated Various aspects of processes – representing stakeholder requirements such as quality, sustainability, health and safety, etc. – are considered jointly and in an integrated manner during the execution</p> <p>Partial integration: Some of the work instructions, records, checklists, and data collection sheets are integrated. The execution of operational processes considers relevant stakeholder requirements in a partially-integrated manner</p> <p>No integration: Separate records, work instructions, checklists, and data collection sheets for various MSs or various aspects of processes No integration among various aspects of processes</p>

Figure 4. Degree of integration and its operationalisation at different organisational levels (Source: Asif et al., 2010a)

Interestingly, documentation and internal audits are two of the elements which are most common to integrate, partly due to a number of available formal guidelines like ISO 19011:2002.

2.2.3 What to integrate and how

With no unique definition of integration, it is not surprising there is no consensus how an IMS should be achieved.

A number of different approaches and methods have been proposed and used for integrating management systems and it seems that neither offers a complete solution. Although some academics argue that IMS should be tailor-made, others try to prove that some integration strategies lead to limited or no benefits.

Karapetrovic and Jonker (2003) wonder whether there really could be one best way to integrate management systems, or rather there are many ways that depend on individual circumstances and organisational needs. They state, "Just like we cannot create the best IMS model, it is not possible to develop a methodology that will work in all cases. This is partly because both the objectives (ending points) and initial conditions (starting points) on the path to an IMS are different for different companies." (*Ibid.*)

Seghezzi (2000) argued that in designing IMS, "most important is to find a generic management concept which supports the integration of all existing partial management systems (...). That means companies have to look for a general management system with high integrative power."

Almost all integration strategies found in literature use one or a combination of the following concepts: the Matrix Model, "a system of systems", process-based approach, risk-based approach, Total Quality Management (TQM) and Business Excellence (BE) models.

These concepts and resulting integration strategies should be examined alongside the definitions and degrees of integration described in previous sections. Each proposed solution has its merits and each has its costs.

The Matrix Model

At the onset of IMS discussions which regarded only QMS and EMS, Karapetrovic and Willborn (1998a) proposed three possible strategies for integration:

- (1) Establish QMS first and subsequently EMS.
- (2) Establish EMS first and subsequently QMS.
- (3) Establish EMS and QMS simultaneously

Using one of the existing standards as a base of an IMS remains one of the most popular strategies (e.g., Bamber *et al.*, 2000; Beechner and Koch, 1997; Block and Marash, 2002; Craddock, 1997; Culley, 1998; Douglas and Glen, 2000; Lengden, 1997; Lissenden, 1999; Massey, 1996; Renzi and Capelli, 2000; Wright, 2000).

Most authors highlight similarities in the structure and advocate adding ISO 14001 components to those of ISO 9001. Empirical studies also show that adding EMS and or OHSMS to existing QMS is most common, mostly because of high use of QMS and the time lag between publishing the first QMS and EMS standards (Bernardo *et al.*, 2009; Bernardo *et al.*, 2012b; Karapetrovic and Casadesús, 2009). Griffith (2000) believed that existing quality systems were “the obvious vehicle for driving necessary change”. Craddock (1997) underlines the advantages of this approach which enables organisations to use lessons learned from implementation of the first system.

One of the few empirical examples of the second strategy is given by Ahsen and Funck (2001). This strategy is only available for companies which have yet to implement QMS.

In an empirical study Bernardo *et al.* (2012b) found that “organizations that had decided to implement standardized MSs simultaneously (...) are those that have integrated their MSs at the highest level, compared to all other groups. This is possibly because MSs were implemented together, and therefore, the organizations have found it easier to exploit synergies between the different MSs”.

All three strategies exploit commonalities and synergies of the standards. Some of the standards include in annexes matrices of the linkages and cross-references between sub-clauses of the most popular standards, e.g. Annex A in ISO 9001:2008, Annex B in ISO 14001:2004, Annex A in BS OHSAS 18001:2007 or Annex C in ISO/IEC 27001:2005.

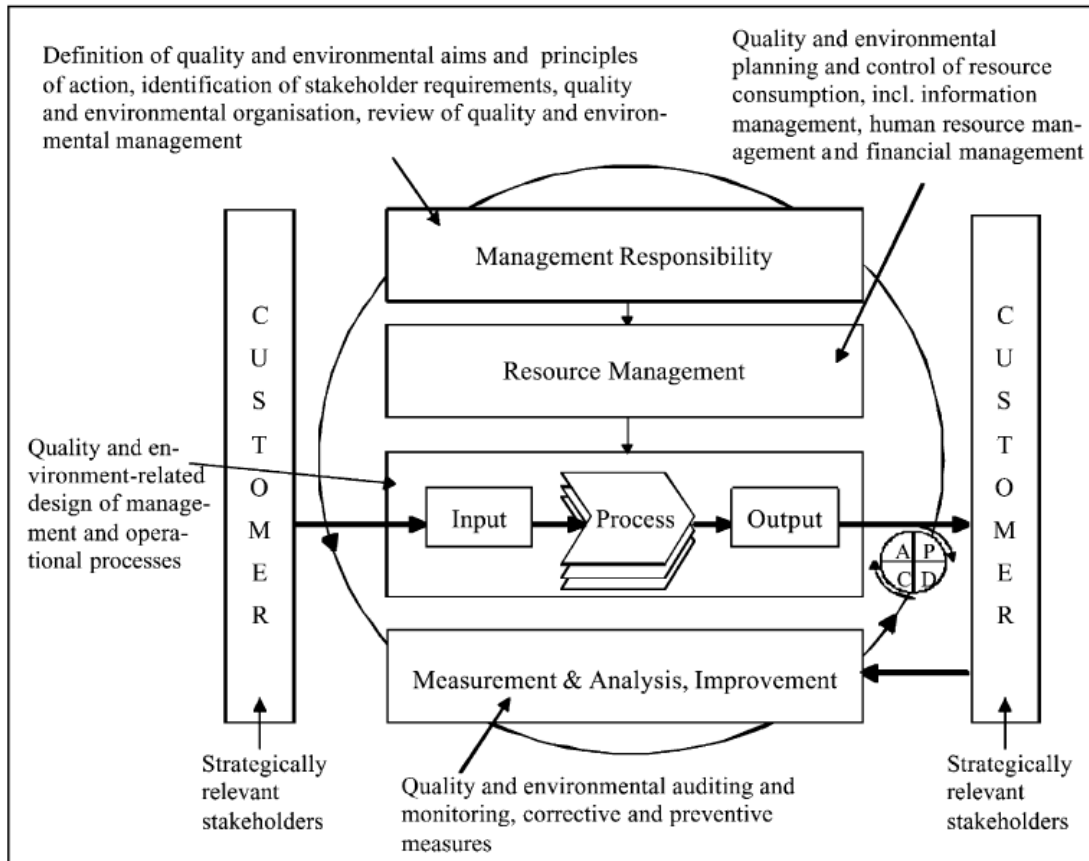


Figure 5. Integration of quality and environment related elements in the structure of ISO 9001:2000 (Source: Ahsen and Funck, 2001)

Ahsen and Funck (2001) also showed how elements of ISO 14001 are linked with the ISO 9001 structure (Fig.5).

In 2001 Scipioni *et al.* reported that SMEs were slow to embrace the concept of IMS and presented an overview of the IMS Implementation Guide commissioned by The Euro Info Centre EIC/IT 378 and developed by the Research Centre for Quality and Environment of the University of Padova. The guide presented a model of integration based on the commonalities and dissimilarities between the three standards, ISO 9001, ISO 14001, and BS 8800 and offered a choice of solutions at different levels of integration.

The fact that not all elements of the early versions of the standards could be easily linked has been considered a weakness of the matrix model (MacGregor Associates, 1996; Powley, 1996; Seghezzi, 2000; Stapleton, 1997; Wilkinson and Dale, 1999c)

Furthermore, Beckmerhagen *et al.* (2003) claim that integration based on commonalities of the standards leads to “integrated standards” rather than “integrated systems”. In their opinion, supported also by Renfrew and Muir (1998), the matrix model is the first milestone towards achievement of full IMS, should a company wish to do so.

A System of Systems

Karapetrovic and Willborn (1998a) suggested another approach which they called “a system of systems” with a model that made use of the identified linkages in the standards but also attempted to fill the gaps where the linkages were unclear or not obvious. The system’s view is illustrated in Fig. 6.

Karapetrovic and Willborn, (1998c, 2002) show an example of how their system concept can be applied to integrate internal audits.

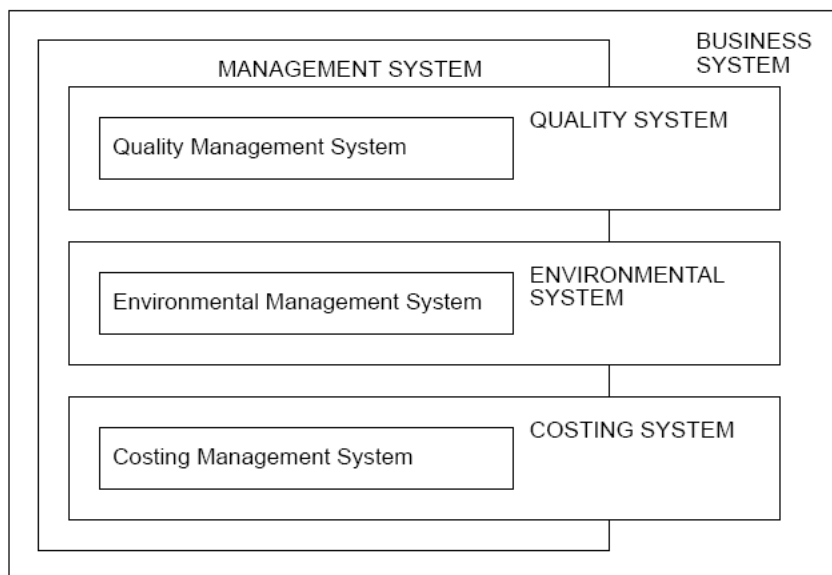


Figure 6. The system’s view: quality system and related systems (Source: Karapetrovic and Willborn, 1998d)

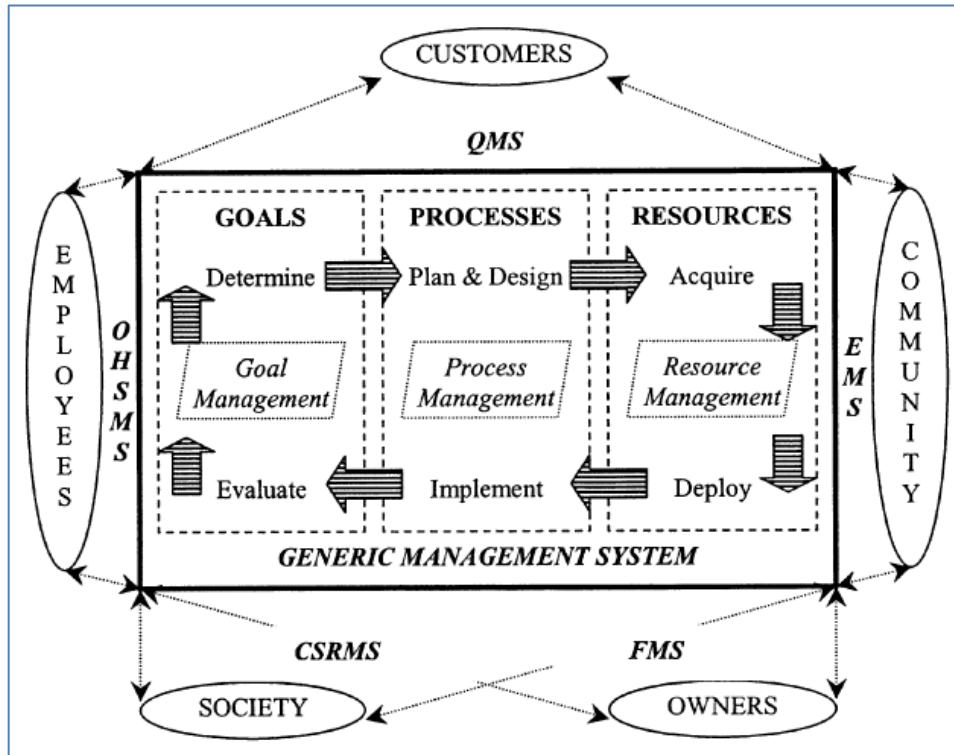


Figure 7. The systems model for IMS (Source: Karapetrovic and Jonker, 2003)

The model was later enhanced to combine the process-approach of ISO 9001:2000 and the PDCA approach of ISO 14001:1996, OHSAS 18001:1999 and SA 8000:2001 (Fig. 7).

In their case study of four companies, Asif *et al.* (2010a) explored the two integration strategies: the matrix model (which they call “the techno-centric approach”) and the systems model in an attempt to measure their effectiveness. They concluded that the integration strategy based on the former leads to benefits confined to the operational level and IMS could not develop into a holistic business MS. On the other hand, companies which follow the stakeholders-oriented integration approach with integration at the strategic level and then cascades downward achieve full integration and benefits at all levels (strategic, tactical and operational).

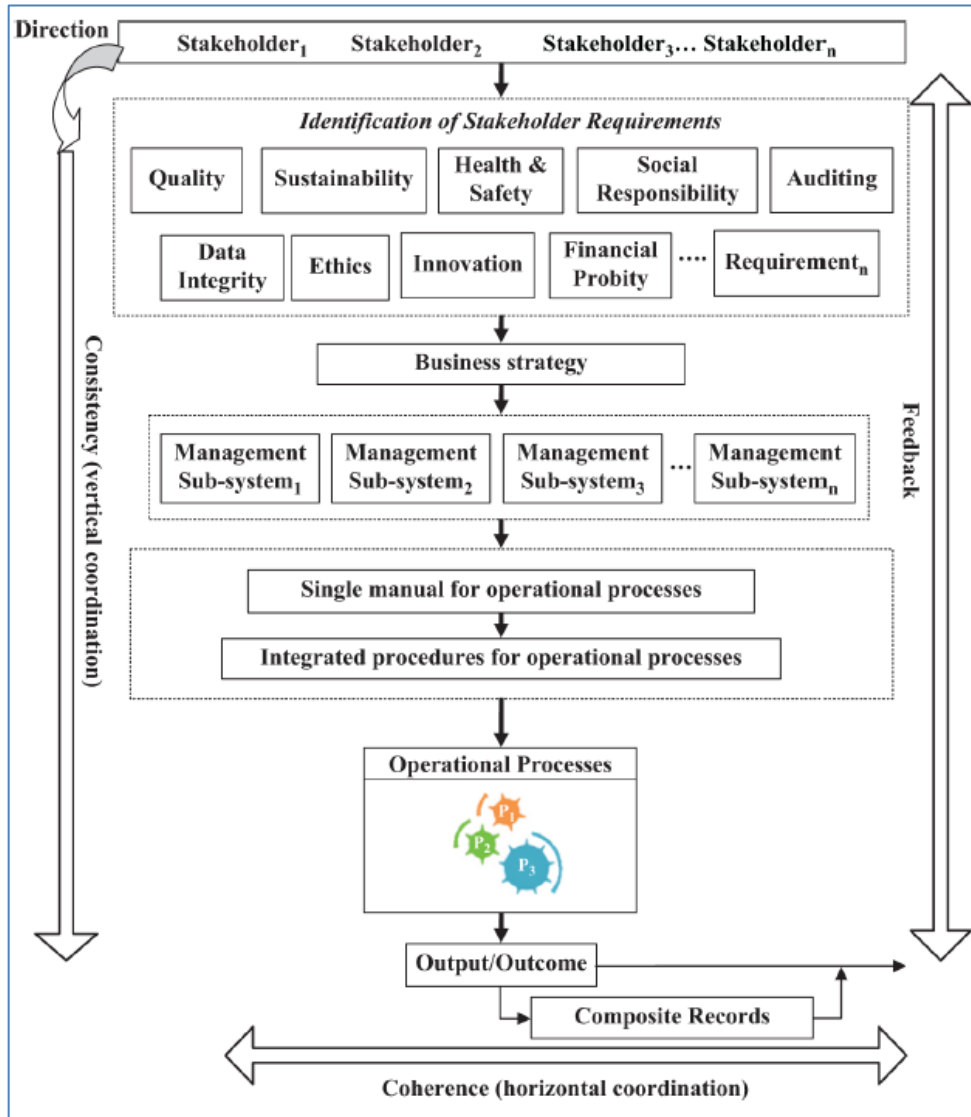


Figure 8. Systems approach to integration of MSs (Source: Asif *et al.*, 2010b)

Their systems approach shown in Fig. 8 differs from the one first proposed by Karapetrovic and Willborn (1998a, 1998d) by emphasising stakeholders' requirements as the starting point of integration and determinants for design of IMS. They call this "a meta-management approach" as it refers to the management of the whole enterprise (including social, ecological and economic aspects) rather than management of individual sub-systems. (Asif *et al.*, 2011)

Conti (1999) proposes another systems model also based on all stakeholders' needs. His model (Fig. 9) is based on combined visions and cross-functional processes which deliver satisfaction of all stakeholders.

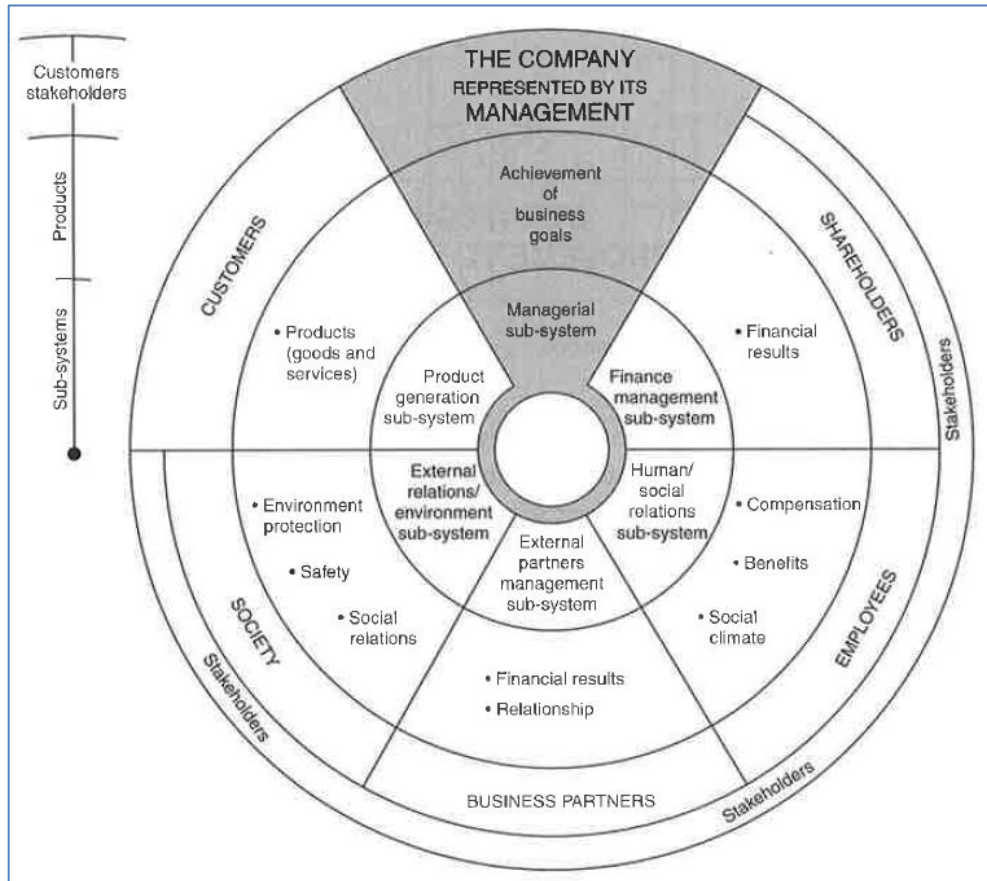


Figure 9. The company as a system that generates products to satisfy the needs of a variety of customers/stakeholders (Source: Conti, 1999)

Wilkinson and Dale (1999c) criticised both the matrix model and “the system of systems” approaches for failing to address the issue of organisational culture.

