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Embedding Sustainable Development in Organizations Through an Integrated Management Systems Approach

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1. Introduction

The concept of sustainable development (SD) was popularized by the publication of the World Commission on Environment and Development's (WCED) report *Our Common Future* in 1987 (WCED, 1987). There has been considerable debate regarding the meaning of SD since the publication of *Our Common Future*. However, the definition provided in that report remains the most widely-cited definition: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987). Building on that definition, there have been many efforts to elucidate the key components of SD. The WCED suggested that SD involved the simultaneous pursuit of economic, environmental, and social goals. These three areas are commonly referred to as the "three pillars" of sustainable development. Gladwin et al. (1995) proposed five principal components of SD: inclusiveness, connectivity, equity, prudence, and security. Additional conceptions on the key principles of SD are widely available in the literature (see, for example, Dresner, 2002).

Although early efforts focused on applying SD to the national and regional levels, it is increasingly being applied at the organizational level (Shrivastava, 1995). Several theoretical frameworks have been used to explore why organizations commit to SD. For example, Bansal (2005) demonstrated that both resource-based (Barney, 1991) and institutional (DiMaggio and Powell, 1983) factors influence SD at the corporate level. Perhaps the most widely-used theoretical framework for explaining organizational SD is stakeholder theory (Freeman, 1984). Stakeholder theory recognizes that organizations have obligations to many individuals and groups, including (but not limited to) shareholders, customers, employees, and the wider community. Building on these theories, several authors have sought to clarify why organizations would operate in environmentally- (Bansal and Roth, 2000) or socially-friendly (Campbell, 2007) ways. These motivations have provided a basis for research on the business case for SD (Salzmann et al. 2005).

Recently, research on organizational SD has begun to shift from why SD should be implemented at the organizational level to how this can be accomplished. In this light, there is a growing stream of research on standardized management systems for SD. The literature

highlights that one possibility is developing a stand-alone standard for SD. Singh et al. (2007) provide an example of how this may be accomplished. The literature also highlights the possibility of integrating the principles of SD with existing management system standards (MSS), such as ISO 9001, ISO 14001, and OHSAS 18001, among others. This research builds on wider research on integrated management systems (IMS). Examples are provided by Rocha et al. (2007) and Oskarsson and Malmberg (2005), among others. However, while much research has been conducted on how SD can be implemented at the organizational level, work remains.

This paper contributes to these efforts. The paper argues that an IMS-based approach can be used to embed SD in organizations. The focus on IMS is in recognition of the point that existing MSSs, such as ISO 9001 and ISO 14001, may provide needed leverage points for integrating SD with mainstream organizational issues. It also recognizes that SD should not be seen as a stand-alone initiative, which may be encouraged through the development of a separate MSS focused on SD. An IMS approach provides opportunities to explicitly link SD with existing organizational goals, policies, programs, processes, procedures, and resources. However, research on the application of an IMS-approach to organizational SD is still in its relatively early stages. While several IMS models have been proposed in the literature, they have not been systematically evaluated with respect to their potential to embed SD in organizations.

2. Literature survey

The concept of IMS initially emerged about 15 years ago. Early efforts focused on the integration of ISO 9001 and ISO 14001, though other MSS are increasingly being taken into account in the IMS literature. An increasing body of knowledge is available in the specialized literature containing information about the potential benefits and limitations of IMS; IMS models; and empirical results of implementing IMS in specific organizations (see, for example, Wilkinson and Dale, 2001; Karapetrovic and Willborn, 2002; Scipioni et al., 2001; Rocha et al., 2007; Asif et al., 2009). Further details on the concept of integration, models, methodologies, potential benefits, and lessons learned are provided below.

2.1 The concept of integration

There are many different definitions of IMS in the literature. These differences reflect different approaches and strategies for integration. The differences start with the concept of “integration” and the possible equivalent use of the terms “alignment” and “merge”. For instance, integration was defined as the “degree of alignment or harmony in an organization - whether different departments and levels speak the same language and are tuned to the same wavelength” (Garvin, 1991). Alignment has been at the center of the ISO approach in developing updated versions of ISO 9001 and ISO 14001. It has been noted that this has in turn created additional opportunities for an aligned Environmental + Quality MS (Scipioni et al. 2001). Integration through the merging of two standards into one has been explored in the integrated auditing guidelines provided in ISO 19011:2002. However, recent efforts on industry specific standards, such as ISO/TS 16949 for the auto industry or ISO 22000 for food safety, indicate a further proliferation of individual standards rather than a move towards a consolidated set of standards. In recognition of this trend, a comprehensive approach for integration has been developed around the concept of systems theory. In their

seminal work on IMS, Karapetrovic and Willborn (1998) defined integration as “linking two systems in a way that results in a loss of independence of one or both means that these systems are integrated” (Karapetrovic and Willborn, 1998). In a similar manner, Bernardo et al. (2008) explained that integration is “a process of linking different standardized MSs into a unique MS with common resources aiming to improve stakeholders’ satisfaction”. Thus, recent research has generally focused on the integration of management systems, rather than management standards. This is a key distinction.

According to Jonker and Karapetrovic (2004) two elements are required to integrate MSs: (1) a model describing the MS elements and their relevant interactions and (2) a roadmap or methodology showing the process for implementing the model. Although this may seem obvious, relatively few papers actually describe a model for integration of MSs (Karapetrovic and Willborn, 1998; Scipioni et al. 2001; Wilkinson and Dale, 2001; Rocha et al. 2007; Asif et al. 2009; Lopez-Fresno, 2010) and fewer still elaborate proposals for the second requirement (Lopez-Fresno, 2010; Asif et al. 2009; Rocha and Karapetrovic, 2006). These issues are briefly explored in further detail below.

