School of Business Administration
Department of Business Administration

Doctoral Thesis

Integration of Management Standards and Systems – Impact on Corporate Sustainability Performance

Maria Gianni

Principal Supervisor: Aikaterini Gotzamani, Professor
Co-supervisor: George Tsiotras, Professor
Co-supervisor: Christos Vassiliadis, Professor

This thesis is submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy

June 2020

DECLARATION

I, Maria Gianni, the undersigned, a post-graduate student at the University of Macedonia and author of this thesis entitled "Integration of Management Standards and Systems – Impact on Corporate Sustainability Performance", hereby solemnly declare that this thesis is an original research work that has been designed and executed by me under the supervision of the Professors A. Gotzamani, G. Tsiotras and C. Vassiliadis. This thesis does not contain any material accepted for the award of any academic degree, diploma or a similar title at this or any other university.

Student's Signature Date 05.06.2020

To my loving and supportive family

ACKNOWLEDGEMENTS

The first person that deserves my gratitude is my supervisor, Professor Katerina Gotzamani, for her support and active participation in every step of the process. Without her patient guidance, encouragement, and advice this thesis may never have been completed. I have been extremely lucky to have such a supervisor who cared so much about my work, and who responded to my questions and queries so promptly. There have been few occasions where I remember feeling worried and stumped about the steps of my research, but inevitably, a meeting with her would reinvigorate my enthusiasm and raise my spirits immeasurably. I would also like to thank my associate supervisors, Professors George Tsiotras, Christos Vassiliadis and Fotis Vouzas, for their suggestions and advices in completing the thesis.

I would like to acknowledge the rich and supportive academic environments provided by the University of Macedonia. Particularly, I would like to thank Assistant Professor Evangelos Psomas for his kind support and inspiration during the intermediate stages of my research. I would also like to convey my appreciation to the members of the examining committee for their precious efforts in reading this thesis and for providing valuable recommendations.

Finally, I am indebted to all of my friends and colleagues in the Department of Business Administration, the coordinating staff of the School, and all the staff at the Secretariat of the Department for their support throughout my research.

Last but not least, I would like to thank my family, and, particularly, Lazaros, my husband, for his continued support and encouragement in completing this degree. I find it difficult to express my appreciation for him because it is so boundless. I must also thank my daughters, Hara and Petrini, for their understanding and support.

ABSTRACT

Corporate sustainability is at the center of interest for many academics and professionals, especially in today's uncertain economic environment. The ability of companies to withstand and meet modern challenges in the highly volatile market conditions is being tested now more than ever. The oxymoron lies in that while the accounting and reporting of corporate sustainability performance have been greatly developed, its management within businesses remains a “black box”. Corporate sustainability and corporate social responsibility reports are often limited to individual indicators and outcomes, without providing information on the processes and ways in which these outcomes emerge. The ambiguity and lack of documentation is reinforced by the confusion of terms and concepts, such as performance measurement, performance management and management system.

In order to address this ambiguity, this doctoral dissertation offers a holistic systemic view of the performance of corporate sustainability extending beyond “measuring fixation and myopia”. In this context, business sustainability must first be integrated into a management system. Subsequently, the performance of this system should be managed and monitored. Effective corporate sustainability management requires the alignment of strategy, mode of operation and the results of business activities in terms of sustainability. In other words, the company needs to reconsider its “introverted” perspective and manage the effects of its operation on a number of stakeholders in a systematic way.

There are certain management systems that address corporate sustainability aspects and are based on international standards and guidelines, such as the ISO 9001 quality standard, the ISO 14001 environmental standard, the OHSAS 18001 standard (recently replaced by ISO 45001) for health and occupational safety, and the ISO 26000 guideline on corporate social responsibility. By definition, a fully integrated (unified) management system meets all the requirements posed by the standards, while management processes extend to all areas of business so that organizations get the maximum possible benefits from integration. In this context, the integration (unification) of the corresponding management systems “comes naturally” to organizations that aim for sustainable development. Moreover, it has been established that integrated management systems, through the harmonized adoption of management standards, meet the requirements of all stakeholders.

Having acknowledged the deficit of a systemic approach to the performance management of corporate sustainability on the one hand and the excess dynamics of integrated management systems to cover this deficit, this dissertation addressed the theoretical/conceptual and empirical correlation of these variables.

In particular, the initial literature review identified the main research streams and their findings in terms of the motives, the benefits, the barriers and the audits of integrated management systems. Then, the combined adoption of generic and sectoral standards was examined both theoretically and empirically. The integration mechanism was analyzed in depth by the case study method. Some critical factors for the success or failure of integration systems, such as top management commitment, data and information management, integration level, resource constraints, and business relationships with customers, suppliers, consultants, government agencies and the environment have emerged.