Process-based approach

Process-based IMS involves mapping core, supporting and assurance processes and describing them often by flowcharts using chosen process language. The process descriptions include all aspects of the process (quality, environmental, etc.) and cover requirements of all standard.

Process-based approach to integration was advocated by Tranmer (1996) and Weiler (1997). Tranmer (*Ibid.*) postulated: “the common element of all management systems is a very simple one: process”.

However, with the flagship standards all based on the Plan-Do-Check-Act (PDCA) model, process-based approach had not been very popular until it was formally adopted in the 2000 revision of the ISO 9001.

For instance, Seghezzi (1997) initially argued that process-oriented management models were too restrictive, were “strongly operation oriented” and did “not consider normative and strategic issues in an adequate way”.

Nevertheless, after publication of ISO 9001:2000 and the formal move from a system-based to a process-based management approach, he wrote “Process management models are a very good generic foundation for the integration of partial systems.” (Seghezzi, 2000)

This view was further supported by Pojasek (2006) and Griffith and Bhutto (2009). The latter identified organisational mapping as one of the best practices in IMSs in the construction sector in the UK. López-Fresno (2010) showed how the process-based approach was used to implement IMS in an airline company.

Process management is also a vital ingredient in models proposed by Karapetrovic and Willborn (1998b) and Asif *et al.* (2009) which require both vertical and horizontal integration. Fig. 10 shows process-based design of IMS proposed by the latter.

Asif *et al.* (*Ibid.*) write: “At the operational activities level, the need for a process-based design of IMS lies in the very basic fact that there is no “one size fits all” IMS: organisations need to design an IMS that is tailored to the specific challenges and opportunities of their own context and this process must start from the core processes of the organisation.” According to their model, the work on IMS starts with identifying processes, incorporating quality, environmental and all other requirements in the design of these processes and then further improving their efficiency using TQM, 6S, lean and other tools to aim for excellence. Therefore, process-based approach and TQM are compatible.

Finally, another attempt of combining process view and a systems approach is Pojasek’s employee-focused integration model (2006). Pojasek (2007a) advocates that true integration may be achieved not by integrating the functions themselves but rather making employees “responsible for aspects like quality, environment and health and safety within their work areas.”

His views are further supported by Beckmerhagen *et al.* (2003), Karapetrovic (2003) and Renzi and Capelli (2000) who argue that for large organisations full integration should occur “at the top and bottom organizational levels, while function-specific elements can be kept separate at

intermediate levels”. Renzi and Capelli (*Ibid.*), in fact, oppose full integration of the systems and support the view that the quality and environmental functions should be kept separate.

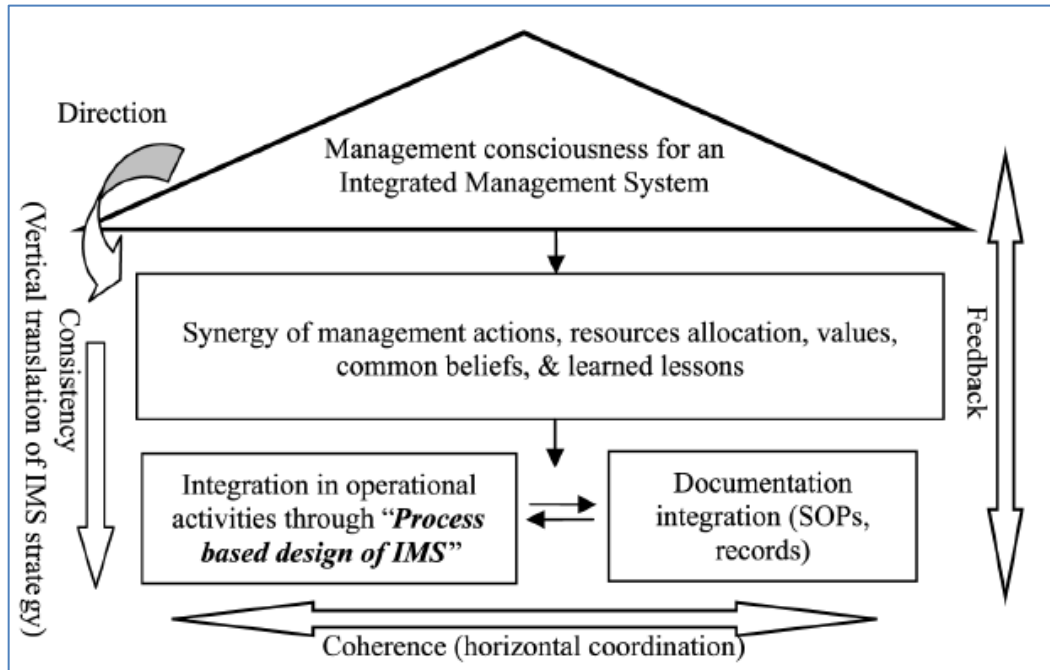


Figure 10. Vertical and horizontal integration of IMS (Source: Asif *et al.*, 2009)

One of the main advantages of the process-based approach is that it postulates involvement of employees and therefore has a higher potential of their buy-in (Pojasek, 2006). Mackau (2003) also believes in extensive involvement of all employees in the design and implementation of a process-based IMS which results in “a highly-transparent and user-oriented management system. (...) Rather than a few individuals, all employees are responsible for the maintenance and further development.”

Mackau (*Ibid.*), however, recognises that this is not the easiest method of integration, especially for SMEs. For employees to be able to consider all aspects and requirements for their process they need either extensive training or specialists need to be involved, thus increasing costs and/or required time. Moreover, the transition from a function-orientated organisation to a process-orientated one needs to be tackled carefully to avoid resistance from staff who perceive the change as threatening.

In contrast, Wilkinson and Dale (2002) disapproved the use of the process approach in ISO 9001:2000 which they believed caused more problems due to the fact that the other standards did not use it.

Dalling (2011) attempts to solve this problem by combining PDCA with process approach to propose his Twelve Universal Elements of the Management Topic Taxonomy as a structure model for a unified management system covering all sub-systems which could exist in any organisation.

(Fig. 11)

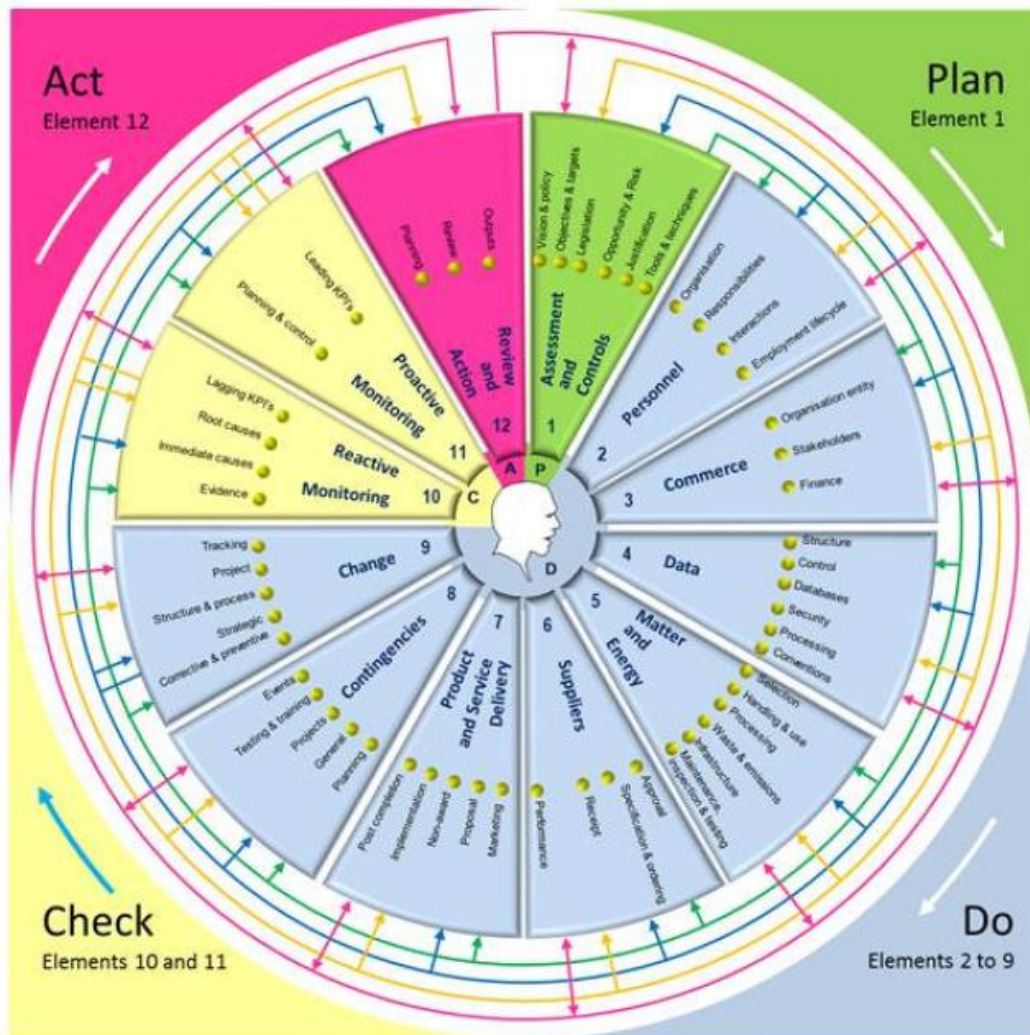


Figure 11. Twelve Elements of the Management Topic Taxonomy (Source: Dalling, 2011)

Risk-based integration

Risk-based approach is gaining popularity in the recent years owing to the growing importance of risk management (Accenture, 2011).

Despite the fact that various risk management tools like ERM or FMEA have entered the quality domain, there is no mention of risk management in the ISO 9001:2008 standard or its previous revisions. Okrepilov (2010) is among those who expressed his concern about it.

Nonetheless, this has not prevented several authors from proposing that integration should be risk-based.

Muir (1994) and Renfrew and Muir (1998) introduced the idea of QUENSH (QUality ENvironment Safety Health), a single management system focused on management of key business risks.

Likewise, Griffith (2000) believed risk assessment to be the “principal property around which to structure the IMS”.

An empirical example of risk-based integration is given by Hall (1998).

Labodova (2004) also argues that risk can be used as an integrating factor for complex MSs – “risk for the environment, risk for life and health of employees and surrounding population, and risk of economical losses.” Her methodology (originally developed for OHSMS) combines risk analysis with the PDCA approach to implement IMS covering quality, environmental and health and safety management systems.

Grosskopf *et al.* (2007) dittoes this view stating that “[q]uality, EH&S, and security simply represent different aspects of business risk, all of which can be addressed with similar processes and methodologies”. Their unified risk management approach based on PDCA cycle fully supports the principles of Enterprise Risk Management. Its advantage is that it gives the management a tool to compare risks across all processes thus enabling implementation of controls proportionate to the risk.

Nitu and Nitu (2010) propose a similar integration methodology built on the risk management framework described in the ISO 31000:2009 Risk management standard.

Milliman *et al.* (2004) and Salomone (2008) note that risk-based integration is easier for systems based on risk-based standards, such as ISO 14001, OHSAS 18001 or ISO/IEC 27001.

Combined process- and risk-based approach

Badreddine *et al.* (2009) attempt to combine the best of all approaches with a model which uses three integrating factors:

- (1) process approach to integrate processes,*
- (2) risk management to integrate aspects of different standards, and*
- (3) a monitoring system with performance indicators*

Their recipe for total integration starts by setting up objectives to address requirements of all stakeholders, followed by establishing processes to deliver the objectives. Then for each process identify and evaluate hazards and risks relating to various systems (e.g. quality, environmental, safety, security) which would prevent the organisation from achieving its objectives. Subsequently, a global action plan should be developed based on the results of the risk evaluation and its successful implementation monitored. Finally, effectiveness of the implementation is measured to evaluate to what degree the objectives have been achieved and the plan is re-adjusted. The model is shown in Fig. 12.

It is instructive to examine a framework proposed by Dickstein and Flast (2009, p.78). Although their work is not specifically related to IMS, their model (Fig. 13) aims to integrate risk management and process management which are the two dominant approaches in meta-standards.

Dickstein and Flast (*Ibid.*, p.41 and p.79) believe there is a linkage among operational risk management (ORM) and business process management (BPM) and neither can work effectively without the other. They argue that “only by working in tandem can both frameworks [ORM and BPM] effectively manage and mitigate operational risk and improve business processes.

It is suggested that this model could potentially be used to integrate management system but requires further research to do so.

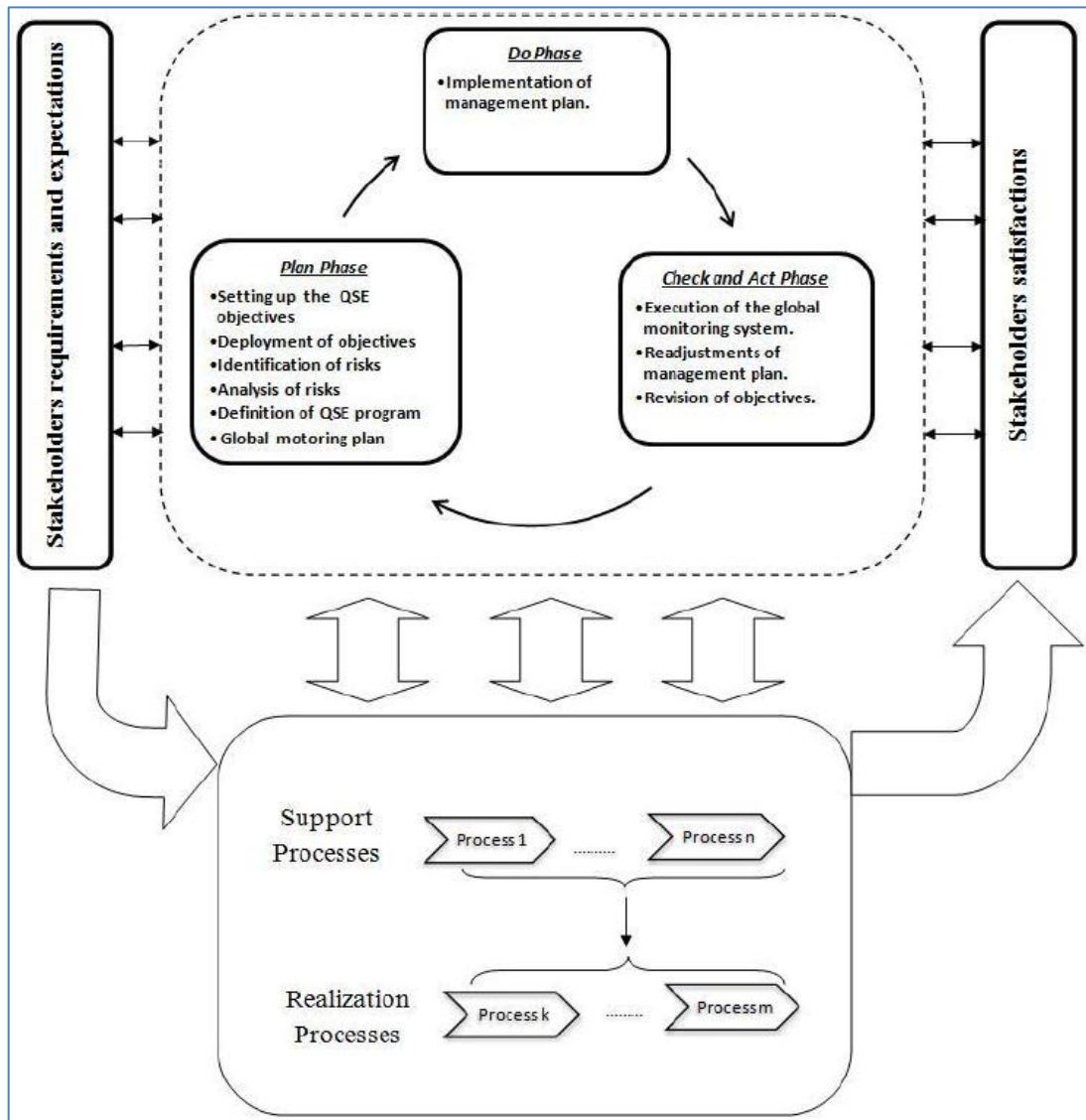


Figure 12. Process-based approach for IMS (Source: Badreddine *et al.*, 2009)

Total Quality Management (TQM) and Business Excellence (BE) models

A number of authors have tried to demonstrate that the TQM and BE models provide the missing link between QMS and other MSs and should be used as vehicles to achieve integration (e.g.

Conti, 1999; Karapetrovic and Jonker, 2003; Lawrence *et al.*, 1998; Mangelsdorf, 1999; Seghezzi, 1997)

Seghezzi (1997) initially argued that “TQM has a chance to be a generic management model. On the other hand, it is not evaluated enough. Further, especially for small and medium-sized companies, it seems to be too complicated.” Later, he (2000) saw a better potential of using the excellence models as good bases for integrating partial management systems, mainly due to the formally adopted process approach in ISO 9001:2000.

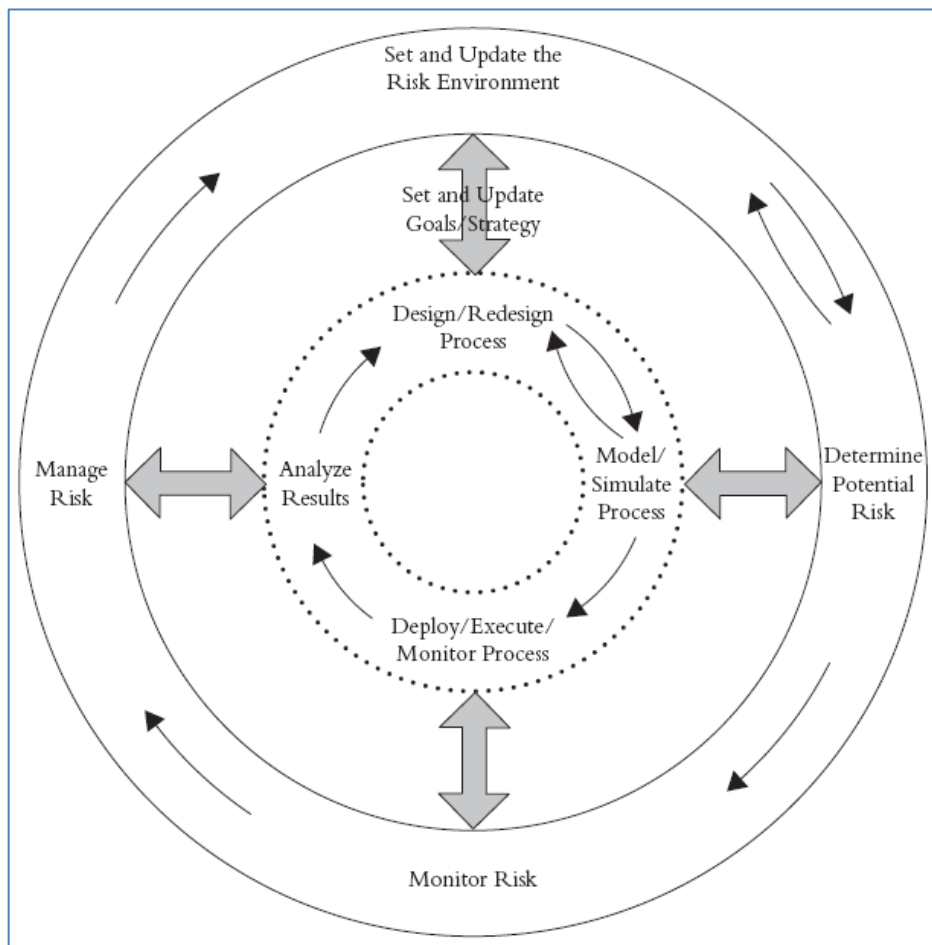


Figure 13. Operational Risk Management and Business Process Management Integrated Framework

(Source: Dickstein and Flast, 2009, p.78)

In Uzumeri’s (1997) view, there are two ways of looking at management systems. He suggests that “integration can be based either solely on the requirements of the standards or on a total quality and continuous improvement approach. In the latter case, standards are still necessary but they are primarily for quality assurance and quality control, and improved business performance

is the main aim. With integration through the standards, the objective is limited to reducing audit fees, management fees and administration costs.