2.2 IMS models

One stream of research on IMS focuses on the development of IMS models. The underlying emphasis on IMS models is generally on achieving integration that goes beyond the development and use of a unique MS manual and supporting documentation system towards the integration of selected functional requirements into the organization structure. To accomplish this, IMS models generally focus on identifying and building on the key management systems elements that are common to all of an organization’s initiatives. These elements vary by model. For example, Karapetrovic and Willborn (1998) focused on a systems approach organized around three key elements: goals, processes, and resources. Wilkinson and Dale (2001) proposed a total quality management approach structured around seven key elements: policy, leadership, resources, processes, culture, goals, and stakeholders. Rocha et al. (2007) proposed a model organized around the following elements: stakeholders, resources, leadership, processes, values, objectives, and results. Additional examples are available in the literature. In any case, all models must be able to accommodate the inclusion of current and new MSS, harmonize differing requirements of MSS, and support IMS implementation and improvement.

IMS models are usually designed with a specific scope in mind. The most common starting point for an IMS is using an ISO 9001-compliant QMS that is already in place. This is sensible since more than 1,200,000 organizations worldwide have implemented a QMS based on this standard. According to empirical research done in different countries, EMS and OHSMS have been selected as the preferred MSs to be integrated with QMS (Harjeev et al., 2010; Griffith and Bhutto, 2009; Zutshi and Sohal, 2005; Beckmerhagen et al. 2003; Lopez-Fresno, 2010). There is increasing interest in including social-focused MSSs into the integration mix. ISO 26000, AA1000 and SA8000 have been mentioned as potential candidates for companies willing to tackle the needs of their community (Rocha et al. 2007).

2.3 IMS methodologies

Another stream of research focuses on the development of IMS methodologies. As Karapetrovic (2003) notes, a generic methodology would address (as a minimum) model

selection, standard(s) selection, IMS implementation, and IMS audits. Rocha and Karapetrovic (2006) have further noted that having a methodology may increase the attractiveness of integration to companies but more detail is required to address “how to” questions such as: flexibility to cover different starting points (MSs already in place), differences on organizations final scope (QMS/EMS/OHSMS + others), links to overall business strategy, and culture change required for assimilating new roles, among others. As noted above, relatively few papers explicitly address these issues. For example, published methodologies include a PDCA-based implementation process developed by Scipioni et al. (2001); a flexible three-phased IMS implementation process (Rocha and Karapetrovic, 2006); and an implementation process for the PEDIMS model designed by Asif et al. (2009). In any case, all methodologies must be able to illustrate how to put a function-specific MS together while allowing for differing initial organizational conditions and objectives. However, none of the published methodologies have been implemented; thus, they remain unproven. Empirical evidence from experiences of Spanish and Australian companies indicated that IMS implementation requires top management commitment through an appointed integration champion, training to reduce anticipated problems, and the deployment of essential resources (Zutshi and Sohal, 2005). Furthermore, a cellular-like implementation pilot project helps to reduce uncertainty and increase efficiency, while risk assessment enables a reduction of potential problems (Lopez-Fresno, 2010)

2.4 Potential benefits of integrating MSs

Initially, the literature tended to emphasize operational efficiency and effectiveness as the main factors in the promotion of IMS. Over the last several years, additional benefits have been discussed in theoretical and empirical papers. Table 1 shows a summary of the potential benefits of integrating quality, environmental, occupational health and safety management systems, and other management systems. As Table 1 illustrates, the benefits of IMS have been organized in this paper around the three pillars of SD: economic, social, and environmental benefits. A fourth category, operational benefits, was added to include those benefits that serve as enablers for improved performance in those three dimensions.

Economic Benefits	Social Benefits	Environmental Benefits	Operational Benefits
<ul style="list-style-type: none"> • Reduction in duplication of policies, procedures and work instructions • Time savings • Reduced operational costs 	<ul style="list-style-type: none"> • Increased transparency • Enhanced internal communication • Facilitation of cultural change in the organization • Potential image benefits 	<ul style="list-style-type: none"> • Increased prominence of environmental issues in organizational management • Increased emphasis on compliance with applicable regulatory requirements 	<ul style="list-style-type: none"> • Increased synergy between MSS • Reduced audit fatigue • Explicitly shows how the MSS relates to the rest of the business • Clarification of responsibilities • Improved information flow

Adapted from Zutshi and Sohal (2005); Lopez-Fresno (2010); Harjeev et al. (2010); Griffith and Bhutto (2009)

Table 1. Illustrative Summary of Key Benefits of an IMS Approach

2.5 Lessons learned for integrating MSs

It is important to acknowledge that an IMS approach is not a cure for all problems facing an organization. When integrating MSs organizations may face new obstacles that go beyond their previous experiences with isolated MSs. For example, employees may see an increase in workload and responsibilities. Some of the other key barriers to implementing an IMS include the different nature of individual systems, employee resistance, lack of resources, post implementation difficulties, and organizational culture aspects (Asif et al. 2008, Zutshi and Sohal, 2005, Griffith and Bhutto, 2009).