This was followed by the composition of a conceptual framework, the formulation of the main research hypothesis and the operationalization of the research variables. For the in-depth study and analysis of the main concepts, a systematic literature review was designed and implemented, in which the theories of stakeholders, resources and institutions were used. The main concepts are the internalization of integrated management systems and corporate sustainability performance. Internalization is first analyzed in two components: a) the resources (strategic, human, external, information, awareness and integration methods) allocated to integrate the systems, and b) the integration level. Corporate sustainability performance is analyzed in terms of the organisations' stakeholders, which include customers, suppliers, employees, investors / shareholders, financial institutions, the environment, government agencies and society. According to the main research hypothesis, the internalization of integrated management systems has a positive effect on corporate sustainability performance.

Survey research confirmed the correct formation of variables through exploratory and confirmatory factor analysis. More specifically, two measurement scales have been developed, one of which concerns the degree to which an integrated management system is internalized by the organization or, in other words, the extent to which experience from its implementation (resource use and process integration) is integrated into organizational knowledge. The second scale concerns the measurement of corporate sustainability performance.

Then, the main research hypothesis was tested and confirmed using structural equation modeling. This method is suitable for testing models with a strong theoretical background (as in the case of this doctoral dissertation). The two measurement scales, derived from the conceptual framework and the operationalization of latent variables, were used to test the underlying causal relationship between internalization and performance. The main research hypothesis was confirmed, proving the positive effect of internalizing the integrated management system of an organization on its performance in terms of sustainability. In fact, best fit solution suggests that an integrated management system that invests in strategic development, raising employee awareness, formulating and using appropriate integration tools, and completing internal processes and audits has a positive impact on the organization's relationships with customers, suppliers, employees, investors / shareholders, government agencies, the environment and society.

The performance evaluation framework that has been substantiated offers new arguments in the discussion of management system performance. In general, literature findings on the performance of standalone management systems are contradictory. This dissertation examines the combined effect of individual systems on an equally complex type of performance. Also, this is the first time the internalization of integrated management systems is being empirically investigated. For managers and other professionals that are involved in managing business operations, the results of this dissertation are equally important. The allocation of resources for the integration of systems that individually manage parameters, such as quality, environmental protection, energy and natural resources, health and safety of employees, corporate social responsibility, as well as the integration level of processes and procedures, can play a vital role in the survival and well-being of organizations. In addition, it is proven how important it is to change the stance of organizations towards management systems and, to the integrated ones, in particular. It is not enough to keep bureaucratic procedures and files. Streamlining and transforming integration experience through allocated resources and well-adjusted processes into organizational knowledge is imperative for the organisations' prosperity.

PUBLICATIONS ASSOCIATED WITH THIS THESIS

Journal articles

Cabecinhas, M., Domingues, P., Sampaio, P., Bernandes, M., Franceschini, F., Galetto, M., Gianni, M., Gotzamani, K., Mastrogiacomo, L., Hernandez-Vivanco, A. (2018), "Integrated management systems diffusion models in South European countries", *International Journal of Quality and Reliability Management*, Vol. 35 No. 10, pp. 2289-2303.

Gianni, M., Gotzamani, K. and Tsiotras, G. (2017), "Multiple perspectives on integrated management systems and corporate sustainability performance", *Journal of Cleaner Production*, Vol. 168, pp.1297-1311.

Bernardo, M., Gianni, M., Gotzamani, K. and Simon, A. (2017), "Is there a common pattern to integrate multiple management systems? A comparative analysis between organizations in Greece and Spain", *Journal of Cleaner Production*, Vol. 151, pp. 121-133.

Gianni, M., Gotzamani, K. and Vouzas, F. (2017), "Food integrated Management Systems: Dairy industry insights", *International Journal of Quality & Reliability Management,* Vol. 34 No. 2, pp.194-215.

Gianni, M., Gotzamani, K. and Linden, I. (2016), "How a BI-wise responsible integrated management system may support food traceability", *International Journal of Decision Support System Technology*, Vol. 8, No. 2, pp. 1-17.

Gianni, M. and Gotzamani, K. (2015), "Management systems integration: lessons from an abandonment case", *Journal of Cleaner Production*, Vol. 86, pp. 265-276.