Wilkinson and Dale (1999c) looked at the application of the EFQM model as a foundation for IMS and concluded that “the combined standards still fall short of what the EFQM Model offers, and it cannot meet the certification requirements of the standards”. However, they make a claim that organisations familiar with the TQM approach will face less difficulty when adding EMS and OHSMS to their QMS (1999b). They developed a model, shown in Fig. 14, based on a total quality approach, tested it empirically and found that it had both value and validity. (Wilkinson and Dale, 2001). However, no further information was found in literature regarding practical application of this model.

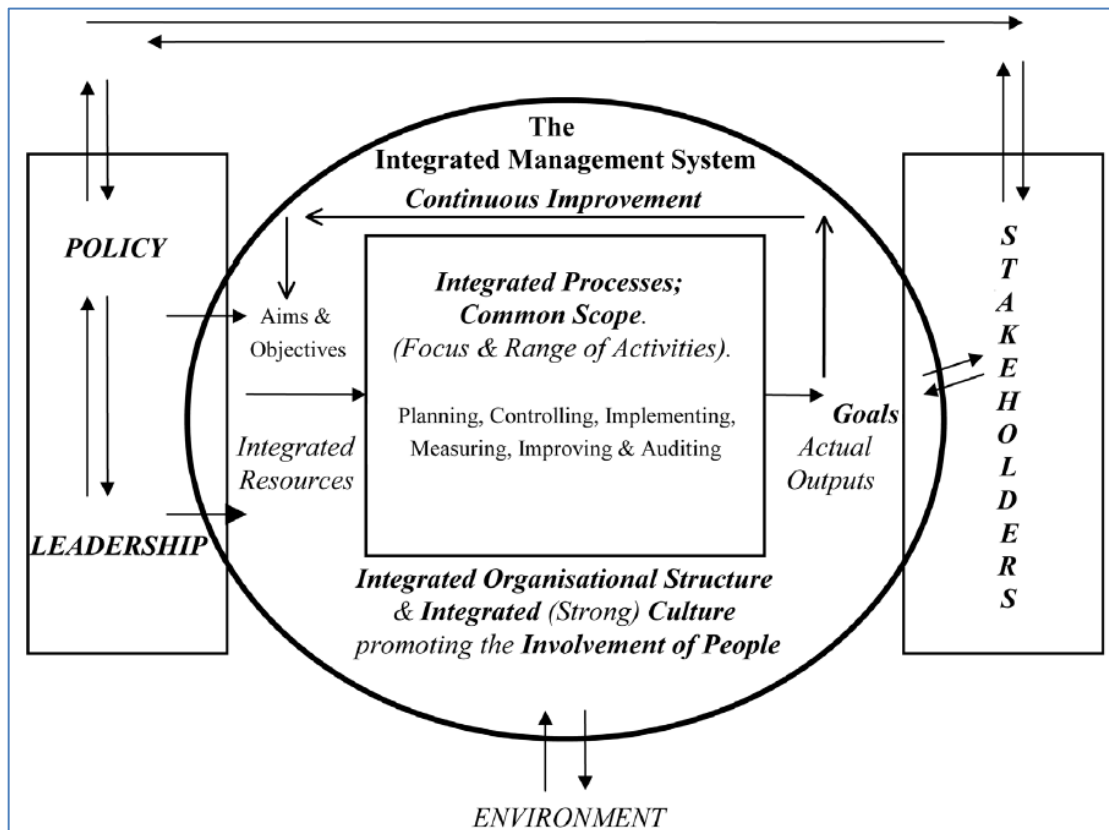


Figure 14. A model of an integrated quality, environment, and health and safety management system (Source: Wilkinson and Dale, 2001)

Ahsen and Funck (2001) also evaluated the use of the EFQM model as an integration tool. They pointed out that although environmental criteria are all-pervading in the model, their overall weighting is relatively low, which may result in quality objectives taking priority over the

environmental ones. Another criticism of the EFQM model included the lack of requirement to document continuous improvement of EMS.

On the other hand, Tarí and Molina-Azorín (2010) believe that the EFQM model meets the requirements of QM and EM systems.

No literature could be found with a practical demonstration of an EFQM-based IMS.

Examples of IMSs based on the TQM model (Chan *et al.*, 2002; Wilkinson and Dale, 2000; Khanna *et al.*, 2010) show that they are more aware of the culture issues and their effect on implementation of IMS. As Jørgensen *et al.* (2006) put it, "TQM has always emphasised the embeddedness in the organisational culture and the active participation of employees etc. In other words, integration is more about culture, learning and employees than about common system elements and generic processes." Wilkinson and Dale (1999c) acknowledged the fact that BE models are the only ones which address the issue of culture.

Asif *et al.* 2009 think that "IMS, at its best, is not a destination but rather a critical milestone in an endeavour to achieve business excellence". This view is supported by Karapetrovic (2003). Pojasek (2007b) adds a further step to the journey, namely business sustainability framework which is a single program "integrating management systems, process improvement, and risk management"

Conversely, Đorđević *et al.* (2010) believe that for SMEs achieving TQM is difficult and recommend IMS as an alternative route to reaching business excellence within a short time

Other approaches

Bamber *et al.* (2000) and Gapp *et al.* (2008) argue that Total Productive Maintenance (TPM) and 5S can become the integrating factor for IMS but only if used to its full potential, i.e. as a holistic philosophy as well a management technique. Thus, TPM and 5S are used as a platform for the development of integration of quality, environment and health and safety in a similar way to TQM (Fig.15).

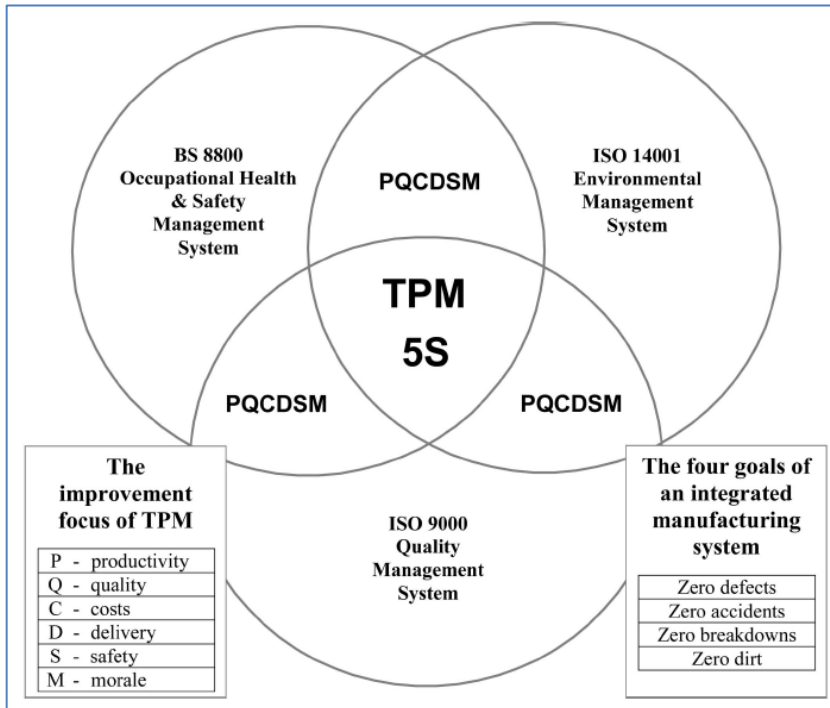


Figure 15. TPM and 5S as cementing factor for OH&SMS, EMS and QMS (Source: Bamber *et al.*, 2000)

2.2.4 Benefits of integration

The subject literature offers an extensive overview of expected as well as achieved benefits of integrating management systems. These have been summarised below. It is important to note that the headlines used are merely figurative constructions as all benefits are closely interlinked.

Benefits relating to internal and external audits

By integrating MSs, organisations may save on costs of internal and external audits (Beckmerhagen *et al.* 2003; López-Fresno, 2010; Smith and Politowski, 2007; Zeng *et al.*, 2011).

This can be achieved through harmonising the audit tool as well as training of internal auditors so that they carry out simultaneous audits of several MSs which should result in more efficient audit process, including reporting and corrective actions (Beckmerhagen *et al.* 2003; Karapetrovic and Willborn, 1998c; Zeng *et al.*, 2011; Zutshi and Sohal, 2005).

All external audits could be carried out at one visit reducing the number of required audit days and costs of certification (Griffith, 2000; Karapetrovic and Willborn, 1998a; Wilkinson and Dale 1998a; Zeng *et al.*, 2011; Zutshi and Sohal, 2005).

Dalling and Holt (2012) also notice that integrated audits allow monitoring to be focused where it will be most effective.

Empirical studies show that benefits related to audits ranked as number 1 in surveys of organisations in the UK (Douglas and Glen, 2000), numbers 1 and 3 (for internal and external audits respectively) in Italy (Salomone, 2008) and were also among benefits reported by Indian manufacturing organisations (Khanna *et al.*, 2010)

Decreased management costs

Benefits in this category include those which result from reduced duplication from multiple individual systems and better use of resources (Beckmerhagen *et al.*, 2003; Beechner and Koch, 1997; Block and Marash, 2002, p.5; Corcoran, 1996; Dalling and Holt, 2012; Hall, 1998; López-Fresno, 2010; Pojasek, 2007a; Smith and Politowski, 2007; Tranmer, 1996; Weiler, 1997; Wilkinson and Dale, 1999b).

As argued by Wright (2000), “[w]hy have three sets of records, three different policies or three systems of internal audits, when one will do? There are many financial benefits associated with operating formal management systems, but even if no other financial savings are immediately apparent, then the more efficient use of the various resources presently devoted to quality, health and safety, and the environment must indicate a considerable cost advantage.”

Streamlined and improved documentation is among the most significant benefits quoted in both theoretical and empirical studies (Ahsen and Funck, 2001; Beckmerhagen *et al.*, 2003; Del Brio *et al.*, 2001; Douglas and Glen, 2000; Khanna *et al.*, 2010; López-Fresno, 2010; Renzi and Capelli, 2000; Salomone, 2008; Zeng *et al.*, 2011; Zutshi and Sohal, 2005)

Other benefits include:

- clearer responsibilities (Ahsen and Funck, 2001; Dalling and Holt, 2012; Khanna *et al.*, 2010; Salomone, 2008),
- optimised training (Dalling and Holt, 2012; Renzi and Capelli, 2000; Salomone, 2008), and

- general improvement of effectiveness and efficiency (Beckmerhagen *et al.*, 2003; Douglas and Glen, 2000; Karapetrovic and Willborn, 1998a; Khanna *et al.*, 2010; Smith and Politowski, 2007; Zutshi and Sohal, 2005)

Improved employee awareness, communication and involvement

Integration improves understanding of systems by employees and therefore increases their motivation, engagement and ownership (Dalling and Holt, 2012; Khanna *et al.*, 2010; López-Fresno, 2010; Tranmer, 1996; Wilkinson and Dale, 2000; Zutshi and Sohal, 2005). In particular, staff may become increasingly aware of inter-dependencies between individual systems, for example how a change in quality of a component may impact on environmental footprint of the final product (Zutshi and Sohal, 2005)

With the above, organisations should experience enhanced communication (Dalling and Holt, 2012; Douglas and Glen, 2000; Khanna *et al.*, 2010; López-Fresno, 2010; Matias and Coelho, 2002).

As Zutshi and Sohal (2005) found by looking at a case study in Australia, “[b]etter utilisation of resources and effective training leads to more effective communication across the organization as employees across different functions and levels are using the same language. Furthermore, employees benefit from learning new skills and/or exchange of ideas and expertise across the different departments. This also contributes to creating a “team approach” atmosphere across the organization.”

The effect is less functional isolation and a beneficial change in culture (López-Fresno, 2010; Wilkinson and Dale, 2000; Wright, 2000). Such change can then facilitate implementation of other initiatives, such as business excellence models (Dalling and Holt, 2012; López-Fresno, 2010).

Better management performance

Companies achieve better alignment with the strategic objectives with IMS compared to often conflicting objectives of disperse systems (Beckmerhagen *et al.*, 2003; Del Brio *et al.*, 2001; Dalling and Holt, 2012; López-Fresno, 2010; Salomone, 2008; Tranmer, 1996).

Integration allows for a more holistic approach to managing business risks (Hall, 1998; Smith and Politowski, 2007; Zutshi and Sohal, 2005). Dalling and Holt (2012) state “risks are more likely to be

identified and treated when processes are reviewed from all angles". This, in turn, results in improved compliance.

Unified approach to management methodologies should also improve management control, decision-making and overall management performance (Khanna *et al.*, 2010; López-Fresno, 2010; Renzi and Capelli, 2000; Wilkinson and Dale, 2000; Zutshi and Sohal, 2005).

Benefits related to external stakeholders

In this category there are gains associated with improved customer satisfaction and better image.

For some managers achieving an IMS is synonymous with achieving "world-class" status (Wilkinson and Dale, 1998a). Although there is usually little pressure from stakeholders to implement IMS, most businesses expect that integrated processes would give them competitive advantage and enhance their credibility among external parties (Khanna *et al.*, 2010; Salomone, 2008). However, fewer actually report the benefit to be achieved (Khanna *et al.*, 2010; López-Fresno, 2010; Zutshi and Sohal, 2005). In Douglas and Glen's study (2000) half of the surveyed companies reported improved image with customers.

It may be argued that more efficient processes and improved management will inevitably enhance competitiveness (Dalling and Holt, 2012; López-Fresno, 2010) and that stakeholder-based IMS has a better chance to equitably optimise stakeholders' satisfaction.

It is important to note that the subjective and intangible nature of some of the above benefits (for example relating to communication or enhanced image) makes it extremely difficult to prove a quantifiable cause-and-effect relationship between the existence of IMS and these benefits.

Casadesús *et al.* (2011) conducted a survey of more than 500 Spanish companies with certificated ISO 9001 and ISO 14001 and could not "confirm the existence of statistically significant differences in any of the benefits studied between the organizations with an IMS and those without it".

2.2.5 Barriers to integration

Many challenges await organisations attempting to integrate their partial management systems. They can be broadly grouped into the two categories: internal and external.

Cultural factors are among the most frequently reported in the literature (Wilkinson and Dale, 2000).

Integration may be impeded by adverse culture that opposes change due to poor communication, lack of awareness, commitment or team work (Asif *et al.* 2009; Dalling, 2002; Dalling and Holt, 2012; Zutshi and Sohal, 2005).

Employees may also have been demotivated by past bad experience with failed improvement initiatives leading to scepticism, resistance and lack of buy-in, particularly among top and middle management (Beckmerhagen *et al.*, 2003; Wilkinson and Dale, 1998a, 2000).

Dalling and Holt (2012) state that “[o]rganisations often complain that they suffer from “initiative overload” and it is important that the move to an integrated system is not simply seen by line managers and employees as just another management initiative which will soon be replaced by another and can be safely ignored.”

Rejection may as well be caused by the perception of change as threatening. Some employees may fear they would lose their job as a result of integrated functions, others may feel they would lose power or ownership. Finally, some staff might not be happy to perform additional roles, for example when a Quality Manager is asked to become a Quality and Environmental Manager (Asif *et al.*, 2009; Beckmerhagen *et al.*, 2003; Dalling, 2002; Dalling and Holt, 2012; Karapetrovic and Willborn, 1998a; Karapetrovic, 2002; Zutshi and Sohal, 2005)

Lack of financial, human and knowledge resources is another problem businesses are facing.

Owing to the lack of universal integration methodology and diversity among businesses, integration efforts are often perceived as complex and requiring a lot of resource. (Ahsen and Funck, 2001; Dalling and Holt, 2012)

Many authors draw attention to the scarcity of internal IMS expertise and the consequent reliance on external consultants who also often lack knowledge and experience but are expensive (Asif *et al.*, 2009; Dalling 2002; Dalling and Holt, 2012; Scipioni *et al.*, 2001; Zutshi and Sohal, 2005). This may result in limited uptake of IMS initiatives (especially in SMEs, e.g. Zutshi and Sohal, 2005) or worse, ill-conceived IMS.

Zutshi and Sohal (2005) argue that “even though they [the consultants] can implement the systems, they cannot assist the organization in maintaining these, which has to be done by internal people.”

According to Mackau (2003), “[t]he lack of employee integration in the IMS development and implementation process becomes increasingly obvious through examination of non-accepted and nontransparent management systems which, in addition, are rarely specialised for an individual company”.

Regardless whether integration is led by internal or external staff, the lack of know-how and a formal long-term strategic vision for IMS may result in delays, internal resistance, and half-baked IMS with little benefits to the organisation (Dalling, 2002; Zutshi and Sohal, 2005)

Renfrew and Muir (1998) warn that “[i]f IMSs are viewed solely as a way of reducing procedures and certification costs then they will receive the same criticism from businesses as ISO 9000”. Their view is supported by Dalling and Holt (2012) who are concerned that companies may lose out on the full potential of IMS.

Tranmer (1996) notes that IMSs are often structured around individual standard’s structure “which is meaningless to all but the ‘experts’”.

The inability to effectively design and implement the IMS poses the risk of reduced organisational flexibility (Asif *et al.*, 2009; Crowe, 1992; Wilkinson and Dale, 1999a; Zutshi and Sohal, 2005). This happens “when information interfaces are tied together in a fixed and rigid manner” (Asif *et al.*, *Ibid.*) and may restrict the capacity to quickly respond to the continually changing regulations and guidelines (Zutshi and Sohal, *Ibid.*).

Furthermore, in an integrated system there is a risk of not assigning the right level of importance to components of that system, for example when QMS and EMS become integrated, one of them may lose significance (Salomone, 2008).

Wilkinson and Dale (2000) highlight concerns that weaknesses in an organisation’s existing systems may be amplified by integration. Whitelaw (2004, p.125) also makes a point that in IMS a non-conformance raised against one system may have a negative impact on the other system. However, the author of this work thinks this would only be a problem if a major non-conformance raised externally against one standard would impact on the certification against another standard.

Finally, integration initiatives face obstacles due to perceived adequacy of existing separate systems, lack of quantifiable benefits of integration or no guarantee of added value which would justify the effort (Beckmerhagen *et al.*, 2003). This is further amplified by absence of pressure from stakeholders to integrate (Beckmerhagen *et al.*, *Ibid.*; Dalling and Holt, 2012).

Among the external disadvantages reported in the literature the most common are the lack of IMS standard, uniform terminology and integration methodology.

Dalling and Holt (2012) note that “there is generally a lack of uniformity in management standards and models and in particular ISO has generally made no significant attempt to unify the various approaches to management and there has been a proliferation of published management system standards each managed by separate technical committees with little cooperation and coordination”.

This view is echoed by Asif *et al.* (2009), Karapetrovic and Willborn (1998a), Labodova (2004), and Salomone (2008).

In their study of construction companies in the UK, Griffith and Bhutto (2008) discovered that the lack of detailed understanding of what integration is and how to achieve it is a major problem.

Jonker and Klaver (1998) view the lack of integration methodology (road map) as the main reason why integration is difficult. Ahsen and Funck (2001) believe there are not enough suitable implementation tools.

Asif *et al.* (2009) are concerned that “operational managers are left with no option except to integrate the individual MSS based on their perceptions and experiences”.

Many authors believe different scopes of MSSs are partially to be blamed for the lack of compatibility between them (Ahsen and Funck, 2001; Asif *et al.*, 2009; Beckmerhagen *et al.*, 2003; Karapetrovic and Willborn, 1998a; Karapetrovic, 2002; Wilkinson and Dale, 2000; Zeng *et al.*, 2007)

Different stakeholders (e.g., customers buying products or service for QMS and employees and their families for OHSMS) and their differing demands may result in conflicts of objectives in IMS.

Another major barrier to IMS relates to certification bodies.