3. Evaluation of IMS models with respect to sustainable development

The notion of applying an IMS approach to organizational SD has been recognized by a number of authors, including Rocha et al. (2007), Jorgensen (2008), Oskarsson and Malmberg (2005), and Fresner and Engelhardt (2004). This is in recognition of the point that the infrastructure provided by the existing MSS provides opportunities to structure the implementation of SD at the organizational level. However, not all of these papers proposed a specific model for IMS. Nonetheless, the literature survey shows that several IMS models have been developed. The objectives of these models range from the original IMS goal of operational efficiency improvement to current views where SD, corporate responsibility and labor rights are added in an effort to reflect a fast-paced sustainable-oriented market. The IMS models that were found to include a summarized version of key elements and their interactions include: (1) the "Systems approach" developed by Karapetrovic and Willborn (1998, 2001); (2) the "Total quality approach" designed by Wilkinson and Dale (2001); (3) the EQOHSMS model presented by Scipioni et al. (2001); (4) the "Rotor" model developed by Rocha and Karapetrovic (2005, 2006); (5) the "Airline applied" IMS model shown by Lopez-Fresno (2010); and (6) the "Systems approach to integration" model developed by Asif et al. (2010). For a summary of these models see Table 2. To date, no systematic evaluation of the ability of these models to address organizational SD has been conducted.

3.1 The concept of integration

To analyse the ability of these IMS models to embed the principles of SD in organizations, a set of criteria was developed. The criteria were designed assuming a need to be concise and to meet current and future needs of organizations employing an IMS approach to SD. The criteria were divided into two broad categories: management requirements and SD requirements. It should be noted that it is recognized that modifications to the criteria are possible. Additional criteria could be developed and additional questions to guide the analysis could also be created. Nonetheless, the criteria do provide a starting point for structuring the analysis of the existing IMS models with respect to organizational SD. With that in mind, the criteria are introduced below.

1. **Management requirements:** Criteria in this category were focused on ensuring that the IMS model was capable of addressing the diverse requirements of standardized MSSs. The clarity of the model was also an overarching emphasis in this category. With that in mind, several questions were used to guide the assessment of these criteria: Does the IMS model accommodate the requirements of current MSSs? Are the IMS elements clearly explained? Is the scope of the model clear? Does the IMS model provide linkages

to overall business strategy? How do the IMS elements interact to produce the planned objectives? Does the model accommodate different degrees of integration? What lessons have been learned from the application of the model in practice (if applicable)? Does the model address the need for MSs to evolve over time?

To structure both management and integration of MS requirements the criteria were organized around the ISO quality management principles outlined in ISO 9000:2005.

Models (Authors, year)	Key elements	Integration approach
<i>The Systems approach</i> Karapetrovic & Willborn (1998, 2001)	Goals, processes and resources	A generic system connected by a flow of resources transformed by processes to accomplish objectives.
<i>Total quality approach</i> Wilkinson and Dale (1999)	Leadership, stakeholders, integrated processes, resources, goals, infrastructure	A generic system calling for full integration of resources, processes and structure. Special emphasis on cultural issues as foundation for the IMS
<i>The EQOHSMS</i> Scipioni <i>et al.</i> , (2001)	Structure similar to ISO 9001:2008: Management responsibility; resource management; product realization; measurement analysis and improvement	A system based on ISO 9001:2008 tenets such as processes and systems. Scope limited to Quality, environment and Occupational Health & Safety
<i>The Rotor model</i> Rocha et al (2005, 2006)	Stakeholders providing resources to processes and directed by leadership producing results (rotor movement)	Using a dynamic system where results and stakeholder engagement are included integration is achieved for quality, environment, social and other functions
<i>The Airline applied model</i> Lopez-Fresno (2010)	Global framework and function-specialized modules. The global framework contains: Organisation and policies; planning; resource management; process and activity management; activity evaluation; continuous improvement; Relationship with the authorities	Integration is done at high level processes as described in global framework. However, specific objectives can be managed through specialized programs such as maintenance.
<i>The Systems approach to integration</i> Asif et al (2010)	Stakeholders, requirements, business strategies, management subsystems, documentation, operations, feedback	Integration is achieved at high and low levels on stakeholder requirements and business strategies. Flexibility is provided through management sub-systems.

Table 2. Summary of relevant IMS models

These were chosen due to their wide applicability to MSSs and the inclusion of both the process and the systems approaches, which are the foundation for true integration (Karapetrovic, 2003). Seven of the eight ISO quality principles formed an evaluation category, namely: leadership, systems focus, process approach, human resources focus, building partnerships, factual decisions, and continual improvement. The associated evaluation criteria were further developed based on the literature, particularly that focused on existing MSSs (such as ISO 9001, ISO 14001, OHSAS 18001, SA8000, and AA1000), business excellence models (MBNQA and EFQM), and empirical studies focused on the implementation of MSSs (see, for example, Bernardo et al. 2007). For example, the first principle “leadership” deals with the role of a proactive and dynamic top management leadership. To test how each IMS model deals with this sub-category there are questions focused on issues such as if the model is actually linked to organizational strategic planning; if leadership sets up an integrated policy; if leadership commitment is provided and, if so, how this is done. Integration at this level is vital for the IMS to succeed thus the questions also seek to explore the degree of integration in establishing policies and objectives as well as planning and reviewing the system’s performance. The complete set of evaluation criteria for management requirements are provided in Table 3.