Book chapters

Gianni, M. and Gotzamani, K. (2016), "Integrated Management Systems and Information Management Systems: Common Threads" In P. Papajorgji, F. Pinet, A. Guimarães, & J. Papathanasiou (Eds.) *Automated Enterprise Systems for Maximizing Business Performance.* IGI Global, pp. 195-214.

Peer-reviewed conference articles

Gianni, M. and Gotzamani, K. (2019), "Extrovert Integrated Management Systems", 22nd *Excellence in Services International Conference*, August 29-30, Thessaloniki, Greece.

Gianni, M., Gotzamani, K. and Tsiotras, G. (2016), "Multiple Perspectives on Integrated Management Systems and Corporate Sustainability Performance", *19th QMOD - ICQSS*, September 21-23, Rome, Italy, Conference Proceedings, pp. 571-592.

Cabecinhas, M., Domingues, J.P.T., Sampaio, P., Bernardo, M., Franceschini, F., Galetto, M., Gianni, M., Gotzamani, K., Mastrogiacomo, L. and Hernandez-Vivanco, A. (2016), "Integrated Management Systems diffusion in South European countries", *2nd International Conference on*

Quality Engineering and Management, July 13-15, Guimarãez, Portugal, Conference Proceedings, pp. 729-749.

Gianni, M., Gotzamani, K. and Linden, I. (2015), "Towards a BI Platform to Support Food Traceability Management: Benefits and Challenges Identification", *1st EWG-DSS International Conference on Decision Support System Technology - Big Data Analytics for Decision Making*, May 27-29, Belgrade, Serbia.

Gianni, M., Gotzamani, K. and Vouzas, F. (2014), "Integrated Management Systems in the Food Sector: Insights from a Dairy Plant", *1st International Conference on Quality Engineering and Management*, September 14-16, Guimarãez, Portugal, Conference Proceedings, pp. 303-314.

Gianni, M. and Gotzamani, K. (2013), "Management Systems Integration in Practice – A case of abandonment", *16th QMOD - ICQSS*, September 4-6, Portorož, Slovenia, Conference Proceedings, pp. 1189-1205.

Bernardo, M., Gotzamani, K. and Gianni, M. (2013), "Certification maturity as a diffusion factor for management systems integration", *20th EurOMA Conference – Operations Management at the Heart of the Recovery*, 7th-12th June, Dublin, Ireland.

Peer-reviewed conference extended abstracts

Gianni, M., Gotzamani, K. and Tsiotras, G. (2016), "Integrated Management Systems, Corporate Sustainability and Innovation", Extended Abstract, *19th QMOD - ICQSS*, September 21-23, Rome, Italy, Conference Proceedings, pp. 1909-1912.

Gianni, M. and Gotzamani, K. (2014), "Exploring the Integration of Management Systems in Services", *AMA ServSig 2014 - International Service Research Conference: Services Marketing in the New Economic and Social Landscape*, June 13-15, Thessaloniki, Greece.

TABLE OF CONTENTS

CHAPTER 1. INTRODUCTION

It has been a long time since the first release of the ISO 9001 standard for quality management. Quality management systems spread in the business world as a 'megatrend' (Lubin & Esty, 2010) and paved the way for many other standards to follow. The proliferation of standards has led to the spread of management systems within organizations. This plethora of standards and systems created conflicts between departments and processes and raised the demand for skilled employees and other resources. In an attempt to address these challenges, managers have brought together two or more different management systems and formed unified, merged artifacts giving birth to the integrated management systems.

Several years later another business megatrend emerged, that of sustainability. People and organizations became sensitive about their impact on the environment. Natural resource scarcity came in the foreground of public interest. Lastly, ethical and social responsibility concerns have been added to the environmental awareness of companies. Short-term financial returns are no longer a big issue. Companies are more and more invested in their long-term sustainability focusing on the social and environmental performance of their activities. Hence, corporate sustainability reflects the three-dimensional definition of companies' sustainable development.

In this context, this PhD research aimed to explore the relationships between corporate sustainability and integrated management systems, as analyzed in the following paragraphs.

1.1 Thesis scope

Corporate sustainability (CS) lies at the centre of interest for many scholars and practitioners, particularly since the economic uncertainty has risen sharply. The ability of business organisations to endure and deal with current challenging and volatile market conditions is now more than ever under scrutiny. In their struggle for survival, organizations may resort to management system standards and guidelines, such as the ISO 9001 standard on quality, the ISO 14001 standard on the environment, the OHSAS 18001 standard on health and safety (now replaced by the ISO 45001 standard), the AA1000 standard series on accountability assurance and stakeholder engagement, the SA 8000 standard on social accountability and the ISO 26000 guidance on corporate social responsibility (CSR). In this context, the integration of the corresponding management systems comes "naturally almost without reflection, when aiming for sustainable development" (Oskarsson and von Malmborg, 2005). López-Fresno (2010)

emphasizes that "a fully integrated management system should cover all the requirements stipulated by the standards of application, being general or sectoral, function-specific or function-generic, and the management processes should extend into all parts of the business in order for organizations to derive significant benefit from integration".