Many authors underline the lack of support from certification bodies (Salomone, 2008; Wilkinson and Dale, 1998a,1998b; Zeng *et al.*, 2007; Zwetsloot, 1995). This could be due to the fact that it is not in their financial interest to reduce the number of audit days and thus their profit.

Additionally, certification bodies themselves face the same problems as companies, i.e. shortage of multi-disciplined auditors.

Reported issues also include high costs of multiple audits, even if standards and systems are integrated and inadequacies of audit methodologies (Karapetrovic, 2002).

Often external audits are still performed separately even though the audited businesses operate IMS (Beckmerhagen *et al.*, 2003). Kirkby (2002) reports that “[o]ften, where certification bodies are offering an integrated assessment of management systems, these provide little more than a coordinated assessment service against two or more standards at best.”

This problem is still valid today as reported by Bernardo *et al.* (2010, 2011). Their empirical studies found that the integration of internal audits is at a higher overall level than the integration of external audits.

Another problem is that many methods and tools are only used in individual MSs, for example, life-cycle assessments or best available techniques used in environmental management (Honkasalo, 2000).

As a final note, it is useful to mention Wilkinson and Dale (2000) who point out that many of the challenges are not specific to integration but would also apply “when introducing any new initiative or change in the organisation and are likely to have been equally relevant when first introducing ISO 9001 and ISO 14001”.

Bernardo *et al.* (2012a) analysed a large group of Spanish businesses and found that integration difficulties when integrating QMS and EMS are not hindering integration, however, “the organisations with three MSs (QMS, EMS, OHSMS or CSRMS) may face difficulties during the integration process, related to internal organisation and to the standards that will condition the integration level of some components of the management system”

Chapter 3: Research methodology

3.1 Methodology choice

Marczyk *et al.* (2005, p.123) distinguished between three general categories of research design: experimental, quasi-experimental, and non-experimental, with the sequence signifying the level of scientific rigour applied. They also state that “researchers should attempt to use the most rigorous research design possible” (*Ibid.*, p.138).

According to them, “when feasible, the randomized experimental design is the preferred method of research. Put simply, it provides the highest degree of control over a research study, and it allows the researcher to draw causal inferences with the highest degree of confidence.” (*Ibid.*, p.127). However, as Gill and Johnson (2002, p.64) point out, “the use of the true experiment in management research is relatively rare”.

This method is not viable for the research questions proposed for this study due to the fact that it is not possible for the author to meet the conditions of a true experiment, i.e. to allocate subjects to control and experimental groups in a random manner and manipulate the occurrence and non-occurrence of the independent variables, such as, for example the size of the company or the number of management system standards implemented. (*Ibid.*, p.51)

Quasi-experimental designs are often used when true experiments are not an option. Quasi-experiments search to preserve the logic underpinning the true experiment while avoiding the logistical difficulties related to it. (*Ibid.*, p.67).

For this type of research, the control and experimental groups are naturally occurring populations identified in the field. (*Ibid.*) In the context of the research questions proposed in chapter 1, a quasi-experiment could be performed by identifying companies with matching characteristics (e.g. size, industry, structure, number and types of MSSs) and comparing the dependent variables (approach to integration, achieved degrees of integration, experienced problems and benefits).

Again, this method is not viable due to the time constraints, large number of variables and difficulties in obtaining detailed information about organisations.

The next most rigorous research method is a variant of the quasi-experiment, so-called action research, which involves a planned intervention by a researcher (*Ibid.*, p.71). Again, this method is not appropriate for the aim of this study due to several reasons, the main ones being: time required for an intervention and the limitations of the results to the subjects involved.

Non-experimental or qualitative designs include: case studies, survey studies, naturalistic observation and focus groups (Marczyk *et al.*, 2005, pp.147-157).

In fact, Gill and Johnson (2002, p.97) place survey research in an intermediate position between experimental and non-experimental (ethnography) research because of its potential for analytical approach and emphasis on deduction. Thus, survey research allows for generalisation of results. Survey research is appropriate for this study because it can help describe the characteristics of a specific population (eligible member organisations of the CQI and the IIRSM) in a reasonable period of time and at a reasonable cost. Additionally, analytical elements of the survey will attempt to find relationships between variables and thus, answer the research questions.

Gill and Johnson (2002, p.100) argue that the survey research “must be undertaken with due attention to any existing research, theory and literature relevant to the problem”.

Therefore, a desk study is to be carried out as the first step of the research, followed by survey research including both descriptive and analytical elements.

“Case studies involve an in-depth examination of a single person or a few people. The goal of the case study is to provide an accurate and complete description of the case.” (Marczyk *et al.*, 2005, p.147) Therefore, in the context of this study, this method would only be useful when used in conjunction with the survey research to explore interesting cases identified through the survey. However, due to time constraints case studies are not practical.

3.2 Desk study

Firstly, a desk study was carried out to review the existing body of knowledge pertaining to the research objective and the research questions.

The desk study involved critical examination of theoretical and empirical research literature on the subject of IMS, including journal articles, books, reference documents (e.g. standards and specifications), and conference proceedings.

The review allowed identifying key issues, fine tuning of the research questions and subsequent validation of the survey content.

3.3 Survey research

Survey research was used to provide empirical answers to the research questions.

The research technique employed for the collection of data was a self-administered online questionnaire created using a paid online survey service tool with the link sent to respondents via email. A brief covering letter explained the aim of the research and assured the respondents of the confidential nature of all replies.

Online survey was chosen because it is inexpensive, easy to use for designer and respondents, it can reach many people, ensures greater anonymity, and produces quick results which are easy to analyse Gill and Johnson (2002, pp.104-107).

A period of 8 weeks was allowed for completion of the questionnaire.

3.3.1 Survey design

The questionnaire consists of 23 questions (refer to Appendix A).

All answers required the respondents to click on selected answer(s). For open-ended questions respondents were required to type their responses in a comment box.

The creation of the survey on the website was done by the author.

The survey was designed using recommendations of the Dillman's Tailored Design method for self-administered questionnaires (Dillman, 2007). The method is based on the assertion that a survey response is a social exchange and as such, it requires three critical elements: reward, costs and trust (*Ibid.*, p.14).

The reward factor is not necessarily financial but in case of this survey included fundamentals, such as showing interest in and respect to respondents, personalised invitation to participate, saying thank you, a promise to share the results, and making the questionnaire interesting.

Avoiding social costs was considered with attempts made to minimise inconvenience, time and effort required by the respondents as well as the minimum amount of personal information requested. Finally, the trust factor was addressed by obtaining the sponsorship of two respectable professional bodies and explaining the objectives and value of the study.

The questionnaire is structured using what is called the “funnel” technique. It starts with broad general questions which are easy for the respondent to answer, such as which management systems were operated by the respondent’s organisations. These questions serve to “build up [the respondent’s] confidence in the survey’s objective, stimulate their interest and participation, and eliminate any doubt that they may have about being able to answer questions” (Iarossi, 2006, p. 75).

The second question also serves the purpose to exclude ineligible respondents (i.e. those who only operate a single management system to comply with one standard) from answering the remaining questions.

The most difficult questions are placed in the middle.

At the end of the survey there are easier, general questions, including those for demographic and other classification purposes.

Answers to questions 9, 10 and 11 quoted the classification of the degrees of integration as developed by Asif *et al.* (2010a).

Table 2 shows a summary of linkages between the research questions RQ1-10 and the questionnaire questions Q1-20.

Research question	Associated question(s) in the questionnaire
<i>RQ1. How many formalised management system standards (MSSs) are included in the IMS and what are they?</i>	Q1
<i>RQ2. Do bigger companies operate to more MSSs?</i>	Q1, Q16
<i>RQ3. What are the organisations’ approaches to integration?</i>	Q2, Q6
<i>RQ4. To what degree has the integration been achieved and are the results reflecting the integration policy?</i>	Q6, Q9, Q10, Q11
<i>RQ5. Does the number of MSSs impact on the decision whether to integrate or not or on the degrees of integration achieved?</i>	Q1, Q2, Q9, Q10, Q11

Research question	Associated question(s) in the questionnaire
<i>RQ6. Is there a relationship between the structure of support functions and the degrees of integration achieved?</i>	Q7, Q9, Q10, Q11
<i>RQ7. Where do the main drivers for integration come from?</i>	Q5
<i>RQ8. What are the main barriers to integration?</i>	Q8
<i>RQ9. What are the key benefits of integration?</i>	Q13
<i>RQ10. How do the IMS professionals assess their IMS competence?</i>	Q19, Q20

Table 2. Correspondence between the research questions and the questionnaire questions (Source: own elaboration)

It is important to note that questions 3, 4 and 12 were included in the questionnaire on request of the sponsoring organisations. However, these questions are outside the scope of this dissertation and in consequence have been excluded from the analysis. Due to the time constraints for submission of this dissertation, an agreement has been made with the sponsors that there would be further analysis of the remaining questionnaire data carried out by the author at a later stage.

In the majority of questions, a list of alternative answers was provided as research has shown that providing people with a list of answers to choose from gives more reliable responses than using the open-ended format (Iarossi, 2006, p.74). However, due to a large range of possible answers the respondents were also given a chance to include comments inviting them to offer additional information. "It is a good practice, especially in business surveys, not only to start with a narrative question but also to add open questions at regular intervals throughout the form. Elites "resent being encased in the straightjacket of standardized questions" (Zuckerman 1972, p.167) and feel particularly frustrated if they perceive that the response alternatives do not accurately address their key concern (Dexter 1970)." (Iarossi, 2006, p.75)

A live test run of the survey was conducted among a subsample of respondents (the members of the CQI IMSIG) to gather feedback regarding wording, flow, and sequence of questions and answers, the length and layout of the survey as well as to identify any potential technical and non-technical issues, for example regarding skip patterns and web browser compatibility. A few minor changes were introduced in result.

3.3.2 Sampling, survey distribution and data management

The target populations for the survey were the member organisations of the CQI and the IIRMS operating in the UK with at least two management system standards, such as ISO 9001:2008 or ISO 14001:2004. Eligibility was determined in questions 2 and 17 of the survey.

Unfortunately, neither of the Institutes could provide the information regarding what percentage of their members fulfils both criteria to enable the author calculate the true population size.

The sampling method chosen was simple random sampling without replacement, whereby all 11467 members of the two organisations (8767 from the CQI and 2700 from IIRSM) were included in the sampling frame. Although it is perfectly possible to be a member of both Institutes, duplicate entries were prevented as far as practicably possible by setting the options in the online tool to record the IP addresses of all respondents and prevent re-entry to the questionnaire. Additionally, data were inspected for duplication during the data management process described later in this section.

The link to the survey with a covering letter created by Ian Dalling of CQI IMSIG was emailed by the CQI and the IIRSM to all named members. This significantly increased the chance of the link reaching individuals with the most relevant position within organisations to respond to the questionnaire.

The total number of valid questionnaires was 467. Therefore, an effective response rate was ca. 4%.

After excluding the responses from organisations which do not operate in the UK and those with fewer than two standardised management systems (in line with the scope of this dissertation), the number of valid responses was reduced to 184 (39% out of 467).

Estimation is subsequently made that the true population size could be ca. 4500. For population sizes between 3853 and 8950 and the sample size of 184, the margin of error is 7.1% with a confidence level of 95%. It is expected that the margin of error will be bigger for companies with 50 employees or less which are underrepresented in the sample.

The reported margin of error is higher than the desired 5%. However, the author believes this is still acceptable to achieve the objective of this research. The survey data will not be used to draw conclusions about the total population of the Institutes or the standard users.

Due to lack of access to the membership data of the two Institutes, it is not possible to carry out a non-response analysis.

All raw data were downloaded from the online survey tool in a format of an Excel spreadsheet with the layout of a rectangular data file where each row represents a record, and each column represents a variable. Random checks were made to compare data in the online tool with the spreadsheet.

It was determined that because of the characteristics of the collected data (electronically), it was not necessary to conduct reliability tests on data collection or data entry. There was no possibility for out-of-range data and only a few missing entries were identified throughout the questionnaires with no patterns. Missing answers are highlighted in the next chapter.

All data were inspected and coded in a single spreadsheet to avoid opportunities for data to become corrupted during transfer.

Coding was done by using formulas assigning numerical codes to string variables. For example, in questions 9 to 11 about degrees of integration, the following coding was used:

- 1: No integration
- 2: Partial integration
- 3: Full integration

Elementary statistical analyses (see 3.2.3) were computed in the spreadsheet in Excel. For analyses which required advanced statistical procedures, data were first prepared in the spreadsheet and then copied and pasted into statistical software for analysis.

3.3.3 Survey analysis

Data obtained from the survey were analysed statistically and compared to results from other studies when these were available.

Data from questions 1, 2, 5 to 11, 13 to 16 and 18 to 20 were examined using descriptive statistics and graphic displays, dependent on the type of data obtained. For numerical and ordinal data, measures of central tendency (mean, median or mode) and dispersion (range, standard deviation or percentiles) were used, while for nominal data - proportion, percentage, rate or ratio.

Additionally, based on guidelines by Mehta and Patel (1996) a number of statistical procedures were used which are summarised in Table 3.

The tests were performed using Microsoft Excel 2010 and IBM SPSS Statistics Version 20.

Several questions allowed additional comments to be included (i.e. questions number 1, 5, 6, 7, 8, 13, 15, 17, 18, 19, and 21).

In the first question, which asked for the names of standardised management systems, respondents could choose from a pre-defined list of the most widespread MSSs (for example, ISO 9001 and ISO 14001). As listing all possible documents would not be viable, respondents were also asked to specify other standards they had to comply with. The answers provided were generally straightforward and could be easily clustered.

Only answers including national and international management system standards were accepted with the exception of PAS 99:2006. PAS 99:2006 is a specification for integrated management systems and it was referenced by a few respondents alongside other MSSs, therefore it was deemed as an integration tool rather than an additional requirement for the organisations.

In some questions the respondents' comments were reclassified.

For example, in question 5 ("Where did the main drivers for your integration come from?") in one case a respondent ticked only one answer "Other (please specify)" and typed in "myself". On the review of his responses to other questions, it was discovered he was a consultant working for the company. Therefore, his answer was reclassified as "External advisor".

In question 13 ("What benefits of integration have you experienced / would you expect to experience?"), one respondent ticked the box next to answer "Simplification of documentation, paperwork and audits, resulting in a reduced effort for system implementation and maintenance" and additionally in comments typed: "Simplification and reduction in documents and forms". The comment was subsequently excluded as duplication.

For statements given in the remaining questions, the author attempted to develop meaningful categories into which the statements were placed. This is described in the next chapter.

research question	independent variable		dependent variable		test	comments
	variable	nature	variable	nature		
RQ2	size of organisation (q.16)	ordinal, with more than 2 levels (independent groups)	number of MSSs (q.1)	numerical, discrete	the Jonckheere trend test (also called the Jonckheere-Terpstra test) estimated up to Monte Carlo accuracy followed by the Kendall's tau-b for estimation of the effect size	Data in 6 x 7 doubly ordered contingency table. Data not normally distributed. Cells with expected counts below 5. The non-parametric Levene's test of variance performed to check the that the condition of homogeneity of variance is met.
RQ5			integration approach (q.2)	nominal	Fisher's exact test	Data in 7 x 2 unordered contingency table. Data not normally distributed. Cells with expected counts below 5.
RQ5	number of MSSs (q.1)	numerical, discrete, with more than 2 levels (independent groups)	degree of integration (q.9,10,11)	ordinal	the Jonckheere trend test (also called the Jonckheere-Terpstra test) estimated up to Monte Carlo accuracy	Data in 7 x 3 doubly ordered contingency table. Data not normally distributed. Cells with expected counts below 5. The non-parametric Levene's test of variance performed to check the that the condition of homogeneity of variance is met.
RQ8	number of MSSs (q.1)	numerical, discrete, with more than 2 levels (independent groups)	number of barriers (q.8)	numerical, discrete	the linear-by-linear association test estimated up to Monte Carlo accuracy	Data in 7 x 12 doubly ordered contingency table. Data not normally distributed. Cells with expected counts below 5. The non-parametric Levene's test of variance performed to check the that the condition of homogeneity of variance is met.
research question	variable	nature	independent variable	nature	test	comments
RQ6	structure of support functions	nominal with 2 levels (independent groups)	degree of integration (q.9,10,11)	ordinal, with more than 2 levels (independent groups)	the Kruskal-Wallis test with the exact p-values	Data in 2 x 3 singly ordered contingency table. Data not normally distributed. Cells with expected counts below 5. The non-parametric Levene's test of variance performed to check the that the condition of homogeneity of variance is met.

Table 3. Statistics tests used in the research (Source: own elaboration)

Where comments were deemed inappropriate or not answering the question, they were excluded from the results. Examples of such comments are shown in Table 4 (original spelling quoted):

Question	Excluded Response
5. Where did the main drivers for your integration come from?	“Since drug development is a very regulated industry, it is a requirement that the systems used meet the legal requirements first and then the needs of the Business”
8. Which do you think are the main barriers for integration of MSs?	“This is speculation of course.”
13. What benefits of integration have you experienced / would you expect to experience?	“Our system was already integrated.”

Table 4. Examples of comments excluded from the survey results. (Source: own elaboration)

Answers to question 21 included a number of comments about the survey itself as well as about a diverse range of aspects linked to an IMS. All responses were reviewed and quoted as and when deemed appropriate by the author to provide insights and additional information.

Question 17 was excluded from the analysis as its sole purpose was to establish eligibility of respondents. Questions 22 and 23 were also excluded as they had no relevance for the research.

Chapter 4: Results and analysis of data

4.1 Key characteristics of the respondents

In total, 184 organisations based in the UK responded to the survey. Tables 5 to 7 and Fig.16 set out the key characteristics of the respondents.

The majority of answers are from employees of organisations in the business and industry sector, followed by a smaller number of consultants employed by consulting firms.

Sector profile of the survey respondents

	Frequency	Percent	Cumulative Percent
Business and Industry	133	72.3	72.3
Consultancy	29	15.8	88.0
Education / Academia / Research	3	1.6	89.7
Government	5	2.7	92.4
Non-for-profit	3	1.6	94.0
Public Sector	11	6.0	100.0
Total	184	100.0	

Table 5. Sector profile of the survey respondents (Source: own elaboration)

Relationship of the respondent with the organisation

	Frequency	Percent	Cumulative Percent
Employee	151	82.1	82.1
Consultant	28	15.2	97.3
Owner	3	1.6	98.9
Dual role	2	1.1	100.0
Total	184	100.0	

Table 6. Relationship of the respondent with the organisation (Source: own elaboration)

Size of the respondent organisations

	Frequency	Percent	Cumulative Percent
Large international organisation	60	32.6	32.6
Large (more than 250 employees)	53	28.8	61.4
Medium (250 employees or less)	45	24.5	85.9
Small (50 employees or less)	13	7.1	92.9
Micro (10 employees or less)	10	5.4	98.4
Sole trader	3	1.6	100.0
Total	184	100.0	

Table 7. Size of the respondent organisations (Source: own elaboration)

With respect to the size of these organisations, 14.1% are small, having 50 employees or less. 24.5% are medium sized, with the number of employees between 51 and 250, while 61.4% are large, having more than 250 employees.

This is not surprising because the CQI and the IIRSM members are mostly employed by large organisations.

Over three quarters of respondents have roles which involve health and safety or quality management (81.5% and 75% respectively) which is to be expected taken their membership in the CQI and the IIRSM. Environmental management also ranks high with almost 70% votes. These figures are also a reflection of usage of the three management systems (QMS, OHSMS and EMS) compared to other MSs.

One respondent made a comment that the CQI should change their name in order to reflect the fact that its members are increasingly involved in disciplines other than quality.

It is not surprising either that as many as three-quarters of respondents are involved in some form of audit as part of their roles, with audits being a common element of virtually all metastandards. Similarly, about half of those surveyed handle regulatory or legal compliance and training, again two of the key requirements of many MSSs.

Just over half of respondents deal with the IMS and almost half with business risk.

Other work areas include those related to other partial management systems, for example, corporate social responsibility, security, business continuity and food safety.