2. **Sustainability requirements:** Criteria in this category were focused on ensuring that the IMS model was capable of accommodating the principles of SD at the organizational level. The models’ explicit focus on SD was an overarching emphasis in this category. With that in mind, several questions were used to guide the assessment of these criteria: Does the model provide a basis for addressing the key principles of SD? Does the model emphasize the importance of transparency? Does the model explicitly acknowledge the importance of stakeholder participation in the IMS? Does the model accommodate different degrees of stakeholder interaction? Does the model provide a basis for balancing organizational objectives in the decision making process? Is the application of the model to organizational SD discussed?

To provide a structure for addressing these questions, the criteria were organized around three sub-categories: environmental, economic, and social responsibilities. These categories build on the key requirements for SD outlined by the WCED and are closely linked with the “triple bottom line” of organizational SD. They were selected due to their widespread association with SD and their general applicability. The sub-categories and associated evaluation criteria were further developed based on the literature, particularly literature focused on stakeholder theory and corporate sustainability. For example, the social responsibilities sub-category deals with the need to set relevant objectives, to develop indicators to measure progress towards those objectives, to meaningfully consult with stakeholders, and to emphasize the importance of transparency in organizational decision making. The complete set of evaluation criteria for SD requirements are provided in Table 4.

1. Leadership actions

Does the model

- 1.1. Encourage linking the IMS to the overall business strategic planning?
- 1.2. Require a balanced and integrated policy?
- 1.3. Require a leadership system to set up and deploy IMS objectives?
- 1.4. Ask for a system owner or champion?
- 1.5. Integrate and balance IMS goals?

1.6. Require top management to provide and deploy needed resources and infrastructure?
2. Systems focus <i>Does the model</i> <ol style="list-style-type: none"> 2.1. Have explicit boundaries? 2.2. Include elements other than processes and activities? 2.3. Show interactions among the model elements? 2.4. Show sub systems and meta-systems? 2.5. Show type and degree of integration between functional MSs?
3. Process approach <i>Does the model</i> <ol style="list-style-type: none"> 3.1. Require identifying the organizational processes for realizing products and services? 3.2. Follow the main organizational processes along the supply chain (from supplier to customer passing through stakeholders)? 3.3. Include supporting processes such as finance, sales, IT and others? 3.4. Deploy IMS objectives along regular processes without the need for “special programs” when possible? 3.5. Follow the PDCA cycle to deploy IMS processes? 3.6. Integrate documentation and activities along the processes?
4. Human resource focus <i>Does the model</i> <ol style="list-style-type: none"> 4.1. Address the need for a skilled human resource through recruitment and training? 4.2. Require the workforce to become aware of stakeholders needs? 4.3. Establish the need for roles, responsibilities and authorities for HR? 4.4. Integrate roles and responsibilities along process roles and responsibilities?
5. Building partnerships <i>Does the model</i> <ol style="list-style-type: none"> 5.1. Include suppliers as part of the IMS? 5.2. Encourage construction of working relationships with related stakeholders including customers and suppliers? 5.3. Include two-sided communication paths with relevant stakeholders?
6. Factual decision <i>Does the model</i> <ol style="list-style-type: none"> 6.1. Require a documentation sub system for recording relevant information? 6.2. Establish a performance measurement sub system aligned to the IMS goals? 6.3. Include information analysis requirement and possibly a knowledge management sub system? 6.4. Integrate preventive and corrective actions as regular IMS elements? 6.5. Provide guidelines for balancing goals in the decision making process?
7. Continual improvement <i>Does the model</i> <ol style="list-style-type: none"> 7.1. Require a feedback loop for continual improvement? 7.2. Integrate continual improvement in a balanced manner for IMS goals? 7.3. Require a systematic top management / review of the system performance?

Table 3. Evaluation set of criteria for IMS completeness

<p>1. Environmental responsibilities <i>Does the model</i></p> <ol style="list-style-type: none"> 1.1. Explicitly seek to minimize or eliminate negative environmental impacts from organizational activities? 1.2. Allow flexibility to choose relevant and specific environmental objectives? 1.3. Deploy environmental objectives into IMS elements? 1.4. Encourage identification, communication and partnership with environmental-based stakeholders?
<p>2. Social responsibilities <i>Does the model</i></p> <ol style="list-style-type: none"> 2.1. Establish specific social requirements both internal and external to organizations? 2.2. Cover specific social indicators or give flexibility to do so? 2.3. Integrate social-focused objectives into IMS elements? 2.4. Require identification, communication and partnership with social-based stakeholders?
<p>3. Financial responsibilities <i>Does the model</i></p> <ol style="list-style-type: none"> 3.1. Explicitly establish financial responsibilities for both organizations and community? 3.2. Allow a flexible range of financial responsibility indicators? 3.3. Integrate financial-focused objectives into IMS elements? 3.4. Require identification, communication and partnership with social-based stakeholders?

Table 4. Evaluation set of criteria for SD

3.2 Evaluation and information analysis

Each of the six identified IMS models was evaluated on the basis of the criteria with respect to their ability to act as a potential platform for implementing SD in organizations. A summary of the evaluation is presented in Tables 5 and 6. Table 5 provides an evaluation of the IMS models focused on the total quality approach (Wilkinson and Dale, 2001), the rotor model (Rocha et al. 2007), and the systems approach to integration (Asif et al. 2010). Table 6 provides an evaluation of the IMS models focused on the systems model (Karapetrovic and Willborn, 1998, 2002), the airline model (Lopez-Fresno, 2010), and the EQOHSMS model (Scipioni et al. 2001).