An oxymoron lies in the fact that although corporate sustainability accounting and reporting is exhaustively addressed, there is hardly any evidence of managing the "black box", i.e. where the results come from and how they are used to improve CS performance (Windolph et al., 2014). CS and CSR reports often limit themselves to stand-alone indicators and suffer from transparency and reliability (Gray, 2010; Moneva et al., 2006; Schaltegger and Burritt, 2010). Notions such as performance measurement, performance management and management system are often interchangeably misused (Garengo and Biazzo, 2013). Aiming to address this confusion, this thesis offers a holistic system sustainability view of the firm expanding far and beyond the "measure fixation and myopia" (Lozano, 2013; Marsden et al., 2006). In this context, sustainability needs, firstly, to be managed within a system. Secondly, the performance of the sustainability management system needs to be managed and measured.

Effective sustainability management requires that strategy, structure, and management systems are aligned to coordinate firm activities and motivate employees (Epstein and Roy, 2001). In other words, the "inputs – process – outputs" sequence, the key performance drivers and their relationships need to be revised encompassing sustainability aspects and addressing the impacts of corporate activities on a broad set of stakeholders (Aras and Crowther, 2009; Ranängen, 2015). It is theoretically established that IMS address stakeholder demands in a systematic manner by harmonized adoption of management standards (Asif et al., 2013; Karapetrovic, 2003). Therefore, it can be induced that integrated management systems (IMS) based on institutional elements (standards and guidelines) may provide governance mechanisms and CS integrating routines (Asif et al., 2011).

There is an ongoing debate over embedding corporate sustainability into business strategy in order to combine the "aspirations of strategy with the realities of measurement" (Figge et al., 2010; Maas and Reniers, 2014). Several researchers criticise the GRI reporting process as inversely developed, meaning that it focuses on metrics rather than on other aspects, such as sustainability awareness and the understanding of key stakeholder requirements and expectations

(Moneva et al., 2006). In other words, there is a void in research and practice, when it comes to the operations of an organization addressing the management of corporate sustainability (Adams and Frost, 2008). That is, organizations seem often failing to prove that internal operations deal with sustainability issues yielding results that come out as improvement in sustainability indicators.

The complexity of corporate sustainability management demands for "production of new knowledge" (Schaltegger et al., 2013). Moreover, in order to integrate sustainability practices, such as fair operating practices and community involvement and development, within existing management systems a systematic approach is needed to establish that a sustainability management system is in place working actively and systematically with its stakeholders (Ranängen and Zobel, 2014). In this direction, several academics discuss the integration of corporate sustainability and social responsibility management into existing integrated management structures and its impact on stakeholders across the supply chain (Klute-Wenig and Refflinghaus, 2015; Wiengarten et al., 2013; Witjes et al., 2017). Fresner and Engelhardt (2004) identify the IMS as a step towards the "sustainable company" involving suppliers, clients, neighbours and authorities. Siva et al. (2016) stress that integrated management systems support sustainable development initiatives. Stakeholder satisfaction is, otherwise, reflected in IMS motivations, such as "to satisfy customers' requirements", "to respond to government's appeal" and "to cope with stress from competitors" (Zeng et al., 2010).

It has become evident that the two fundamental constructs (IMS and CS) share significant common features, such as stakeholder orientation and complexity. The objective of this research is to concurrently address two identified gaps. Firstly, integrated management systems (IMS) are managed yet not measured and, secondly, corporate sustainability (CS) is measured yet not managed. In light of their commonalities and deficiencies, potential synergies are investigated to the mutual benefit of management systems integration and corporate sustainability. On the one side, integrated management systems may provide the necessary holistic framework for the management of corporate sustainability. On the other side, corporate sustainability accounting and reporting may offer the metrics for IMS effectiveness. This reciprocal approach may aid both academics and practitioners to enhance the IMS positive impact and improve management of corporate sustainability performance.