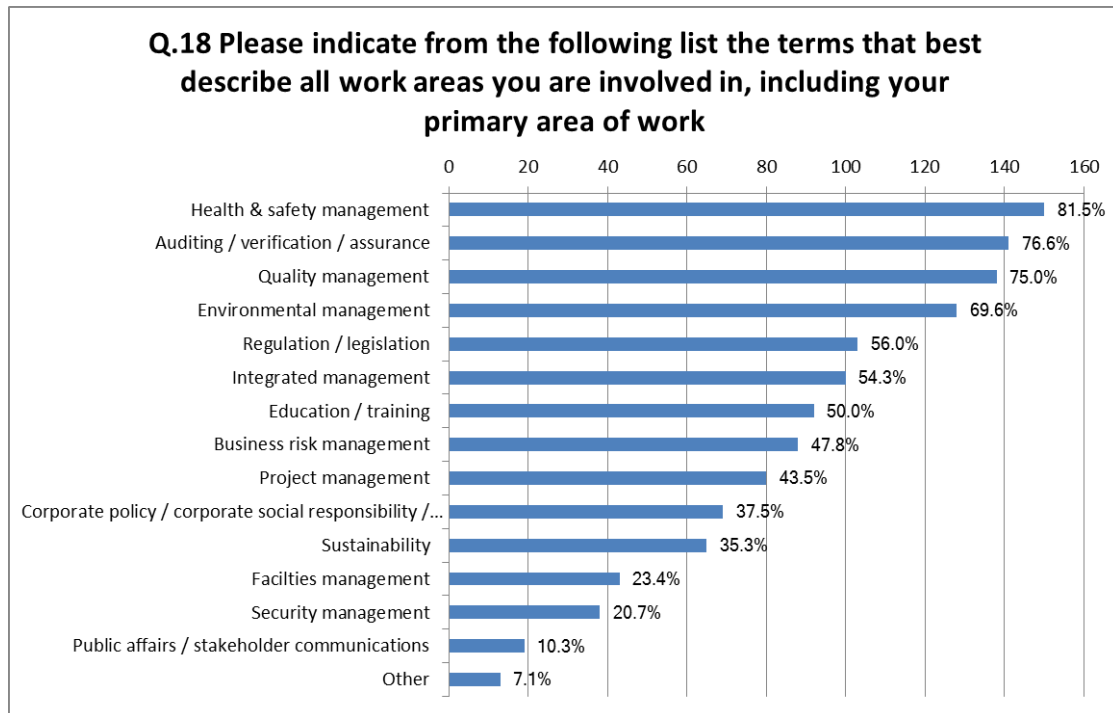


Figure 16. Respondents' areas of work (Source: own elaboration)

4.2 Answers to the research questions

RQ1. How many formalised management system standards (MSSs) are included in the IMS and what are they?

The first question asked about standardised management systems operated by the company.

In response a total of 46 unique MSSs were quoted. It is important to note that not all documents are technically standards, some are in fact specifications, guidelines or other reference documents. However, for simplicity reasons in this study they are referred to as management system standards (MSSs).

The number of votes for each MSS or a cluster of MSSs is shown in Figure 17.

The cluster "other sectoral quality management standards" includes, for example:

- *ISO/TS 16949:2009 - QMS for the automotive industry*

- *ISO/IEC 17025:2005 - General requirements for the competence of testing and calibration laboratories*
- *AS9100C - QMS for the aerospace industry (SAE International, 2009)*
- *ISO 13485:2012 – QMS for medical devices*

Other MSSs include, among others, PAS 55-1:2006, the specification for optimal management of physical assets and the Investors in People Standard.

As expected, ISO 9001, ISO 14001 and OHSAS 18001 lead the ranks. The results are consistent with the findings from the survey in Catalonia by Karapetrovic and Casadesús (2009).

The three standards are the most commonly implemented which is why they are the subject of majority of integration methodologies, as presented in chapter 2. Interestingly though, 26.1% of responding companies operate only to ISO 9001, ISO 14001, and OHSAS 18001 and 4.9% operate only to ISO 9001 and ISO 14001.

Thus, majority companies (69.0%) have to conform to requirements other than those specified in the three flagship standards.

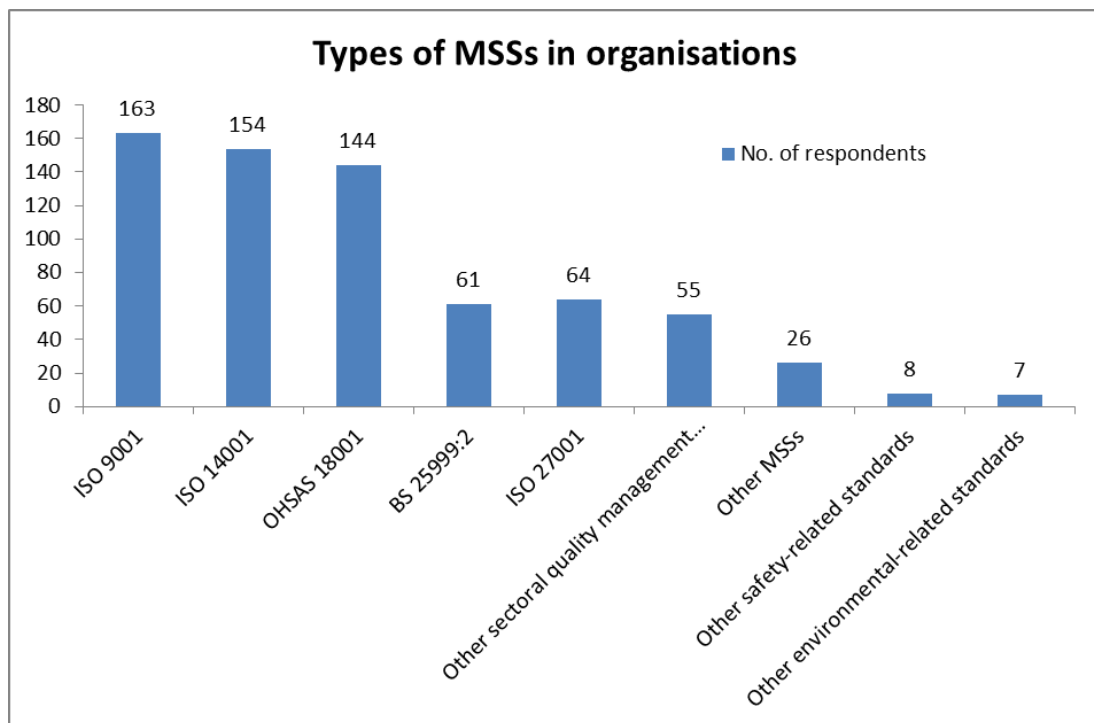


Figure 17. Reference documents used by organisations (Source: own elaboration)

The average number of MSSs per business is 3.71 with the biggest number of businesses operating to three standardised MSs (33.2%), followed by four and five (20.1% each). Two companies must or choose to comply with as many as eight different standards. Full information is shown on the distribution chart in Figure 18.

It is important to stress that the survey asked only about standardised management systems so the results do not reflect the existence of non-standardised systems. Majstorović and Marinković (2011) argue that companies are using between five and twenty different partial management systems in their operations, standardised and non-standardised.

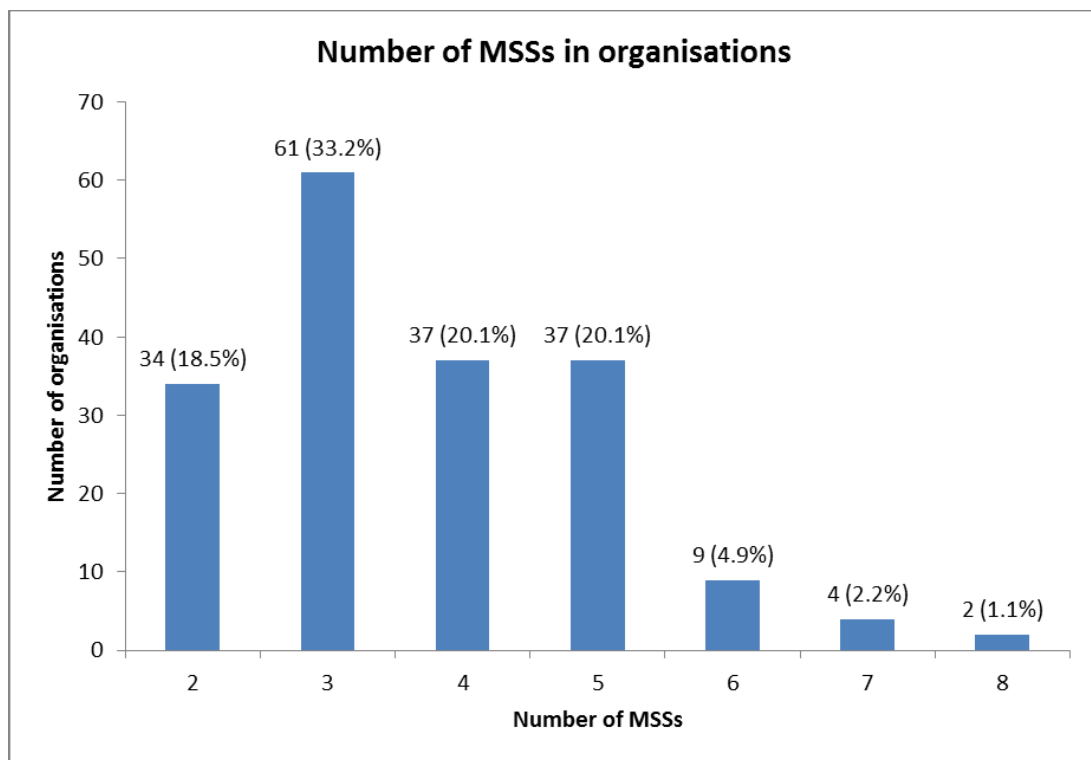


Figure 18. Number of MSSs per organisation (Source: own elaboration)

RQ2. Do bigger companies operate to more MSSs?

The previous analysis was repeated, this time breaking down organisations according to their size.

Bernardo *et al.* (2012b) discovered that “large organizations seem to implement more standardized MSs than small- and medium-sized companies” However, their study looked at only four MSs, namely QMS, EMS, OHSMS and CSRMS (corporate social responsibility management system).

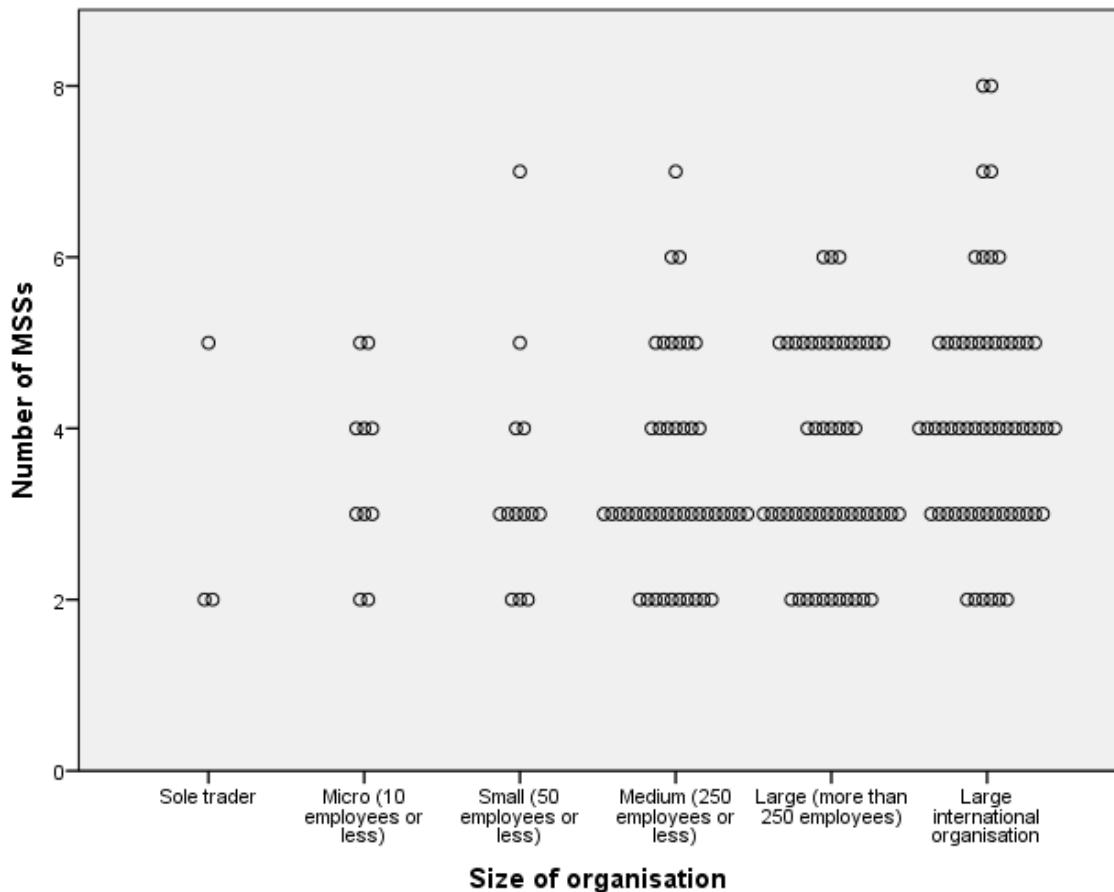


Figure 19. Association between size of organisation and the number of MSSs (Source: own elaboration)

The associations between the two variables are presented in Figure 19 (refer to Appendix B for the contingency table with results). It appears that there is indeed a slight tendency for larger organisations to operate to more MSSs and the Jonckheere trend test can be performed to examine this tendency.

The null and alternative hypotheses are as follows:

H_0 : There is no difference in the number of operated MSSs between companies of different sizes.

H_a : There is a difference in the number of operated MSSs between companies of different sizes.

Due to the sparse data the exact p-value is estimated up to Monte Carlo accuracy. The results are shown in Table 8). The p-value is between 0.0016 and 0.0044 ($p < 0.05$), therefore the null hypothesis is rejected and it is confirmed that the number of operated MSSs varies systematically with the size of the company.

		Number of MSSs	
Number of Levels in Size of organisation		6	
N		184	
Observed J-T Statistic		7465.500	
Mean J-T Statistic		6286.000	
Std. Deviation of J-T Statistic		389.498	
Std. J-T Statistic		3.028	
Asymp. Sig. (2-tailed)		.0025	
Monte Carlo Sig. (2-tailed)	Sig.	.003 ^b	
	99% Confidence Interval	Lower Bound	.0016
		Upper Bound	.0044
Monte Carlo Sig. (1-tailed)	Sig.	.001 ^b	
	99% Confidence Interval	Lower Bound	.000
		Upper Bound	.002

a. Grouping Variable: Size of organisation

b. Based on 10000 sampled tables with starting seed 2000000.

Table 8. Results of the test for an association of the size of a company and the number of MSSs (Source: own elaboration)

In order to estimate the size effect of this relationship, the Kendall's tau-b test is performed (Table 9) which shows significant positive correlation. Therefore, it can be concluded that larger organisations tend to operate to more MSSs as discovered by Bernardo *et al.* (2012b).

		Number of MSSs		Size of organisation	
Kendall's tau_b	Number of MSSs	Correlation Coefficient	1.000	.184 ^{**}	
		Sig. (2-tailed)	.	.0025	
		N	184	184	
Size of organisation	Size of organisation	Correlation Coefficient	.184 ^{**}	1.000	
		Sig. (2-tailed)	.002	.	
		N	184	184	

** . Correlation is significant at the 0.01 level (2-tailed).

Table 9. The Kendall's tau-b test's result for RQ2 (Source: own elaboration)

RQ3. What are the organisations' approaches to integration?

In the second question respondents were asked whether in their organisation there have been made any attempts of integration. The results are shown in Table 10.

Approach to integration			
	Frequency	Percent	Cumulative Percent
Yes, we already comply with more than one standard via an integrated management system	97	52.7	52.7
Yes, we are currently attempting to comply with more than one standard and intend to achieve it via an integrated management system	48	26.1	78.8
No, we operate more than one system and have no plans to integrate them	39	21.2	100.0
Total	184	100.0	

Table 10. Approach to integration (Source: own elaboration)

As can be seen, majority of respondents (78.8%) already have an IMS or are in the process of integration. The finding coincides with several empirical studies (e.g. Bernardo *et al.*, 2009; Del Brio *et al.*, 2001; Douglas and Glen, 2000; Karapetrovic and Casadesús, 2009; Khanna *et al.*, 2010), although the exact percentages vary slightly from study to study.

Therefore, only 21.2% businesses do not have an IMS and do not plan to use one.

The approach to integration was further explored in question 6 which asked for more information about the companies' integration policies (Table 11).

By examining the relationships between the responses to these two questions, some interesting contradictions are revealed.

As can be concluded by looking at the contingency table (Table 12), when companies state they have an IMS, this may, in fact, reflect integration policy ranging from very little to full integration and vice versa, a decision not to integrate does not preclude the existence of partial or even full IMS.

Integration policy		
	Frequency	Percent
Fully integrated MS which covers all processes and requirements of your company	56	30.4
Single integrated MS with no documents dedicated specifically to individual standards	3	1.6
Single integrated MS with some documents dedicated to individual standards	40	21.7
Separate MSs with one MS taking the lead (e.g. quality management system) and the others referencing the lead MS as necessary	17	9.2
Separate MSs with some sharing of common elements, e.g. document control, internal audit	32	17.4
Separate but aligned MSs (similar structures and style)	17	9.2
There is no perceived benefit for integrating management systems (MS) in my company	16	8.7
Other	3	1.6
Total	184	100.0

Table 11. Organisations' integration policies (Source: own elaboration)

Remarkably, 25 out of 39 (64%) companies which had stated in q.2 that they had no plans to integrate their systems, in fact, did plan to achieve some form of integration as claimed in q.6.

23 of those 25 companies also subsequently claimed having achieved at least partial integration in q.9 to 11.

Likewise, two companies which had claimed in q.2 that they had an IMS or intended to implement an IMS, in q. 6 disclosed they did not see any benefits in integrating. Furthermore, both these companies also stated in q.9 to 11 that they had achieved at least partial integration at some levels.

There is a cautionary tale in these hard-to-explain responses that without further practical examination of the respondents' IMSs, it may be impossible to speak about their IMS strategies with a high degree of confidence.

RQ4. To what degree has the integration been achieved and are the results reflecting the integration policy?

Questions 9 to 11 examined the achieved degrees of integration at three levels: strategic, tactical and operational. The respondents were choosing from three options for each level and were provided with a detailed description of the options.

Integration policy * Integration approach Crosstabulation

		Integration approach			Total	
		Yes, we already comply with more than one standard via an integrated management system	Yes, we are currently attempting to comply with more than one standard and intend to achieve it via an integrated management system	No, we operate more than one system and have no plans to integrate them		
Integration policy	Fully integrated MS which covers all processes and requirements of your company	Count	42	12	2	56
		% within Integration approach	43.3%	25.0%	5.1%	30.4%
	Single integrated MS with no documents dedicated specifically to individual standards	Count	2	1	0	3
		% within Integration approach	2.1%	2.1%	0.0%	1.6%
	Single integrated MS with some documents dedicated to individual standards	Count	24	14	2	40
		% within Integration approach	24.7%	29.2%	5.1%	21.7%
	Separate MSs with one MS taking the lead (e. g. quality management system) and the others referencing the lead MS as necessary	Count	9	6	2	17
		% within Integration approach	9.3%	12.5%	5.1%	9.2%
	Separate MSs with some sharing of common elements, e. g. document control, internal audit	Count	11	10	11	32
		% within Integration approach	11.3%	20.8%	28.2%	17.4%
	Separate but aligned MSs (similar structures and style)	Count	5	4	8	17
		% within Integration approach	5.2%	8.3%	20.5%	9.2%
	There is no perceived benefit for integrating management systems (MS) in my company	Count	1	1	14	16
		% within Integration approach	1.0%	2.1%	35.9%	8.7%
	Other (please specify)	Count	3	0	0	3
		% within Integration approach	3.1%	0.0%	0.0%	1.6%
Total		Count	97	48	39	184
		% within Integration approach	100.0%	100.0%	100.0%	100.0%

Table 12. Crosstabulation of IMS approaches and policies. (Source: own elaboration)

Most businesses report they achieved partial integration although the percentage of those who are saying they have a fully integrated MS is perhaps higher than expected.