The evaluation of the IMS models provides a general view of the adequacy of the models as a platform for embedding SD into organizations. It is important to emphasize that the evaluation focuses on the features of an IMS model that may enable deployment of SD in organizations. For example, it focuses on the integration of an array of stakeholder requirements into organizational objectives, as well as the characteristics that may hinder that endeavor. The evaluation does not focus on identifying the “best” IMS model for the implementation of SD. With that in mind, some of the key observations from the evaluation are discussed below.

IMS DESIGN	Total Quality approach (Wilkinson & Dale, 2001)	The “rotor” Model (Rocha et al, 2007)	Systems approach to integration (Asif et al, 2010)
1. Leadership	Starts with leadership as a driver for resources, aims and objectives. A single policy is mentioned. No information is given about details on how leadership should be exerted.	Leadership determines organizational values and objectives for processes. An integrated policy is deployed as leadership activity. Also it requires a management representative for the system. No information is given about the definition of a balanced array of goals as a leadership element.	This model draws business strategies from identification of stakeholders’ requirements. Goals and business strategy are integrated but at the tactical and operational level the model still shows several MSs, as many as different stakeholders’ requirements. No mention is made establishing a policy, management representative and a balanced goal oriented performance measurement.
2. System focus	The entire organization is the system’s boundaries. The model includes links with environment and elements such as organizational culture. Processes are integrated around a PDCA based cycle.	The model has a flexible boundary depending on each organization: from two MSs to several and from one location to an entire corporation. The model includes stakeholders as important elements. Full integration is encouraged since no functional sub systems are kept.	The system scope is the entire organization, where stakeholders are the main driver for strategy of “n” management sub systems. Integration of management sub systems happen at the operational level: a single manual and integrated procedures.
3. Process approach	PDCA based processes are at the center of the model. No information is given about the role of supporting processes. Objectives are a single input for the processes with actual outputs as the result. No info about documentation, activities, or programs is included.	PDCA based processes are at the core of the IMS model. The processes follow the supply chain structure too. No special programs are required to isolate stakeholders’ needs. Documentation reqs. are deployed as a necessary process supporting subsystem.	Processes are the operational core of the IMS. It seems that only operational processes are included in the system. More detail is required to show how processes are deployed from each management sub system. Procedures and manual are integrated.
4. Human resource focus	No information about HR requirements within the model, however, it does include organizational structure and culture to promote people involvement.	They are included as a subset of the system resources and also as relevant stakeholders. They need to be recruited and trained to fulfill their roles, responsibilities and authorities (shown by the deployed ISO clauses).	No mention is made HR

IMS DESIGN	Total Quality approach (Wilkinson & Dale, 2001)	The “rotor” Model (Rocha et al, 2007)	Systems approach to integration (Asif et al, 2010)
5. Building partnerships	Stakeholders are included as receivers of processes outputs although is left unspecified about the type of stakeholders. No specific communication paths are shown	Stakeholders are explicitly included in two roles: drivers and receivers of the system. Engagement is considered mandatory. Communication is paramount and partnership is sought by inclusion into the system.	Although stakeholders are included in the model no partnership is sought. Rather, stakeholders seem to be solely customers from the system.
6. Factual decision	Measuring, improving and auditing elements are at the center of the processes. No information about documentation or decision making process is found in the model.	Implementation and measurement process steps are dedicated to documentation subsystem. Measurement is a subsystem of product and process performance. No information on decision making process is provided	Composite records are required for the model but no action other than feedback is explicitly included. Information analysis or a performance measurement system are also missing in the model.
7. Continual improvement	The entire system has a continual improvement loop which is also found at the processes core. No details on specific improvement elements are included.	Improvement of processes is included in the Act component of the PDCA cycle. System results are also compared with stakeholder needs and expectations.	To improve the system performance two coordination directions exist: horizontal covering the system scope and vertical taking care of the deployment of stakeholders needs. A feedback loop is also included but no details are provided.
SUSTAINABLE DEVELOPMENT			
8. Environmental responsibilities	Similar to ISO 14001, organizations can define relevant environmental objectives. No information on how the environmental objectives are deployed into IMS elements. Similar case for stakeholders partnership	Similar to ISO 14001 organizations can define relevant environmental objectives. Identified processes are analyzed to identify and implement environmental requirements. Similar case for stakeholders partnership	Similar to ISO 14001 organizations can define relevant environmental objectives. The communication line seems to be one-sided top down as a customer with no partnership required.
9. Social responsibilities	The model’s social scope includes solely for worker health and safety. CSR, labor rights and other social responsibilities are out of the model scope.	The model’s social scope includes health and safety of workers, CSR and labor rights as defined by MSSs such as OHSAS 18001, AA1000, SA800 respectively.	Ethics, sustainability, and health and safety are included as stakeholders’ requirements. However, it is unclear how these requirements are actually deployed and stakeholders are included as part of the system rather than just being system clients.

IMS DESIGN	Total Quality approach (Wilkinson & Dale, 2001)	The “rotor” Model (Rocha et al, 2007)	Systems approach to integration (Asif et al, 2010)
10. Financial responsibilities	Not included in the model	Not included in the model	The model enlists an unlimited number of stakeholders; owners, stockholders, and community. However, no information as to how these requirements may actually be deployed into IMS elements is provided.