1.2 Thesis outline and research objectives

The first steps of this PhD research included a thorough review on the basic concepts (IMS and CS) and their background in the extant body of knowledge, including yet not limited to the IMS level, audits, motives, benefits and difficulties and CS performance. Background and state of the art are analytically presented in the second chapter of the thesis. Literature review revealed, on the one hand, a significant paucity of research on the integration of management systems in Greece and, on the other hand, an uncharted territory between IMS and CS. Thus, it was deemed necessary to firstly explore the underlying mechanisms of integration within certain Greek business contexts. To this end, case study has been selected as the most suitable method for the in depth analysis of the integration process and the IMS key success or failure factors. For the application of the case study method, a case of unsuccessful integration has been traced, where the quality and the environmental management systems were originally merged in the form of an integrated management system that was later abandoned. The reasons for the abandonment have been thoroughly explored and discussed. Top management commitment, the integration level, the integration approach and certain integration constraints have been singled out as key interrelating IMS factors.

The study of the unsuccessful integration case was followed by the study of a successful integration case. In this case the integrated management system was generated by the joint adoption of the ISO 9001 quality management and the ISO 22000 food safety management standards. This single case study identified certain IMS generic process aspects and additional sector-relevant particularities that revealed significant factors for the successful integration of management systems. The findings of the case studies are presented in the third chapter of the thesis.

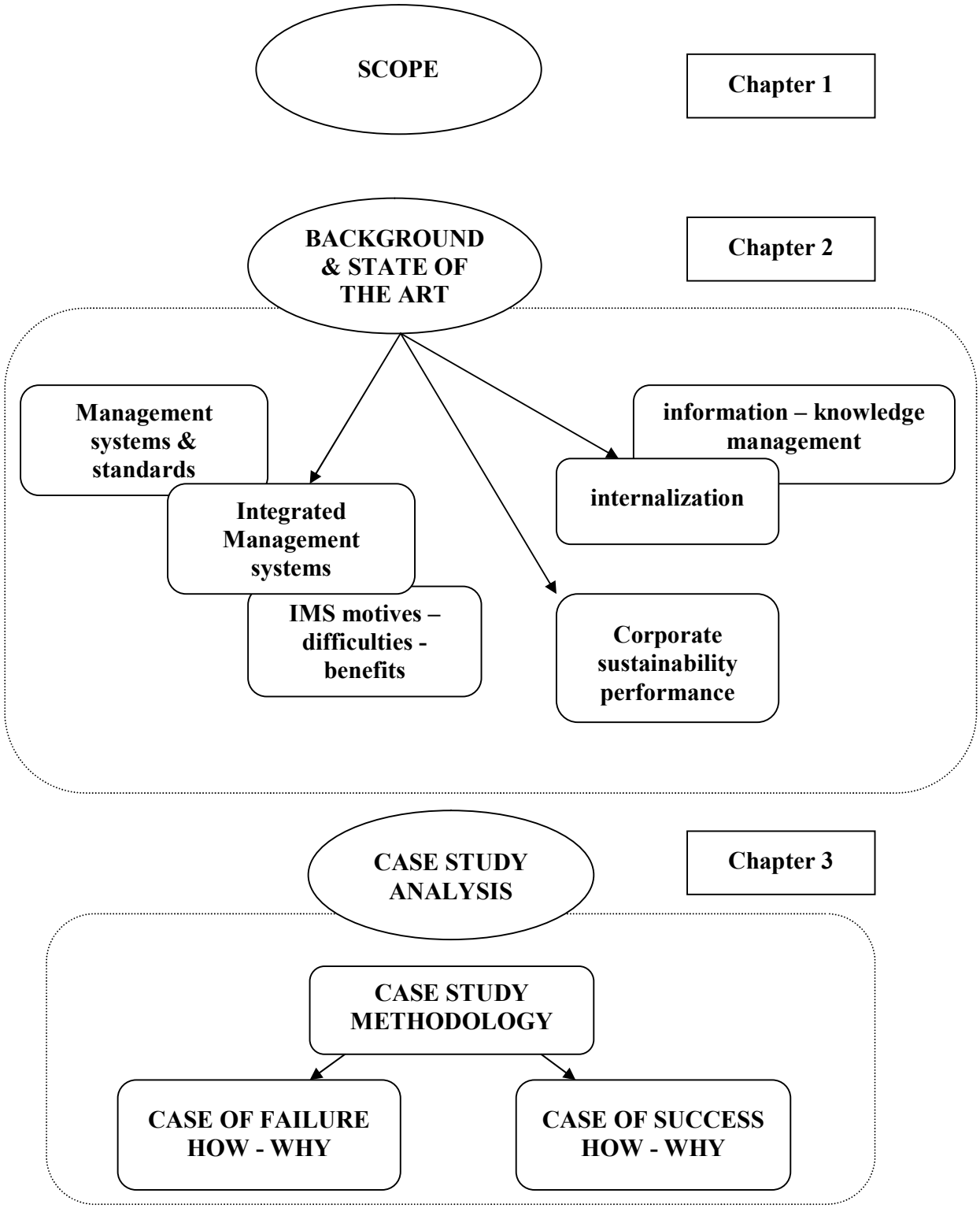
Background identification and case analysis both highlighted several issues implicating the effect of critical IMS factors - such as top management involvement, information management, the level of integration, resource constraints, company's relationships with stakeholders (employees, supply chain partners, customers, consultants, regulatory authorities, and the environment) - on the efficient and effective integration of management systems and their relationship with the sustainable development of organizations. In this context, contemplating on the results and the significant insights gained by the aforementioned research steps, a research framework has been