Overall, all companies have indicated similar degrees of integration at all levels, with the exception of the operational level, at which a significantly higher number of organisations did not achieve any integration (Table 13). This is consistent with the findings of Bernardo *et al.* (2009) who found that “those organizations which partially integrate do so mainly in the more strategic aspects of the organization, leaving the more operational areas such as “product realization” for either later, lesser integration or no integration.”

		Count	Subtable N %
Strategic level of integration	Full integration	72	39.1%
	Partial integration	98	53.3%
	No integration	14	7.6%
	Subtotal	184	100.0%
Tactical level of integration	Full integration	65	35.3%
	Partial integration	103	56.0%
	No integration	16	8.7%
	Subtotal	184	100.0%
Operational level of integration	Full integration	67	36.4%
	Partial integration	89	48.4%
	No integration	28	15.2%
	Subtotal	184	100.0%

Table 13. Achieved strategic, tactical and operational levels of integration (Source: own elaboration)

Again, analysis of the combined responses to the questions about integration policy (q.6) and degrees of integration achieved reveals some significant inconsistencies (Figure 20, full data reproduced in Appendix B).

Notably, among the 42 companies which stated in q.6 that their policy was a fully integrated MS covering all processes and requirements of their company, only 26 (61.9%) had in fact fully integrated system at all three, strategic, operational and tactical, levels. The remaining had only achieved partial integration and two achieved none.

One respondent offered a possible explanation of these inconsistencies: "The questions asked demonstrate an academic view of the situation. An industry view would tell you that total integration is not possible and the level of possible integration depends on the business or industry you work in. You can therefore get some one [sic] indicating that they are operate [sic] a partially integrated system where as they have integrated as far as it is practicable/possible."

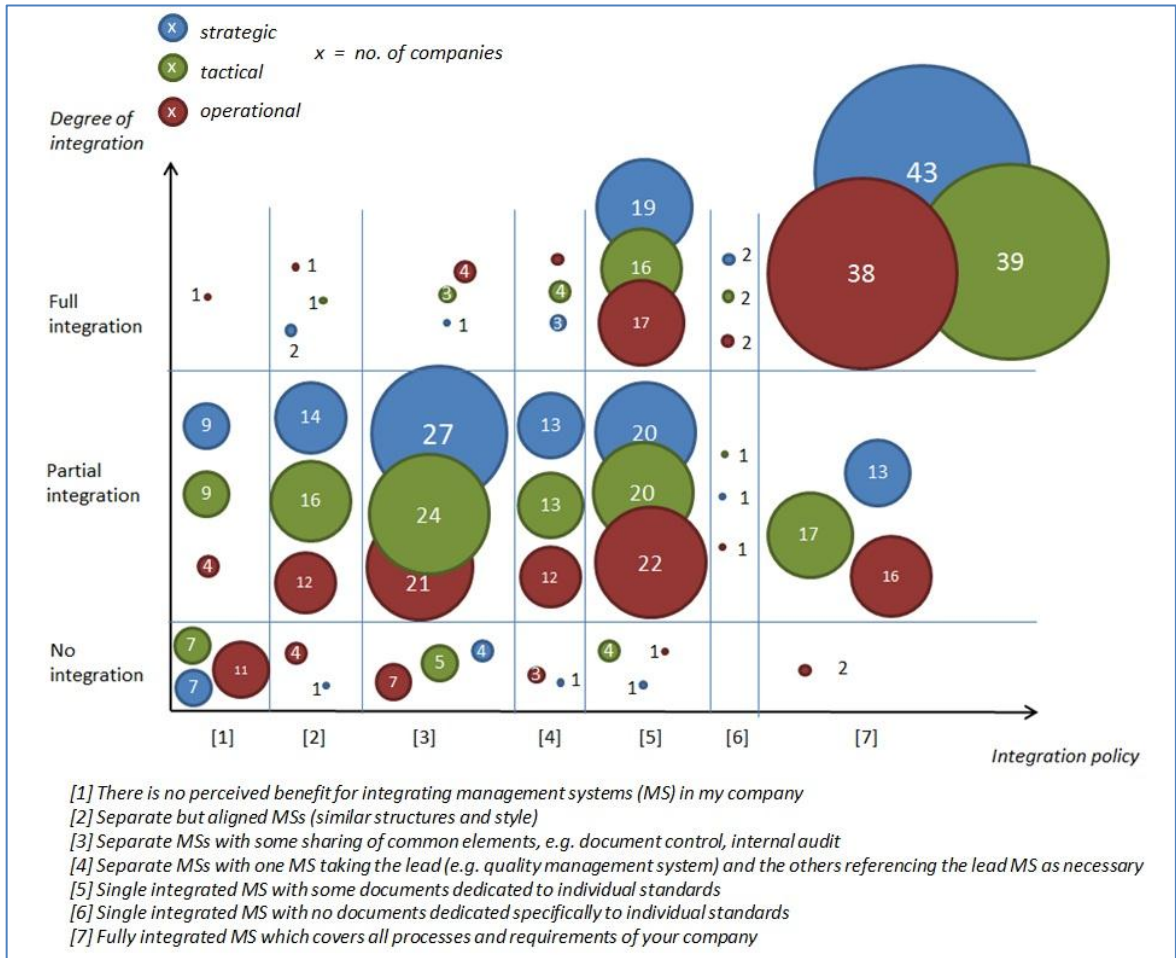


Figure 20. Combined responses to questions 6, 9, 10 and 11. (Source: own elaboration)

This, however, does not explain why some organisations were able to claim achievement of full integration at some levels while having a policy not to integrate or to keep the systems separate but aligned. Due to the fact that a detailed practical explanation of the three degrees of integration (no, partial and full) and the three levels (strategic, tactical and operational) was provided, the source of error could be the misinterpretation of the answers in q.6 which were less prescriptive.

Again, further exploration of the responses should be carried out via interviews and/or case studies.

RQ5. Does the number of MSSs impact on the decision whether to integrate or not or on the degrees of integration achieved?

To answer this research question, a number of tests were performed.

First, it is useful to examine whether the number of MSSs impacts on the decision whether to integrate or not. For this purpose, the answers to questions 2 indicating an implemented IMS as well as those indicating intention to implement it were combined. Results are presented in Fig. 21 which shows ratios of integrate/ not integrate decisions for each group of companies.

By looking at the graph, it appears that the more MSSs a business uses, the more likely it will opt for integration. However, no statistically significant differences (at $\alpha=0.05$) were found with the Fisher's exact test (Table 14).

Subsequently, the Jonckheere trend tests were computed to determine the relationships between the numbers of MSSs reported in question 1 and the degrees of integration claimed in questions 9 to 11.

The null hypothesis is that the proportions of degrees of integration are the same regardless of which sample (number of MSSs) they are in.

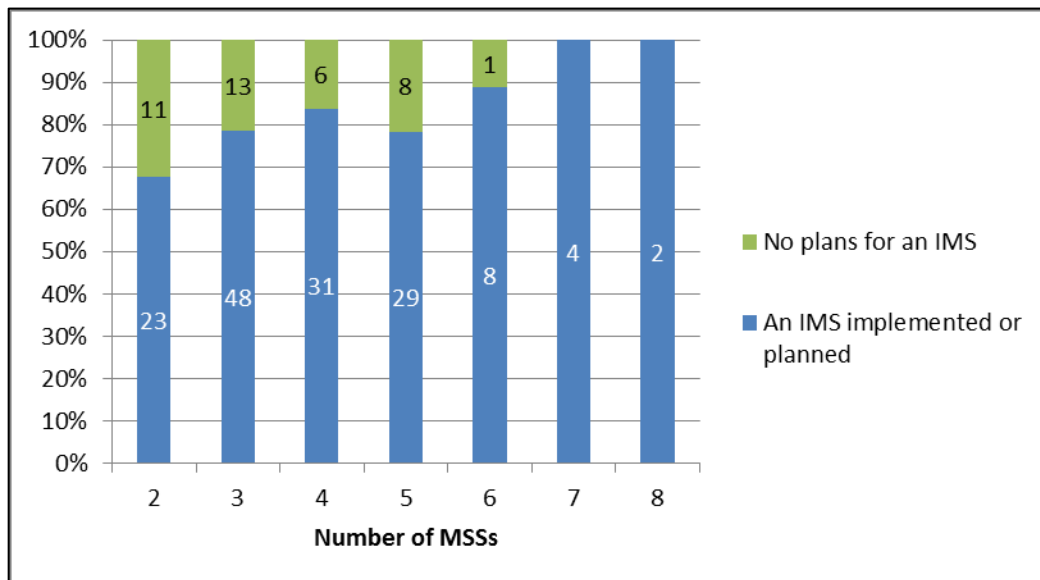


Figure 21. Relationship between the number of MSSs and approach to integration (Source: own elaboration)

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	5.249 ^a	6	.512	.499		
Likelihood Ratio	6.365	6	.384	.450		
Fisher's Exact Test	3.987			.665		
Linear-by-Linear Association	3.396 ^b	1	.065	.066	.035	.010
N of Valid Cases	184					

a. 5 cells (35.7%) have expected count less than 5. The minimum expected count is .42.

b. The standardized statistic is 1.843.

Table 14. The Fisher's exact test's results for the association between the number of MSSs and the approach to integration (Source: own elaboration)

The p-values obtained were 0.757, 0.892 and 0.792 for strategic, tactical and operational integration respectively (see Appendix B for details of the tests). Therefore, there is insufficient sample evidence to reject the null hypothesis, i.e., any difference between the sample proportion and the postulated proportion may be due to chance. However, this result may be due to a small number of samples with more than 5 MSSs.

Evidently, it was not possible to confirm the findings of Bernardo *et al.* (2012b) whose study showed that "the levels of MS integration obtained by the companies with two implemented MSs is [sic] higher than those obtained by the organizations with three MSs".

RQ6. Is there a relationship between the structure of support functions and the degrees of integration achieved?

Over half of companies have their support functions operating under a single manager / director while more than one-third has these functions managed separately (Table 15). The remaining organisations have other arrangements, with the majority operating an element of both of the above, for example individual experts/managers co-ordinated by a committee or steering group. Other businesses in this category include those with complex corporate structures as well as micro businesses in which there is no support function as such and which often use consultants to provide expert advice.

Structure of support functions			
	Frequency	Percent	Cumulative Percent
Business streams are provided with advice and support (for example HSEQ) which comes under a single manager / director	103	56.0	56.0
Business streams are provided with advice and support which each comes under a separate manager / director	66	35.9	91.8
Other	15	8.2	100.0
Total	184	100.0	

Table 15. Structure of the advice and support functions (Source: own elaboration)

The Kruskal-Wallis tests were computed to examine the relationships between the structure of the support functions and achieved degrees of integration at each level. The generic hypotheses (formulated for testing the three levels of integration) are as follows:

H₀: There is no difference in the achieved degrees of integration between organisations which have integrated support functions and those who have them separated.

H₁: There is a difference in the achieved degrees of integration between organisations which have integrated support functions and those who have them separated.

The exact p-values are: 0.00045 for the strategic level of integration, 0.020 and 0.031 for the tactical and operational levels respectively. In all cases, $p < 0.05$, which means we have to reject the null hypothesis. It is worth noting that for the strategic level of integration the p-value is very significant. The crosstabulation of the results are shown in Appendix B.

Therefore, the tests confirm that the achieved degrees of integration are associated with the structure of the support functions and that the association is much more significant for the strategic level of integration. This could be due to the fact that the strategic level of integration deals with the policies, objectives and plans. Nevertheless, the observational data cannot be used to establish any cause-effect relationships; in particular it cannot be determined without experimental data whether the functions are integrated as a result of introducing and IMS or whether their integration increases the degree of integration or there could be some intermediate factors.

RQ7. Where do the main drivers for integration come from?

First and foremost, integration is driven by the organisation's top management. Internal advisors rank second, followed by owners or Group requirements.

It therefore seems that for most businesses integration is internally-driven. This finding is consistent with the fact that most benefits of an IMS reported in the literature and in the survey (refer to RQ9) are related to improved effectiveness and efficiency of processes. In other words, when owners or directors are convinced that integration will help them improve performance and reduce costs, they will endorse it. Similarly, advisors (internal or external) who can convince their top management about these advantages have a better chance of getting the buy-in to secure resources for implementation of an IMS.

There seems to be little pressure from customers and certification bodies to push for integration.

The two other drivers cited were external professional and industry bodies, such as the CQI.

On average each respondent reported 1.27 drivers. Full details of provided answers are shown in Fig.22 (percentages do not add up to 100 as respondents could choose more than one answer).

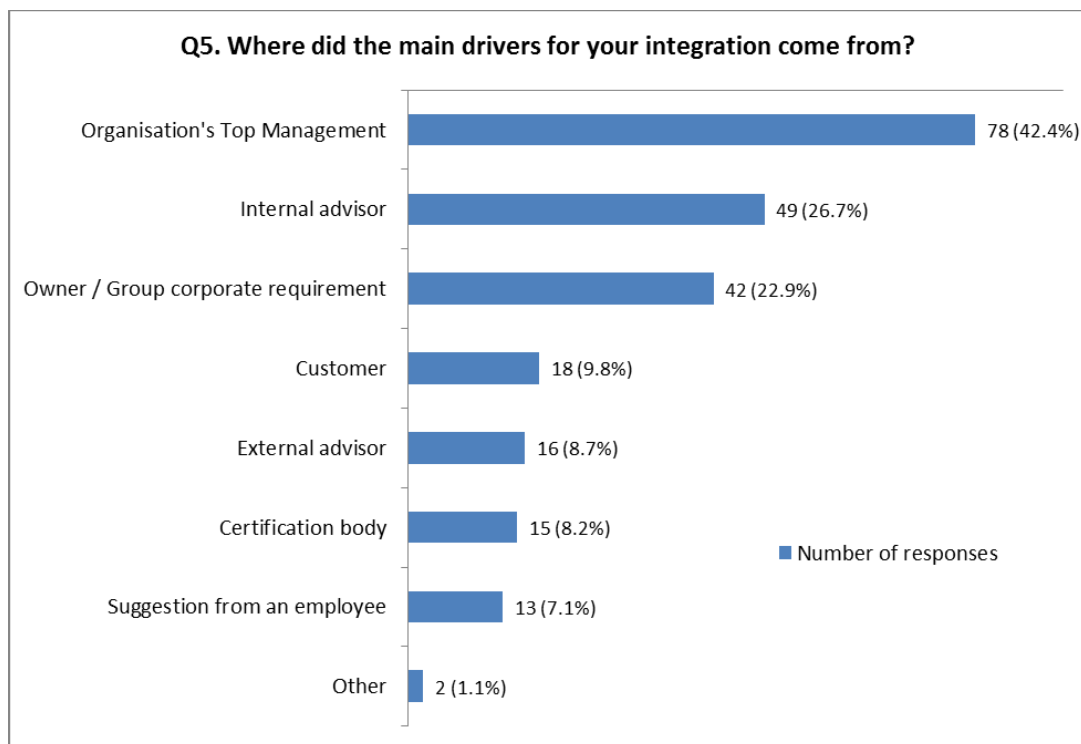


Figure 22. Source of main drivers for integration. (Source: own elaboration)

RQ8. What are the main barriers to integration?

Just over half respondents believe that “misunderstanding of what integration means, thus focusing only on integration of documentation and records” is one of the main barriers. One person commented, “Everyone wants and [sic] 'integrated system'. The difficulties arise when [sic] we talk about precisely what we mean and how we get there.”

Since management support is among the key IMS enablers (Dalling, 2002; Molina-Azorín *et al.*, 2009; Weiler, 1997; Wilkinson and Dale, 1999b; Zutshi and Sohal, 2005), it is perhaps not surprising that the lack of it is the second most highlighted challenge.

Almost equally, a high concern is that individual systems are looked after by different individuals or teams. In addition, businesses operating with separate support functions (as reported in q.7) were slightly more likely to point to this obstacle.

Subsequent barriers include “adverse organisational culture that resists change” and “lack of resource and/or competence” with almost 40% votes for each.

The lack of integration methodology and models as well as the plethora of not always compatible standards ranked only seventh and ninth, respectively. This is despite the fact that these problems have been highlighted more frequently than others in the subject literature.

Remarkably, there was an insignificant difference between the average number of implemented MSs among organisations which ticked the “Too many standards/systems...” barrier (3.53) and those who did not (3.67). Perhaps, once an organisation has found a method to integrate two management systems, it makes it easier for them to add another one.

Separate external audits are a concern for almost a quarter of respondents. Again, this is a recurring issue which suggests that some certification bodies have not fully aligned their services with the needs of their customers.

The most common other obstacle mentioned by respondents was an external pressure to keep the systems separate. One person said, “In our case the two systems operate very closely together, but the perception of accident investigators after a marine incident was that the quality management system with integrated marine elements was not as effective as a separate marine safety management system would have been. as [sic] a consequence we now have a very

prescriptive MSMS (in which backs are covered as long as procedures are followed) alongside a much more flexible QMS.”.

Lack of customer pressure and competition for resources with other initiatives were also cited.

The average number of barriers per respondent was 3.81.

The full details of answers provided are shown in Figures 23 (percentages do not add up to 100 as respondents could choose more than one answer) and 24.

Subsequently, to determine the relationship between the number of MSSs and the number of barriers the linear-by-linear association test was computed with the power values calculated by Monte Carlo simulation. The p-value obtained was 0.870, therefore it can be concluded that there is no significant correlation between the two variables. Crosstabulation of the variables are shown in Table 9, while the test results are reproduced in Appendix B.