Table 5. IMS evaluation results

IMS DESIGN	The “systems model” for IMS (Karapetrovic & Willborn, 1998, 2002)	The “airline applied” IMS model (Lopez-Fresno, 2010)	The IMS model - E/Q/OHS (Scipioni et al, 2001)
1. Leadership	Goal management is the starting point of the model. Linkage with business strategies is missing. Integration happens for policy and targets. Elements missing are: system ownership; balance goal, and leadership tasks.	The system sets organization and policies as set in its global framework, addressing strategic planning from the corporate view. No details about leadership system, system ownership and tasks are included in the model.	Management responsibility is driving the model, including sub elements as described in ISO 9001. Links to business strategy and goal balance are missing from the model.
2. System focus	Boundaries are defined by organizations but the example is limited to QMS/EMS. The system includes goals, processes and resources in a closed loop. No mention about single management subsystems.	The model defines the whole airline corporation as the system. It contains system elements cluster in a global framework + functional sub systems such as maintenance, flight, and security due to the legal relevance.	The system boundaries are quality, environment and health and safety requirements. The structure is highly based on ISO 9001 integrating all requirements around them. The organization is not recognized as the meta system.
3. Process approach	Planning, designing and implementing processes are at the systems core. No discrimination about types of processes is included. In the 2002 version also control and improvement is incorporated, showing deployment of documentation requirements.	Inside the global framework management of processes and activities are included following a PDCA cycle. A corporate single complemented by a number of specific functional manuals exist covering the whole organization.	Processes are found in “product realization” element from design to delivery. As ISO 9001 processes follow a PDCA cycle. No detail is given as to how IMS requirements are deployed into the set of processes.
4. Human resource focus	It is included in resources management. Allocation and deployment are required where training	The model description states that resource management includes HR. The system manual	A single clause for human resource is found similar to the requirement shown in ISO 9001. No detail is

IMS DESIGN	The “systems model” for IMS (Karapetrovic & Willborn, 1998, 2002)	The “airline applied” IMS model (Lopez-Fresno, 2010)	The IMS model - E/Q/OHS (Scipioni et al, 2001)
	and roles + responsibilities are defined.	establishes corporate and functional responsibilities.	provided for the way HR is ready for an array of requirements beyond quality.
5. Building partnerships	Stakeholders are included in the 2002 model. However, no partnership is explicitly sought. Communication lines are setup only for goal management.	No detail is provided about stakeholders beyond compliance with regulatory requirements. Suppliers and other stakeholders are not explicitly included in the model.	Stakeholders are considered only as systems customer but no real partnership is required.
6. Factual decision	Control and improvement is done according to ISO 9001 requirements. No guidelines for balancing goals in the decision making process is included.	Documentation is spread in global framework and specific modules. Given the nature of the air transportation sector preventive and corrective actions are included in the model. No goal balance strategy is provided.	Documentation is maintained as required in ISO 9001 helping to take decisions for corrective, preventive and improvement actions.
7. Continual improvement	The system has a closed feedback loop that assumes continual improvement approach. Management review is performed following ISO 9001 requirements. No mechanism for goal balance is provided.	Continual improvement is engraved into the global framework. No detail on how this is done and whether or not applies to functional modules.	Continual improvement requirement is included in the model. However, no detail is provided on the mechanism to balance this assorted array of performances.
SUSTAINABLE DEVELOPMENT			
8. Environmental responsibilities	Environmental objectives as mentioned by ISO 14001. Processes are used as guidelines to identify and implement environmental requirements. Similar case for stakeholders partnership.	Environmental objectives as mentioned by ISO 14001 which are regulatory for this industry sector. Encourage close relationship with authorities.	Environmental objectives as mentioned by ISO 14001. No information is provided for communication and partnership with environmental stakeholders.
9. Social responsibilities	Although indicated as possible no requirements are shown for social accountability and health and safety of workers.	Air safety is considered as a system objective. No other social requirement is mentioned in the model.	Social responsibilities are reduced to health and safety at the workplace. No detailed information is provided on how safety requirements are deployed into the IMS
10. Financial responsibilities	Although indicated as possible no requirements are shown for financial responsibilities whatsoever.	Not included into the model.	Financial responsibilities are not included. Lateral impact from quality efforts for customer satisfaction and cost reduction.

Table 6. IMS evaluation results (cont)

a. Strong features of the models for SD:

From the evaluation of the management requirements, it was found that most of the IMS models call for strong leadership to drive the system. In all six of the IMS models evaluated, leadership is exerted by setting up integrated policies and objectives, which led in turn to the allocation and deployment of required resources into appropriate structures (Quinn & Dalton, 2009). The models also require top management to define the system scope according to the organizations' needs and evolution. To ensure management commitment, IMS models typically require the assignment of a management representative capable of working across organizational, national and international boundaries to achieve stated objectives.