composed aiming to correlate the internal management operations of organizations with their impact on all interested parties. This framework has been grounded on management theories (Lozano et al., 2015; Seth and Thomas, 1994; Starik and Kanashiro, 2013). More specifically, the resource, stakeholder and institutional theories enable the understanding of the resource allocation and the use of standards to form and maintain an integrated management system (IMS) within the operations of a single organisation and its impact on the organisation's stakeholders. The IMS impact on stakeholders is measured via corporate sustainability performance. More specifically, the triple-bottom line approach is used to interpret the ability of firms to operate sustainably not focusing solely on the economic (profitability) perspective, but also considering the environmental and social impact of their activities. Certain research propositions have been generated and a conceptual framework has been composed. The results of this conceptual study are presented in the forth chapter of the thesis.

The conceptual study yielded four key constructs – IMS resources, IMS level, IMS internalization and CS performance leading to a main research hypothesis. The findings of the aforementioned studies (previous chapters of this thesis) on critical IMS topics (IMS constraints, IMS methods and tools, IMS level, information systems, internalization) and stakeholder relationships have been used to operationalize the key constructs and produce relevant items. To test the research hypothesis a survey has been designed. The survey instrument (questionnaire) was based upon the produced items (questions). The questionnaire has been administered to Greek organizations with two or more management systems irrespective of industry type, size or location. 280 valid responses have been gathered from an initial sample of 787 companies. Next, exploratory and confirmatory factor analyses have been performed on the collected data to explore and confirm the latent factors. Analysis of moment structures (AMOS) software has been used to test goodness-of-fit and path coefficients between first- and second-order variables. Structural equation modeling led to a second-order model, in which IMS internalization is found to strongly impact CS performance confirming the posited hypothesis. It is evidenced that stakeholders and integrated management systems can work well together to serve their common interests that are far wider than the financial prosperity of business organizations. More specifically, the empirical results conclude to a model having on the one side, integration strategy and awareness, integration tools, internal process integration level and audit integration level as first-order latent variables reflecting internalization and, on the other, customer-supplier

relationship, employees, investors/shareholders, financial institutions, the environment and the state as first-order latent variables reflecting corporate sustainability performance.

The survey methodology, the survey results and the discussion of the findings are presented in chapters five, six, and seven of the thesis, respectively. Finally (Chapter 8), overall conclusions are drawn and the limitations and future research directions are provided. The structure of this thesis is graphically outlined in the following figure (Fig. 1.1).


SCOPE
Chapter 1
BACKGROUND & STATE OF THE ART
Chapter 2
Management systems & standards
information – knowledge management
internalization
Integrated Management systems
IMS motives – difficulties - benefits
Corporate sustainability performance
CASE STUDY ANALYSIS
Chapter 3
CASE STUDY METHODOLOGY
CASE OF FAILURE HOW - WHY
CASE OF SUCCESS HOW - WHY