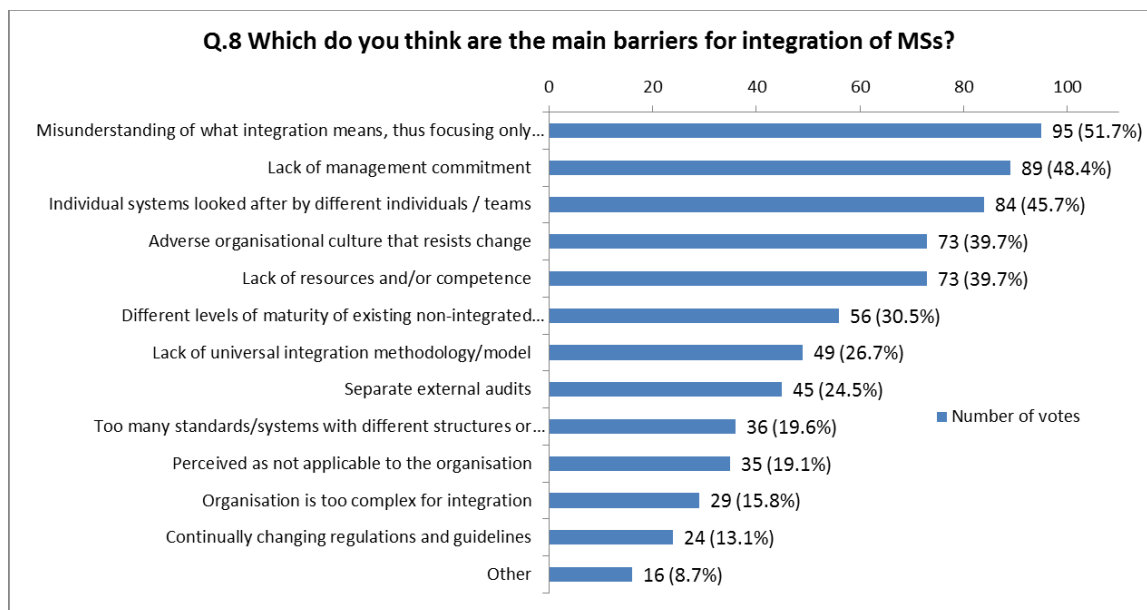


Figure 23. Main barriers to integration (Source: own elaboration)

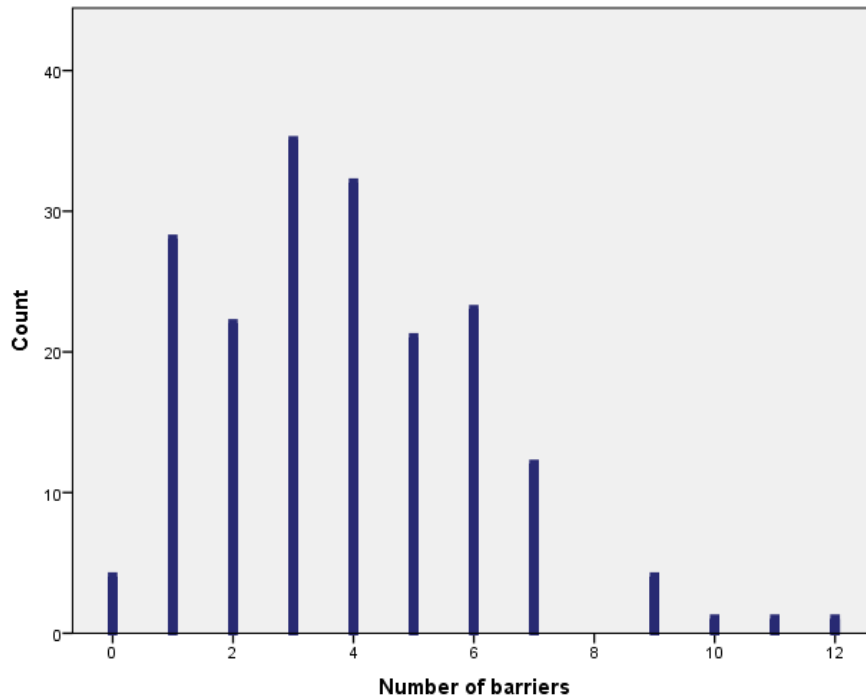


Figure 24. Frequency count of the number of barriers (Source: own elaboration)

Number of MSSs * Number of barriers Crosstabulation

Count		Number of barriers												Total	
		0	1	2	3	4	5	6	7	8	9	10	11		12
Number of MSSs	2	1	7	2	3	5	7	5	2	1	1	0	0	0	34
	3	1	6	10	17	12	6	6	1	2	0	0	0	0	61
	4	1	6	5	6	7	5	2	3	0	0	1	1	0	37
	5	1	4	5	8	6	2	5	5	1	0	0	0	0	37
	6	0	2	0	1	1	1	3	1	0	0	0	0	0	9
	7	0	3	0	0	1	0	0	0	0	0	0	0	0	4
	8	0	0	0	0	0	0	2	0	0	0	0	0	0	2
	Total	4	28	22	35	32	21	23	12	4	1	1	1	1	184

Table 16. Crosstabulation of the number of MSSs and the number of barriers to integration (Source: own elaboration)

Bernardo et al. (2012a) found that barriers are much more significant for organisations with three implemented MSs compared to the very low values for the importance of barriers among those with only two MSs. However, they also warned against judging the results too quickly. In particular, they acknowledged that the perception of the barriers is subject to the effect of time, i.e., “[a]t the start of the integration process, the perception of the difficulties that would be

encountered is probably much higher than it is later. With time, the relative gravity of the problem declines and it is not seen as very important. (*Ibid.*)

It is important to stress that the questionnaire did not examine the importance of the barriers. Also, the interactions between the barriers were not established. However, it is expected that there would be some cause-and-effect relationships, for example lack of knowledge about IMS and misunderstanding of what integration means could lead to the perception that an IMS is not applicable to an organisation which would then justify lack of management commitment and resistance from staff. This view is also supported by the fact that most respondents report 3 or 4 barriers.

RQ9. What are the key benefits of integration?

In this question, the respondents were asked to indicate whether they had experienced each benefit already and if not then whether they expected these benefits or not. Results are shown in Figure 25.

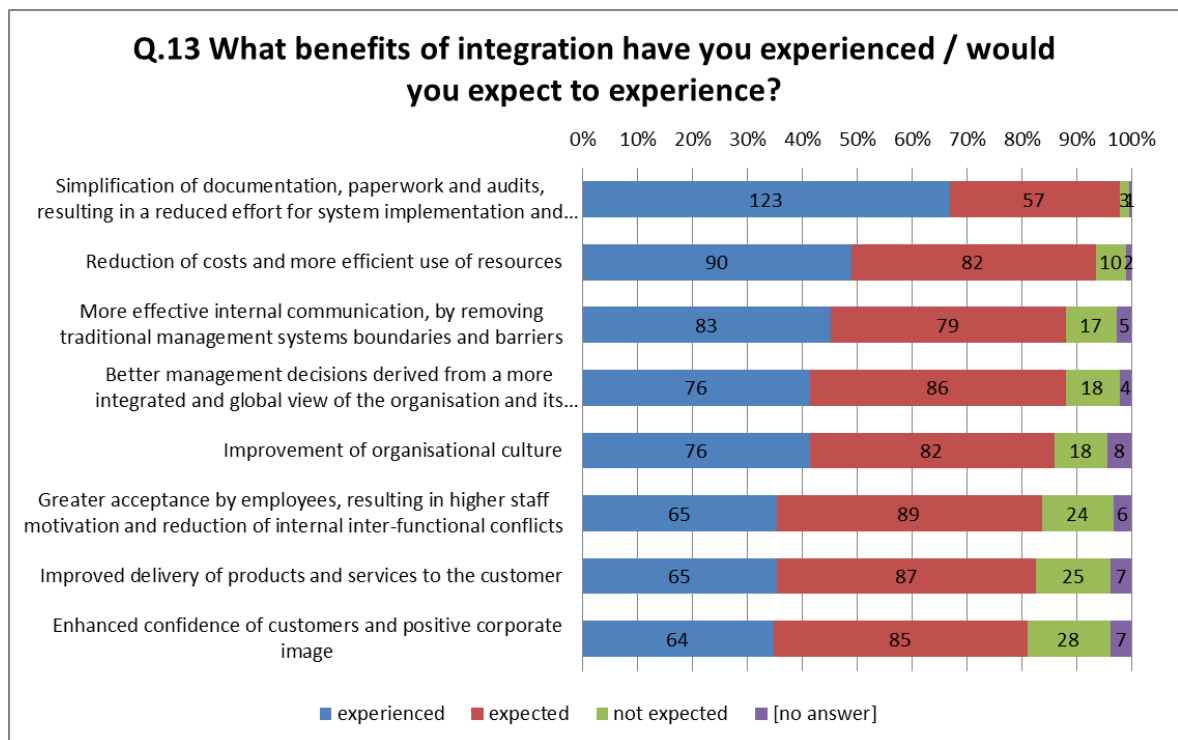


Figure 25. Benefits of integration (Source: own elaboration)

The two top-rated experienced benefits were: simplification of documentation, paperwork and audits, resulting in a reduced effort for system implementation and maintenance and reduction of costs and more efficient use of resources (66.8% and 48.9% respectively). Furthermore, the overwhelming majority of respondents who had not achieved these benefits yet were expecting to experience them at some point. This result coincides with findings from other empirical studies, e.g., Douglas and Glen (2000), Khanna *et al.* (2010), Salomone (2008), and Zeng *et al.* (2011).

The third most significant benefit was related to more effective internal communication achieved by removing traditional management systems boundaries and barriers. Less than 10% respondents did not experience it or did not expect it. Notably, communication-related benefits have not ranked high in most other empirical studies.

The remaining benefits were more often expected than achieved.

Benefits relating to external stakeholder ranked lowest in line with findings from other studies (e.g., Douglas and Glen, 2000; Khanna *et al.*, 2010; López-Fresno, 2010; Zutshi and Sohal, 2005).

Among other benefits mentioned by the respondents, improved training appeared most frequently. One respondent said: “new starters can almost hit the ground running because it is so easy to discover the information that they require”.

Finally, some organisations benefited from “better overall management of risk using a common methodology and risk rating scale” and “simpler project management”.

RQ10. How do the IMS professionals assess their knowledge and experience of IMS?

The respondents were requested to indicate if they had undergone any training in integrated management systems and whether the training was internal or external or both (Table 17).

Half of the respondents have had some IMS training.

The surveyed were also asked to provide details of the training they had received.

The main sources of increasing the IMS-related competence were:

- *certification bodies (e.g., courses on PAS 99:2006),*
- *the CQI (courses as well as participation in the Integrated management special interest group),*
- *business excellence training (e.g., EFQM assessor course, TQM-related training), and*
- *management university degrees.*

IMS training attended		
	Frequency	Percent
Yes, both external & internal	46	25.0
Yes, external	32	17.4
Yes, internal	15	8.2
No	89	48.4
[no answer]	2	1.1
Total	184	100.0

Table 17. IMS training attended (Source: own elaboration)

It is informative to note that some of the above courses are not directly related to IMS. Additionally, respondents learned by experience or own research into the subject or through internal training programmes.

Subsequently, the respondents were asked to assess their knowledge and experience of IMS (Table 18).

Almost two-third respondents declare at least good knowledge and experience of IMS.

Less than 10% of the answers assert poor or very poor IMS competence levels and they all come from people who had not had any training.

However, it seems that the lack of training is not necessarily a determinant for lack of competence as close to 30% of self-proclaimed IMS experts and 43% of people with good and very good knowledge of IMS had had no specific IMS training.

Self-assessment of IMS competence

	Frequency	Percent	Cumulative Percent
Expert	24	13.0	13.0
Very good	35	19.0	32.0
Good	61	33.2	65.2
Fair	47	25.5	90.7
Poor	13	7.1	97.8
Very poor	2	1.1	98.9
[no answer]	2	1.1	100.0
Total	184	100.0	

Table 18. Self-assessment of IMS competence (Source: own elaboration)

Some interesting comments were noted here, for example:

“Good managers do not need it [the training] - they do it naturally! Its [sic] only the narrow specialists that need to be taught how to talk to and work with others.”

Therefore, in some practitioners’ belief, there is no need for specialist knowledge or skill necessary to manage in an 'integrated' manner and that integrated management is more intuitive. This view, however, belongs to a minority and the increasing division of labour means organisations will continue to create functional ‘silos’ which IMS experts will continue to try to break down.

Finally, a number of people indicated they would welcome more information about IMS.

Chapter 5: Conclusions

5.1 Synthesis of the research findings

Several conclusions can be drawn from the research carried out.

Most surveyed organisations plan to integrate their standardised management systems or have them already integrated and that this decision does not depend on the number of MSSs operated.

The results also suggest that the implementation process is almost always internally initiated. In most cases, it is driven by the top management or owners who expect their staff to implement an IMS but do not always provide them with a strategic plan or the necessary support. The support from academic, professional and certification bodies is also limited.

In the early days of the IMS concept, Wilkinson and Dale (1999a) called for “an urgent need for definitions”. The findings of the survey reveal that over ten years later this need has not yet been addressed. There is no absolute agreement among IMS practitioners about how to define an IMS, but most agree that it is important that it be defined. Misunderstanding of what integration is creates the number one barrier to integration. Not knowing where exactly we are going, it is very difficult to plan a route how to get there.

In consequence, many practitioners just get on with the task to the best of their abilities, experiment on their companies and implement an IMS according to their intuition creating a climate of multiple innovations. The examination of the details of the companies’ IMS approaches, policies and the actual integration achieved reveals that the alignment doesn’t always stay straight.

As organisations vary so do their integration processes and there are many possible barriers or factors affecting the integration process and its outcome. Most organisations achieve a partial integration. This may be due to the chosen integration strategy, failed attempts of full integration, lack of IMS competence, no perceived value in it or other obstacles which need to be studied.

IMS implementers have limited help in available integration models which primarily focus on the two most used standards: ISO 9001 and ISO 14001 which represent only a fraction of the management system standards' landscape. This could be a problem for large organisations as it appears that the larger the organisation, the more MSSs it operates. On the other hand, the number of MSSs does not seem to have a significant impact on the degree of integration achieved or the number of barriers encountered in the implementation process. It seems that once an organisation has found a method to integrate two management systems, it makes it easier for them to add another one.

Interestingly, the survey results do not seem to support the views of many researchers that there is a significant need for an IMS standard, possibly because of doubts that such a standard could be created. Another possibility may be related to the apparent dichotomy in approaches to integrated management, i.e., is integrated management natural or should it be nurtured? If we assume the former, then IMS standards and methodologies are generally redundant as they can be replaced by general management education. Indeed, some respondents cite general management courses as a source of their IMS training. This is, however, not a widely supported view and an IMS standard could solve many of the difficulties reported by respondents.

With respect to the IMS benefits, the findings coincide with those from earlier studies which claim that the main advantages of integrating MSs are related to internal process efficiencies.

5.2 Reflection on the work

This study aimed to present the picture of integrated management systems in the UK-based organisations which are members of the CQI and the IIRSM. Although this has been achieved, the research was not without its limitations.

While the focus of the survey on the members of the two Institutes suggests that the sample used may not reflect the true population of standard users, the findings are informative and are likely to be of interest to other organisations as well.

The main limitations of the results are related to the possible bias due to the national context, the small size of the sample of the participating organisations and their limited diversity with respect to their size and sector.

Furthermore, the lack of access to the full database of the CQI and the IIRSM member organisations did not allow conducting the non-response analysis. Conversely, it was not possible to determine whether the sample obtained was a true representation of the study population.

Had it not been for the time constraints of the dissertation, the reliability of the survey could have been enhanced by conducting a measurement of its internal consistency (Litwin, 1995, p.21).

Even though all care had been taken to word questions and answers in the questionnaire in a way which would eliminate confusion and bias, the survey results show that this has not been fully achieved. The problem was compounded by the fact that there is no universal language when it comes to IMS. Hence, comments such as “We don’t use the term ‘integrated management system’ in our company but I guess we operate what others would call an IMS”. Although the theoretical construct of an IMS is widely accepted, there is little agreement on how it should be measured. This presents a significant challenge to conducting research in this field.

It is expected that there would be limited social desirability bias as the survey did not ask about behaviours or attitudes which are subject to societal disapproval or that are considered embarrassing. However, the questionnaire assumed that the respondents be familiar with the concept of an IMS, an assumption that proved in some cases to be wrong. In hindsight, additional information could have been included in order to reduce the ambiguity of certain questions.

Finally, it is important to stress that this research is entirely exploratory and, when significant associations are found, the search for a cause-and-effect connection should be the subject of further experimental work.

5.3. Recommendations for further research

As explained in chapter 3, agreement has been made with the sponsoring Institutes to continue this research with a more comprehensive analysis of the surveys which will include responses from other countries and responses to the remaining questions of the questionnaire. Attempts will be repeated to include members of other institutes, for instance IEMA and IOSH, whose members are also likely to work in companies with multiple formalised MSs.

A number of those surveyed expressed their consent to provide additional information if requested, thus, the results could be supported by case studies from those organisations. It would be particularly useful to explore specific aspects of an IMS, such as, what integration methodologies are used and how specific IMS elements are integrated in practice. There is also a potential for identifying and showcasing good practice.

Due to the observational nature of the study, there is an opportunity for more experimental research methods to be applied to confirm all correlations determined by data mining, as described in chapter 4.

The most significant research opportunity would appear to relate to developing a universal interpretation of what an IMS is. Achieving a common denominator would help researchers and practitioners design universal IMS training models, management tools and techniques.

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Appendix A: Questionnaire

Integrated Management System Survey

Thank you for taking the time to complete the Integrated Management System survey. This survey is a part of an MSc in Total Quality Management at Sheffield Hallam University in cooperation with the Chartered Quality Institute Integrated Management Special Interest Group. The value obtained from the process will depend on a good response. A report will be compiled based on the data received. All data received will remain confidential.

You can go back to previous pages in the survey and update your responses until the survey is finished or until you have exited the survey. After the survey is finished, you will not be able to re-enter the survey.

**Consultants completing the questionnaire*

If you are a consultant, please answer the questions on behalf of the organisation where you last implemented a significant management system or provided consultancy. Please address all questions as if you were employed by the organization.

1. Which standardised management systems does your company operate? Please select a response for all listed.

	Yes, third-party certified	Yes, but not certified	No
Quality (ISO 9001)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental (ISO 14001)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Occupational Health & Safety (OHSAS 18001)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Information Security (ISO 27001)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business Continuity (BS 25999 Part 2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food Safety (ISO 22000 / BRC)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automotive (ISO/TS16949)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

2. If your company has to comply with two or more management system standards, have there been made any attempts of integration?

- Yes, we already comply with more than one standard via an integrated management system
- Yes, we are currently attempting to comply with more than one standard and intend to achieve it via an integrated management system
- No, we operate more than one system and have no plans to integrate them
- No, we only operate a management system to comply with one standard and have no plans to add another

3. What year did you decide to integrate your management systems? If you cannot remember exactly please give your best guess.

4. And what year did you complete or do you expect to complete the implementation of an integrated management system? Again, your best guess is fine.

Integrated Management System Survey

5. Where did the main drivers for your integration come from? (Tick all that apply)

- Owner / Group corporate requirement (where there are a group of companies)
- Organisation's Top Management
- Customer
- Certification body
- Internal advisor
- External advisor
- Suggestion from an employee
- Other (please specify)

6. What is your company's integration policy? (Choose one answer)

- There is no perceived benefit for integrating management systems (MS) in my company
- Separate but aligned MSs (similar structures and style)
- Separate MSs with some sharing of common elements, e.g. document control, internal audit
- Separate MSs with one MS taking the lead (e.g. quality management system) and the others referencing the lead MS as necessary
- Single integrated MS with some documents dedicated to individual standards
- Single integrated MS with no documents dedicated specifically to individual standards
- Fully integrated MS which covers all processes and requirements of your company
- Other (please specify)

Integrated Management System Survey

7. How are the advice and support functions structured within your organisation?

- Business streams are provided with advice and support (for example HSEQ) which comes under a single manager / director
- Business streams are provided with advice and support which each comes under a separate manager / director
- Other (please specify)

8. Which do you think are the main barriers for integration of MSs? (Tick all that apply)

- Lack of universal integration methodology/model
- Misunderstanding of what integration means, thus focusing only on integration of documentation and records
- Lack of management commitment
- Adverse organisational culture that resists change
- Lack of resources and/or competence
- Perceived as not applicable to the organisation
- Organisation is too complex for integration
- Continually changing regulations and guidelines
- Separate external audits
- Different levels of maturity of existing non-integrated management systems
- Too many standards/systems with different structures or incompatible requirements
- Individual systems looked after by different individuals / teams
- Other (please specify)

We would like to understand in detail the degree of integration of your management systems. Please read the statements below and choose the answer that best describes your organisation.

Integrated Management System Survey

9. Strategic level of integration:

- Full integration. An integrated policy exists. The organisational objectives relate to effective management of stakeholder requirements - such as quality, environment, health and safety, and social responsibility. Organisational plans are clear to achieve stated goals and objectives. There is complete alignment between organisational policy, goals, and plans to achieve these goals.
- Partial integration. Organisational policy, objectives, and plans are mutually aligned to some degree. They describe to some extent how the organisation will achieve its objectives.
- No integration. Organisation has policies, objectives, and plans, which are aligned neither to each other nor to the operations. They give no clue to how the organisation will achieve its goals regarding various stakeholder requirements.

10. Tactical level of integration:

- Full integration. Managers have combined duties for various functions. Managers develop integrated management manual and procedures. Managers emphasise the need of integrated operations, documentation, records, and overall working in their directions, training, and other formal/informal means of communication and implementation. Most of the time the managers from various functions interact, collaborate, and arrive at mutually acceptable outcomes. Integrated audits are carried out.
- Partial integration. Managers have combined responsibilities to some extent. They are primarily concerned with getting their specific job done well. Only sometimes do managers interact, collaborate, and arrive at mutually acceptable outcomes. Performance evaluation is based on getting their specific job done well (such as meeting production targets or savings in procurement) rather than integrated functioning. Audits and corrective action reports are partially integrated.
- No integration. Most of the time managers do not interact, collaborate, nor do they reach mutually acceptable outcomes. There are separate procedures for each department which promote little collaboration. In general individual functions are considered the responsibility of separate departments. Separate auditing is carried out for each function.