To varying degrees, all six IMS models employed a systems approach to develop the holistic vision that sustainability requires to be successful (Goel, 2006). Most of the IMS models have a flexible scope that depends on the current organizational needs and possibilities. However, IMS models also call for scope expansion towards the whole organization and increasing stakeholders' requirements (Karapetrovic & Willborn, 1998; Rocha et al., 2007; Lopez-Fresno, 2010). However, as mentioned by Senge et al (2007), "systems thinking can be messy and uncomfortable". Inclusion, relationship building and true engagement of stakeholders, as done at different depth levels in all six IMS models, is a direct result of systems thinking and an enabler for sustainability (Roome and Bergin, 2006; Senge et al, 2007; Pepper and Wildy, 2008; Quinn and Dalton, 2009)

Within their system requirements, all IMS models have processes as the building blocks for fully deploying stakeholder requirements in both operational and supporting activities. As mentioned by Lueneburger & Goleman (2010) sustainable development needs a "specific set of business processes geared to manage previously unquantified risks and capture new opportunities". All processes may be organized according to the PDCA cycle, which is common in IMS frameworks. Such an approach emphasizes planning as an important activity before taking any substantive action. As pointed out by Quinn and Dalton (2009) sustainability requires timing and readiness in their activities; an organization that does plan according to the opportunities and positive outcomes has a better chance to succeed.

The IMS models generally emphasize the importance of skilled human resources that are aware of an assorted array of functions (such as quality, environment and so on). Employees are a key stakeholder that must be engaged in collaborative action along the processes mentioned above (Senge et al, 2007; Pepper & Wildy, 2008). Partnerships with stakeholders are included in the IMS framework however at different levels; only the "Rotor" Model explicitly includes stakeholders as part of the system by providing resources (Rocha et al. 2007). Other models include stakeholders, but only as a receiver of the system outputs. Engagement with stakeholders has been identified by several authors as an essential element for sustainability (Roome and Bergin, 2006; Senge et al, 2007; Pepper & Wildy, 2008; Quinn & Dalton 2009).

Driving sustainability throughout an organization requires a deep knowledge of sustainability (Pepper & Wildy, 2008). IMS models can help facilitate a process of embedding sustainability in organizations through enhanced training in SD issues, process documentation, and measurement and analysis of processes outputs. All together these elements help enable factual-based decision making and an increased body of knowledge for SD within the organizations.

From the evaluation of the SD requirements, it is evident that environmental responsibilities are largely accounted for through the explicit incorporation of ISO 14001 into the IMS. Social requirements are also included in several of the IMS models, though this is generally to a lesser degree than environmental issues. Social accountability, occupational health and safety, labor rights and decent work are the most common social requirements included. All of these issues have international standards that facilitate their inclusion into the IMS models.

b. Weak aspects of the models for SD:

From the management side the analysis shows that, although an IMS does have *leadership* requirements to drive sustainability, it still falls short of the level required to succeed. Most of the IMS models lack of guidelines for objectives that balance priorities between financial, social and environmental dimensions. To make sustainable development sustainable Quinn & Dalton (2009) indicate that there are two options: organizations should look for “solutions both sustainable and economically profitable” or change the objective measurement from economic based to sustainability based. Either way SD requires a strong integrated performance measurement which is non-existent in all six models. Furthermore, sustainable development requires being part of the strategic planning of the organization (Pepper & Wildy, 2008); nonetheless only two models, the “airline applied” and the “systems approach”, explicitly include strategy planning as part of the IMS elements.

Due to their integrative nature, IMS models encourage synergy and holistic vision. However, sustainability goes beyond companies’ walls and even suppliers and customers to include more active relationships with stakeholders into the system (Roome & Bergin, 2006; Quinn & Dalton, 2009). In all six IMS models more detail as to how IMS elements (e.g. processes, documentation, and measurement) are integrated into a unique system is required. Two models, the “airline applied” and the “system approach”, describe modules for particular functions, thus allowing certain flexibility, yet more detail on how they are integrated is required.

An element that needs to be integrated into the system is the set of supporting processes (finance, marketing, IT) which helps in engaging internal and external stakeholders. All analysed IMS models include “processes” at the general level, leaving open to interpretation which processes are included in the search for sustainability. IMS models also show a fragile structure for sustainability in their integration of human resources (as partners) and other stakeholders into the system. Most of the IMS models consider stakeholders just as system clients yet their role as enablers, resource providers and doers is not included or at least diminished. Several authors emphasize the importance of stakeholders’ integration as partners as an essential element to accomplish sustainable development (Roome and Bergin, 2006; Senge et al, 2007; Pepper & Wildy, 2008; Quinn & Dalton 2009).

Broadly speaking, the IMS models still need to address similar issues as those highlighted in empirical studies: obtaining real top management commitment, aligning with business strategies, focusing on training, integrating around processes rather than divisions, and the creation of new functions. It is interesting to note similarities between the suggested improvements for the IMS models and the results from empirical studies on SD implementation. For example, Luenerburger & Goleman (2010) mention identification of risk and opportunities as a first step of a proposed methodology for SD implementation.

Quinn & Dalton (2009) emphasize the need for implementation processes based on positive outcomes and focusing on areas where early success would facilitate more stakeholders participating in the SD process.

Overall, the evaluation of the SD requirements highlighted the lack of emphasis on economic issues in the context of an IMS. Two models indicated the need to develop financial indicators, however, no detail was given as to how they are going to be used in the overall IMS. It is possible that the lack of MSSs on financial management has contributed to this gap. This is a possible concern given the widely held view that financial objectives typically overshadow social and environmental requirements (Roome and Bergin, 2006; Senge et al, 2007; Pepper & Wildy, 2008; Quinn & Dalton 2009). From the two remaining SD dimensions, namely environmental and social issues, the IMS models go no further than briefly stating requirements that the system must address. There is no indication of a management element that helps to prioritize this array of requirements without leaving any of them unattended. A performance measurement system set with a balanced emphasis on the triple bottom line may be part of the answer to help address these issues.