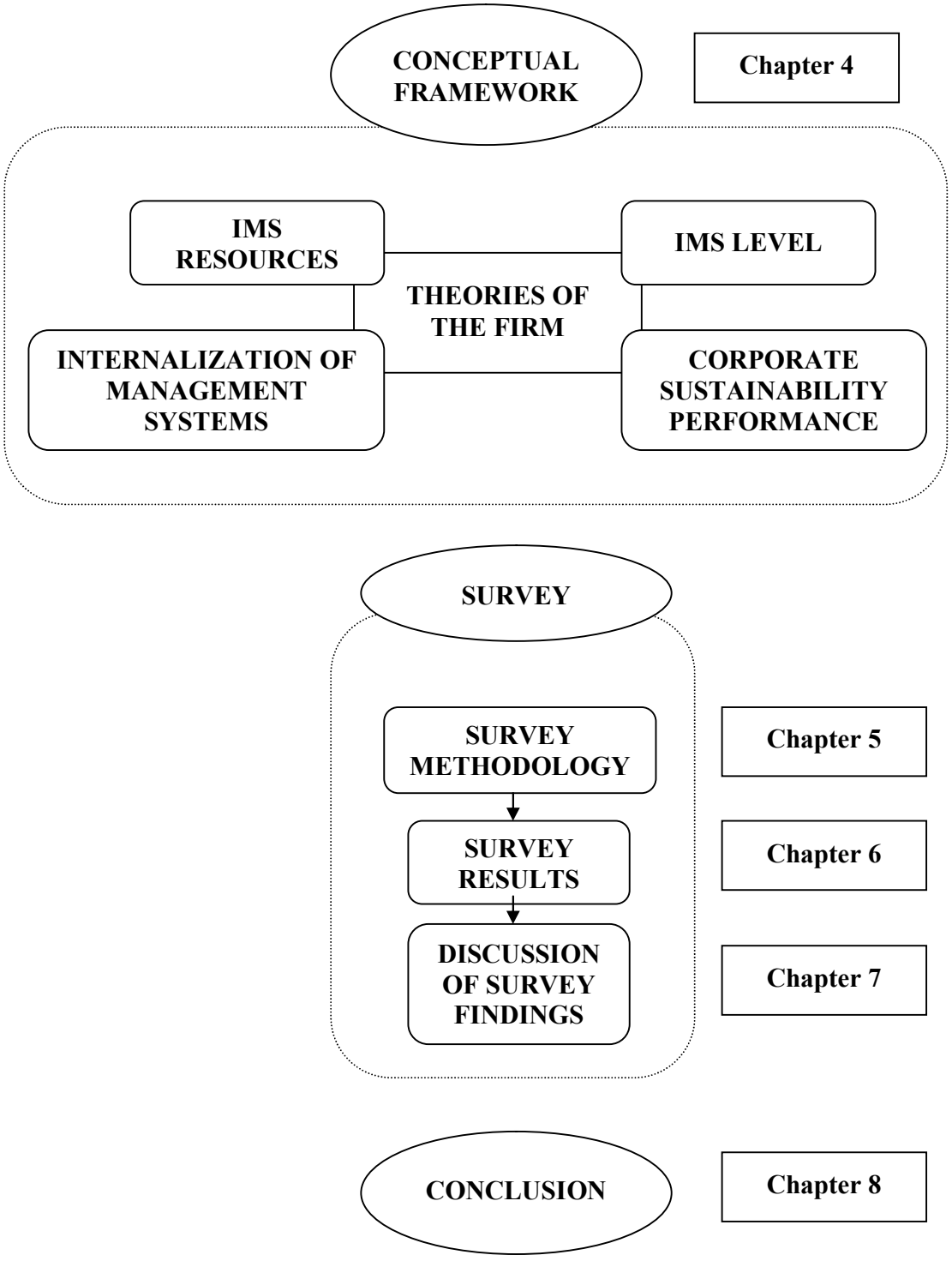


Figure 1.1 Thesis outline

1.3 Research contribution

The overarching aim of this PhD was to investigate the relationships of corporate sustainability with integrated management systems. It is evident by reviewing IMS literature that research on integrated management systems is at its 'adolescence', not until recently embracing concepts and terms, like the internalization, that have already been established in management system research. Furthermore, little has been known about what actually happens when companies decide to integrate their management systems. In terms of performance, on the one hand, the effect of multiple management systems, whether independently or jointly, on performance is unclear. On the other hand, corporate sustainability management has been an uncharted territory. In other words, there is a missing link between the measurement of sustainability outcomes and the management of sustainability within organisations.

Case study method has been selected to observe, document and analyze integration in two real-life settings and identify the reasons for both success and failure. The case studies shed light on several IMS aspects raising the need for further theoretical research towards expanding the IMS conceptual background. To this end, certain management theories have been invoked to operationalize the key research constructs. Following this train of thought, this thesis brought together prior research, both empirical and theoretical, on the integration of management systems, the internalization of stand-alone management systems, and corporate sustainability performance to develop a holistic conceptual framework and posit the main research hypothesis of this thesis. The implementation of exploratory and confirmatory factor analysis has tested and validated the conceptual framework. Structural equation modeling has empirically proven that the internalization of integrated management systems strongly influences corporate sustainability performance, thus confirming the main research hypothesis.