11. Operational level of integration:

- Full integration. Most of the work instructions, records, checklists, and data collection sheets are integrated. Various aspects of processes – representing stakeholder requirements such as quality, sustainability, health and safety, etc. – are considered jointly and in an integrated manner during the execution.
- Partial integration. Some of the work instructions, records, checklists, and data collection sheets are integrated. The execution of operational processes considers relevant stakeholder requirements in a partially integrated manner.
- No integration. Separate records, work instructions, checklists, and data collection sheets for various MSs or various aspects of processes. No integration among various aspects of processes.

12. Are you familiar with any of the following integration methodologies?

	I have used it	I know it but have never used it	I don't know it
EFQM or similar (e.g. MBNQA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PAS 99 or another national standard	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Total Quality Management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk-based integration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (please specify)	<div style="border: 1px solid black; height: 60px; width: 100%;"></div>		

Integrated Management System Survey

13. What benefits of integration have you experienced / would you expect to experience?

	I have experienced this benefit	I would expect to receive this benefit	I do not expect to receive this benefit
Simplification of documentation, paperwork and audits, resulting in a reduced effort for system implementation and maintenance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reduction of costs and more efficient use of resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greater acceptance by employees, resulting in higher staff motivation and reduction of internal inter-functional conflicts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Better management decisions derived from a more integrated and global view of the organisation and its processes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More effective internal communication, by removing traditional management systems boundaries and barriers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved delivery of products and services to the customer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enhanced confidence of customers and positive corporate image	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improvement of organisational culture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

Finally, we would like to ask a few questions about the organisation you work in or you provide management system support.

14. Which of the following best describes the sector you currently work in?

- Business and Industry
- Consultancy
- Public Sector
- Government
- Education / Academia / Research
- Non-for-profit

15. What is your relationship with the organisation?

- Employee
- Consultant
- Other (please specify)

Integrated Management System Survey

16. What is the size of the organisation you work in or you provide management system support?

- Sole trader
- Micro (10 employees or less)
- Small (50 employees or less)
- Medium (250 employees or less)
- Large (more than 250 employees)
- Large international organisation

17. Please input the country where your company is based?

18. Please indicate from the following list the terms that best describe all work areas you are involved in, including your primary area of work. (Tick all that apply)

- Quality management
- Environmental management
- Health & safety management
- Integrated management
- Sustainability
- Corporate policy / corporate social responsibility / communications
- Public affairs / stakeholder communications
- Auditing / verification / assurance
- Regulation / legislation
- Business risk management
- Education / training
- Project management
- Security management
- Facilities management
- Other (please specify)

Integrated Management System Survey

19. Have you undergone any training in integrated management systems?

- Yes, both external & internal (Please provide details if possible)
- Yes, external (Please provide details if possible)
- Yes, internal (Please provide details if possible)
- No

Please provide details

20. How would you assess your knowledge and experience of integrated management systems?

- Very poor
- Poor
- Fair
- Good
- Very good
- Expert

21. Do you have any additional comments about your organisation, management system or this survey?

Integrated Management System Survey

22. Thank you for taking the time to complete this survey. As part of our research, we may conduct selected telephone interviews to capture additional data. Please indicate if you would be willing to be contacted to discuss your survey responses.

- Yes, by email
- Yes, by telephone
- No

Other (please specify)

23. Please provide your contact details if you would like to receive a summary of the survey results.

We take your privacy very seriously and we will never give or sell this information to anyone. You will only be contacted if you agreed to provide additional information or if you wish to obtain results of this survey.

Name (optional)	<input type="text"/>
Email (optional)	<input type="text"/>
Telephone number (optional)	<input type="text"/>

Thank you for participating in the survey. Your input will help us gain a better understanding of key IMS issues. We value your time.

Appendix B: Results of computed statistical tests

RQ2. Do bigger companies operate to more MSSs?

Size of organisation * Number of MSSs Crosstabulation

			Number of MSSs							
			2	3	4	5	6	7	8	Total
Size of organisation	Large (more than 250 employees)	Count	11	18	7	14	3	0	0	53
		% within Number of MSSs	32.4%	29.5%	18.9%	37.8%	33.3%	0.0%	0.0%	28.8%
	Large international organisation	Count	6	15	18	13	4	2	2	60
		% within Number of MSSs	17.6%	24.6%	48.6%	35.1%	44.4%	50.0%	100.0%	32.6%
	Medium (250 employees or less)	Count	10	19	7	6	2	1	0	45
		% within Number of MSSs	29.4%	31.1%	18.9%	16.2%	22.2%	25.0%	0.0%	24.5%
	Micro (10 employees or less)	Count	2	3	3	2	0	0	0	10
		% within Number of MSSs	5.9%	4.9%	8.1%	5.4%	0.0%	0.0%	0.0%	5.4%
	Small (50 employees or less)	Count	3	6	2	1	0	1	0	13
		% within Number of MSSs	8.8%	9.8%	5.4%	2.7%	0.0%	25.0%	0.0%	7.1%
	Sole trader	Count	2	0	0	1	0	0	0	3
		% within Number of MSSs	5.9%	0.0%	0.0%	2.7%	0.0%	0.0%	0.0%	1.6%
Total		Count	34	61	37	37	9	4	2	184
		% within Number of MSSs	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 19. Crosstabulation of the number of MSSs and the size of organisation (Source: own elaboration)

RQ4. To what degree has the integration been achieved and are the results reflecting the integration policy?

Integration policy * Strategic level of integration Crosstabulation

		Strategic level of integration				
		Full integration	Partial integration	No integration	Total	
Integration policy	Fully integrated MS which covers all processes and requirements of your company	Count	20	30	6	56
		% within Strategic level of integration	27.8%	30.6%	42.9%	30.4%
	Single integrated MS with no documents dedicated specifically to individual standards	Count	1	1	1	3
		% within Strategic level of integration	1.4%	1.0%	7.1%	1.6%
	Single integrated MS with some documents dedicated to individual standards	Count	19	18	3	40
		% within Strategic level of integration	26.4%	18.4%	21.4%	21.7%
	Separate MSs with one MS taking the lead (e. g. quality management system) and the others referencing the lead MS as necessary	Count	5	10	2	17
		% within Strategic level of integration	6.9%	10.2%	14.3%	9.2%
	Separate MSs with some sharing of common elements, e. g. document control, internal audit	Count	14	18	0	32
		% within Strategic level of integration	19.4%	18.4%	0.0%	17.4%
	Separate but aligned MSs (similar structures and style)	Count	4	12	1	17
		% within Strategic level of integration	5.6%	12.2%	7.1%	9.2%
	There is no perceived benefit for integrating management systems (MS) in my company	Count	7	8	1	16
		% within Strategic level of integration	9.7%	8.2%	7.1%	8.7%
	Other (please specify)	Count	2	1	0	3
		% within Strategic level of integration	2.8%	1.0%	0.0%	1.6%
Total		Count	72	98	14	184
		% within Strategic level of integration	100.0%	100.0%	100.0%	100.0%

Table 20. Crosstabulation of integration policy and degrees of integration at strategic, tactical and operational levels (Source: own elaboration)

Integration policy * Tactical level of integration Crosstabulation						
Integration policy			Tactical level of integration			Total
			Full integration	Partial integration	No integration	
Fully integrated MS which covers all processes and requirements of your company	Count		21	31	4	56
	% within Tactical level of integration		32.3%	30.1%	25.0%	30.4%
Single integrated MS with no documents dedicated specifically to individual standards	Count		0	3	0	3
	% within Tactical level of integration		0.0%	2.9%	0.0%	1.6%
Single integrated MS with some documents dedicated to individual standards	Count		16	20	4	40
	% within Tactical level of integration		24.6%	19.4%	25.0%	21.7%
Separate MSs with one MS taking the lead (e. g. quality management system) and the others referencing the lead MS as necessary	Count		5	8	4	17
	% within Tactical level of integration		7.7%	7.8%	25.0%	9.2%
Separate MSs with some sharing of common elements, e. g. document control, internal audit	Count		12	19	1	32
	% within Tactical level of integration		18.5%	18.4%	6.2%	17.4%
Separate but aligned MSs (similar structures and style)	Count		6	9	2	17
	% within Tactical level of integration		9.2%	8.7%	12.5%	9.2%
There is no perceived benefit for integrating management systems (MS) in my company	Count		4	11	1	16
	% within Tactical level of integration		6.2%	10.7%	6.2%	8.7%
Other (please specify)	Count		1	2	0	3
	% within Tactical level of integration		1.5%	1.9%	0.0%	1.6%
Total	Count		65	103	16	184
	% within Tactical level of integration		100.0%	100.0%	100.0%	100.0%

Table 21. Crosstabulation of the integration policy and the degrees of achieved integration at the tactical level (Source: own elaboration)

Integration policy ^ Operational level of integration Crosstabulation

Integration policy		Operational level of integration			Total
		Full integration	Partial integration	No integration	
Fully integrated MS which covers all processes and requirements of your company	Count	20	27	9	56
	% within Operational level of integration	29.9%	30.3%	32.1%	30.4%
Single integrated MS with no documents dedicated specifically to individual standards	Count	0	2	1	3
	% within Operational level of integration	0.0%	2.2%	3.6%	1.6%
Single integrated MS with some documents dedicated to individual standards	Count	16	18	6	40
	% within Operational level of integration	23.9%	20.2%	21.4%	21.7%
Separate MSs with one MS taking the lead (e. g. quality management system) and the others referencing the lead MS as necessary	Count	5	6	6	17
	% within Operational level of integration	7.5%	6.7%	21.4%	9.2%
Separate MSs with some sharing of common elements, e. g. document control, internal audit	Count	11	19	2	32
	% within Operational level of integration	16.4%	21.3%	7.1%	17.4%
Separate but aligned MSs (similar structures and style)	Count	7	8	2	17
	% within Operational level of integration	10.4%	9.0%	7.1%	9.2%
There is no perceived benefit for integrating management systems (MS) in my company	Count	6	8	2	16
	% within Operational level of integration	9.0%	9.0%	7.1%	8.7%
Other (please specify)	Count	2	1	0	3
	% within Operational level of integration	3.0%	1.1%	0.0%	1.6%
Total	Count	67	89	28	184
	% within Operational level of integration	100.0%	100.0%	100.0%	100.0%

Table 22. Crosstabulation of the integration policy and the degrees of achieved integration at the operational level (Source: own elaboration)

RQ5. Does the number of MSSs impact on the decision whether to integrate or not on the degrees of integration achieved?

Crosstab

		Degree of integration at strategic level				Total
		No integration	Partial integration	Full integration		
Number of MSSs	2	Count	3	18	13	34
		% within Number of MSSs	8.8%	52.9%	38.2%	100.0%
	3	Count	7	31	23	61
		% within Number of MSSs	11.5%	50.8%	37.7%	100.0%
	4	Count	2	16	19	37
		% within Number of MSSs	5.4%	43.2%	51.4%	100.0%
	5	Count	2	24	11	37
		% within Number of MSSs	5.4%	64.9%	29.7%	100.0%
	6	Count	0	6	3	9
		% within Number of MSSs	0.0%	66.7%	33.3%	100.0%
	7	Count	0	2	2	4
		% within Number of MSSs	0.0%	50.0%	50.0%	100.0%
	8	Count	0	1	1	2
		% within Number of MSSs	0.0%	50.0%	50.0%	100.0%
Total		Count	14	98	72	184
		% within Number of MSSs	7.6%	53.3%	39.1%	100.0%

Table 23. Crosstabulation of the number of MSSs and the degrees of achieved integration at the strategic level (Source: own elaboration)

Jonckheere-Terpstra Test^a

		Degree of integration at strategic level
Number of Levels in Number of MSSs		7
N		184
Observed J-T Statistic		6647.500
Mean J-T Statistic		6535.000
Std. Deviation of J-T Statistic		359.312
Std. J-T Statistic		.313
Asymp. Sig. (2-tailed)		.754
Monte Carlo Sig. (2-tailed)	Sig.	.757 ^b
	99% Confidence Interval	Lower Bound
	Upper Bound	.746
Monte Carlo Sig. (1-tailed)	Sig.	.377 ^b
	99% Confidence Interval	Lower Bound
	Upper Bound	.364

a. Grouping Variable: Number of MSSs

b. Based on 10000 sampled tables with starting seed 209883525.

Table 24. Results of the Jonckheere trend test for the relationship between the number of MSSs and the degrees of achieved integration at the strategic level (Source: own elaboration)

Crosstab

		Degree of integration at tactical level				Total
		No integration	Partial integration	Full integration		
Number of MSSs	2	Count	4	16	14	34
		% within Number of MSSs	11.8%	47.1%	41.2%	100.0%
	3	Count	7	34	20	61
		% within Number of MSSs	11.5%	55.7%	32.8%	100.0%
	4	Count	2	19	16	37
		% within Number of MSSs	5.4%	51.4%	43.2%	100.0%
	5	Count	2	26	9	37
		% within Number of MSSs	5.4%	70.3%	24.3%	100.0%
	6	Count	0	5	4	9
		% within Number of MSSs	0.0%	55.6%	44.4%	100.0%
	7	Count	0	3	1	4
		% within Number of MSSs	0.0%	75.0%	25.0%	100.0%
	8	Count	1	0	1	2
		% within Number of MSSs	50.0%	0.0%	50.0%	100.0%
Total		Count	16	103	65	184
		% within Number of MSSs	8.7%	56.0%	35.3%	100.0%

Table 25. Crosstabulation of the number of MSSs and the degrees of achieved integration at the tactical level (Source: own elaboration)

Jonckheere-Terpstra Test^a

		Degree of integration at tactical level
Number of Levels in Number of MSSs		7
N		184
Observed J-T Statistic		6485.500
Mean J-T Statistic		6535.000
Std. Deviation of J-T Statistic		357.325
Std. J-T Statistic		-.139
Asymp. Sig. (2-tailed)		.890
Monte Carlo Sig. (2-tailed)	Sig.	.892 ^b
	99% Confidence Interval	Lower Bound .884
		Upper Bound .900
Monte Carlo Sig. (1-tailed)	Sig.	.441 ^b
	99% Confidence Interval	Lower Bound .428
		Upper Bound .454

a. Grouping Variable: Number of MSSs

b. Based on 10000 sampled tables with starting seed 926214481.

Table 26. Results of the Jonckheere trend test for the relationship between the number of MSSs and the degrees of achieved integration at the tactical level (Source: own elaboration)

Crosstab

		Degree of integration at operational level				Total
		No integration	Partial integration	Full integration		
Number of MSSs	2	Count	6	12	16	34
		% within Number of MSSs	17.6%	35.3%	47.1%	100.0%
	3	Count	11	32	18	61
		% within Number of MSSs	18.0%	52.5%	29.5%	100.0%
	4	Count	3	17	17	37
		% within Number of MSSs	8.1%	45.9%	45.9%	100.0%
	5	Count	5	23	9	37
		% within Number of MSSs	13.5%	62.2%	24.3%	100.0%
	6	Count	1	3	5	9
		% within Number of MSSs	11.1%	33.3%	55.6%	100.0%
	7	Count	1	2	1	4
		% within Number of MSSs	25.0%	50.0%	25.0%	100.0%
	8	Count	1	0	1	2
		% within Number of MSSs	50.0%	0.0%	50.0%	100.0%
Total		Count	28	89	67	184
		% within Number of MSSs	15.2%	48.4%	36.4%	100.0%

Table 27. Crosstabulation of the number of MSSs and the degrees of achieved integration at the operational level (Source: own elaboration)

Jonckheere-Terpstra Test^a

		Degree of integration at operational level
Number of Levels in Number of MSSs		7
N		184
Observed J-T Statistic		6438.000
Mean J-T Statistic		6535.000
Std. Deviation of J-T Statistic		369.765
Std. J-T Statistic		-.262
Asymp. Sig. (2-tailed)		.793
Monte Carlo Sig. (2-tailed)	Sig.	.792 ^b
	99% Confidence Interval	Lower Bound
	Upper Bound	.803
Monte Carlo Sig. (1-tailed)	Sig.	.399 ^b
	99% Confidence Interval	Lower Bound
	Upper Bound	.411

a. Grouping Variable: Number of MSSs

b. Based on 10000 sampled tables with starting seed 1314643744.

Table 28. Results of the Jonckheere trend test for the relationship between the number of MSSs and the degrees of achieved integration at the operational level (Source: own elaboration)

RQ6. Is there a relationship between the structure of support functions and the degrees of integration achieved?

Crosstab

			Degree of integration at strategic level			
			No integration	Partial integration	Full integration	Total
Structure of support functions	Business streams are provided with advice and support (for example HSEQ) which comes under a single manager / director	Count	4	51	48	103
		% within Structure of support functions	3.9%	49.5%	46.6%	100.0%
	Business streams are provided with advice and support which each comes under a separate manager / director	Count	9	42	15	66
		% within Structure of support functions	13.6%	63.6%	22.7%	100.0%
Total		Count	13	93	63	169
		% within Structure of support functions	7.7%	55.0%	37.3%	100.0%

Table 29. Crosstabulation of the structure of support functions and the degrees of achieved integration at the strategic level (Source: own elaboration)

Crosstab

			Degree of integration at tactical level			
			No integration	Partial integration	Full integration	Total
Structure of support functions	Business streams are provided with advice and support (for example HSEQ) which comes under a single manager / director	Count	5	57	41	103
		% within Structure of support functions	4.9%	55.3%	39.8%	100.0%
	Business streams are provided with advice and support which each comes under a separate manager / director	Count	9	40	17	66
		% within Structure of support functions	13.6%	60.6%	25.8%	100.0%
Total		Count	14	97	58	169
		% within Structure of support functions	8.3%	57.4%	34.3%	100.0%

Table 30. Crosstabulation of the structure of support functions and the degrees of achieved integration at the tactical level (Source: own elaboration)

Crosstab

		Degree of integration at operational level			Total	
		No integration	Partial integration	Full integration		
Structure of support functions	Business streams are provided with advice and support (for example HSEQ) which comes under a single manager / director	Count	11	51	41	103
		% within Structure of support functions	10.7%	49.5%	39.8%	100.0%
	Business streams are provided with advice and support which each comes under a separate manager / director	Count	16	31	19	66
		% within Structure of support functions	24.2%	47.0%	28.8%	100.0%
Total		Count	27	82	60	169
		% within Structure of support functions	16.0%	48.5%	35.5%	100.0%

Table 31. Crosstabulation of the structure of support functions and the degrees of achieved integration at the operational level (Source: own elaboration)

Test Statistics^{a,b}

	Degree of integration at strategic level	Degree of integration at tactical level	Degree of integration at operational level
Chi-Square	12.175	5.421	4.647
df	1	1	1
Asymp. Sig.	.00048	.020	.031
Exact Sig.	.00045	.020	.031
Point Probability	.00006	.001	.001

a. Kruskal Wallis Test
b. Grouping Variable: Structure of support functions

Table 32. The Kruskal-Wallis test for the associations between the structure of support functions and the degrees of achieved integration (Source: own elaboration)

RQ8. What are the main barriers to integration?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	99% Confidence Interval		Sig.	99% Confidence Interval	
				Lower Bound	Upper Bound		Lower Bound	Upper Bound	
Pearson Chi-Square	66.393 ^a	66	.463	.358 ^b	.346	.370			
Likelihood Ratio	58.287	66	.739	.469 ^b	.456	.482			
Fisher's Exact Test	75.751			.393 ^b	.381	.406			
Linear-by-Linear Association	.028 ^c	1	.866	.870 ^b	.862	.879	.426 ^b	.414 .439	
N of Valid Cases	184								

a. 69 cells (82.1%) have expected count less than 5. The minimum expected count is .01.

b. Based on 10000 sampled tables with starting seed 299883525.

c. The standardized statistic is .109.

Table 33. The linear-by-linear association test's results for the correlation of the number of barriers and the number of MSSs (Source: own elaboration)