4. Conclusions

A growing number of organizations around the world have made commitments to apply the principles of SD to their operations. Becoming an organization focused on sustainable principles necessitates addressing specified social, environmental and economic objectives. These objectives must be pursued in an integrated manner while drawing on a common pool of resources. For more than 20 years, organizations have employed MSS, such as ISO 9001 and ISO 14001, to meet a portion of these objectives. The infrastructure provided by the existing MSS may be leveraged to help implement SD at the organizational level. Insight into how this may be accomplished is provided by the growing literature on IMS. The concept of an IMS was created to build synergy among MSS, optimizing resources and focusing on meeting an array of different objectives. There are several models available in the literature and an increasing body of knowledge related to their implementation and operation. However, more research is needed on how an IMS approach may be applied in the context of organizational SD.

The purpose of this paper was to explore how existing IMS models can be used to leverage the implementation of organizational SD. Six prominent IMS models were analyzed with respect to their potential to help embed SD in organizations. An original two-prong set of criteria were developed to help guide the analysis. The analysis showed that the existing IMS models do provide a useful starting point in implementing SD in organizations. However, there are numerous opportunities to strengthen the existing models, particularly regarding their application in practice.

The defined set of criteria explored two dimensions of the IMS: first, it analysed the IMS models for management system strength and coherence; second, it evaluated the feasibility to cover SD principles. For the first category (management requirements), seven sub-categories modeled on the quality management principles in ISO 9000 were employed. Each principle was divided into four to six questions that focused on the depth of the management system elements, their interaction, and their level of integration. For the second dimension (SD requirements), the criteria were divided into three categories closely

associated with SD, namely environmental, economic, and social issues. Each responsibility was deployed into questions focusing on the ability of the IMS to address triple bottom line issues and stakeholder requirements.

In general, IMS models were found to be a useful platform to develop SD within an organization. The “process” and “system” approaches that organizations are already familiar with create a mindset for integration and synergy that is necessary for the diverse set of requirements SD demands. In the models, “leadership” is exerted by top management by following the PDCA cycle for the entire system and by allocating and deploying resources needed for processes to operate. Decisions are increasingly taken based on facts and analysis; methods such as lean thinking, six sigma, performance measurement systems and others are all based on “factual decision” principles and thus complement the IMS model. The decision making process is solidly focused on “continuous improvement” which should be deployed to the entire organization. However, while these elements provide a basis for integrating SD into an organization’s core infrastructure, areas of improvement were also found in this analysis. One key issue was the lack of MS elements to build partnerships with employees, the community, customers, suppliers, and other stakeholders. Until organizations realize partnering is not a choice but a necessity, SD may prove to be an elusive goal. The IMS models recognized human resources as an important resource, but partnership needs to be built into them more explicitly. Another area of improvement is the identification, maintenance, control and improvement of processes, not only those with direct impact on product realization, but also on those supporting the operation such as sales, finance, and marketing. Lack of integration of these processes into the IMS would leave an isolated IMS with small resources and impact on the company’s strategy.

Current IMS frameworks have quality, environmental, health and safety and social responsibility within their scope; meaning that two thirds of the TBL range may already be largely (if not comprehensively) covered. However, little emphasis on economic issues was found in the models. This is a significant oversight, which may contribute to the general lack of application of the models in practice. From the environmental side, the widespread requirement for including ISO 14001-compliant MS elements provides a strong base in the existing IMS models for moving towards more explicit recognition of SD. Social responsibilities in the existing IMS models were addressed to varying degrees. The most common approach was to include solely health and safety at the workplace. Social issues such as CSR, labor rights, and social accountability are other established options, but only one third of the models reviewed considered these as possible requirements. Finally, more detail on how requirements are deployed and controlled in ongoing organizational processes is needed in all models. These will help clarify issues such as the importance of requirements, the risks of not meeting objectives, and the evaluation of employees, among other issues.

5. Recommendations for future research

This paper provided the first systematic review of IMS models and their potential to embed SD in organizations. It is anticipated that the results will be of interest to both academics and practitioners in organizational SD and IMS. However, it is recognized that additional research is necessary. As Bernardo et al. (2009) state, more evidence-based research is necessary to better understand the application of IMS models in practice and how to

manage the various degrees of integration. Only five empirical studies were found in the literature and all of them were solely based on surveys, thus limiting the objectivity of results. As seen in quality audits, answers from management may not correspond to the real situation or the perception of people working directly on organizational processes. Based on empirical results, better models for IMS can be developed, thus making them more appealing to organizations. The development of standards or frameworks for financial management and their possible integration in IMS models is another area for future research. Due to the fast-paced, economic-focused market that organizations are facing nowadays, the lack of economic-oriented MS limits the practice of IMS in the real world. Finally, deployment of SD requirements into an IMS will require enhanced performance measurement systems capable of dealing with an increasing array of diverse objectives. This system should facilitate employees working directly in the process to deploy social, environmental, and economic issues into operational objectives.

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The technological advancement of our civilization has created a consumer society expanding faster than the planet's resources allow, with our resource and energy needs rising exponentially in the past century. Securing the future of the human race will require an improved understanding of the environment as well as of technological solutions, mindsets and behaviors in line with modes of development that the ecosphere of our planet can support. Sustainable development offers an approach that would be practical to fuse with the managerial strategies and assessment tools for policy and decision makers at the regional planning level.

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