The composed performance evaluation framework offers new insights to scholars. The internalization concept, which has long been included in quality and environmental management literature, is now introduced in the IMS research. The second key construct, corporate sustainability performance, has been conceptualized using the triple bottom line approach on stakeholder relationships, for the first time. Hence, this thesis forwards research on the integration of management systems from the 'adolescent' theoretical and empirical underpinnings on the motives, the benefits and the difficulties of integration to a mature

discussion on the relationships of IMS with sustainable growth drawing on operations management theories. To date, standardization is not simply about files, procedures, and tools, leading organizations to internalize their management systems and transform them into knowledge. The internalized multiple management systems become part of the organizational knowledge, which enhances business performance.

The implications for practitioners are equally important, since a great emphasis is given both on the internal conditions, the resources and the needs of each individual organization, and on the relationships with stakeholders at the same time. Furthermore, management system standards are continually evolving while affecting all interested parties whether inside or outside the organization's boundaries, upstream and downstream the supply chain. The three-dimensional interpretation of corporate sustainability offered useful insights to the creation of the CSP construct. According to the outcome of this particular study, practitioners may rely on this interpretation and use integrated management systems as leverage for all stand-alone management systems to improve corporate sustainability performance.

CHAPTER 2. BACKGROUND AND STATE OF THE ART

2.1 Introduction

The history of management systems (MSs) integration begins near the time of the launch of the ISO 14001 standard by the International Organization for Standardization (ISO, 1996) for the environmental management system's adoption and certification (Karapetrovic and Jonker, 2003). A European Council regulation was enacted in 1993 for the Eco-Management and Audit Scheme (EMAS) adoption initially limited to European organizations and extended at international level since 2009 (Testa et al., 2014). The ISO 14001 standard and the EMAS regulation have converging requirements (Testa et al., 2014). Since the formalization of the quality and the environmental management systems several management system standards (MSSs) and specifications have been released for different disciplines and sectors, such as health and safety (OHSAS 18001 and ISO 45001), information security (ISO 27001), food safety (ISO 22000), supply chain security (ISO 28001), energy (ISO 50001), social accountability (SA 8000 and AA1000), and social responsibility (ISO 26000). These standards are voluntarily adopted and comprise requirements for the management of processes in distinction to the technical norms and specifications (Heras-Saizarbitoria and Boiral, 2013). The historic spread of standards is depicted in figures 2.1 and 2.2.

Within this context, the concept of integration was born to cope with the proliferation of MSSs and the respective management systems (MSs) which in turn are adopted by organizations. Several definitions are drawn for the integrated management system (IMS) (see, e.g., Griffith and Bhutto, 2009; Karapetrovic, 2003). López-Fresno (2010) emphasizes that "a fully integrated management system should cover all the requirements stipulated by the standards of application, being general or sectoral, function-specific or function-generic, and the management processes should extend into all parts of the business in order for organizations to derive significant benefit from integration".

So far, an international, world-wide recognized standard for the integrated adoption of MSs is missing (de Oliveira, 2013). This "deficit" is addressed by the distinction between the integration of MS standards and the integration of standardized MSs (Beckmerhagen et al., 2003b; Karapetrovic, 2003). On the one hand, several researchers (Jonker and Karapetrovic, 2004; Karapetrovic, 2003; Rocha et al., 2007) claim that an IMS standard would not facilitate the

integration process due to continued generation of new MS standards. On the other hand, there is a clear need for both a model to harmonize and streamline the MSs standards' requirements and a guideline to assist an organization in implementing that model (Karapetrovic and Jonker, 2003; López-Fresno, 2010).

The integration of management systems was originally approached from a technical point of view (Heras-Saizarbitoria and Boiral, 2013). Nevertheless, as the concept matures non-technical theoretical approaches take the lead enabling a deeper understanding of IMS potential impact (Nunhes et al., 2019). Following this evolution this research aims to add value to the extand body of IMS knowledge by addressing particular topics of interest to unveil any important relationships. Operations management theories are invoked and empirical method and tools are used to serve this research purpose.

Management systems are artifacts that aim to identify and support operations. Standards are understood as composites of requirements that incorporate changes and trends, filter and diffuse the state of the art on specific disciplines, functions or industries and guide organizations to adapt to the environmental conditions by adopting the specified requirements. Within this context, several standards have been composed to provide management systems with a baseline for the effective and efficient communication between different stakeholders. More specifically, the standardization of processes and procedures allows third-party impartial auditing, facilitates transactions, provides the means to a deeper understanding of operations and raises management to a more sophisticated level when addressing challenges.

In the last decades several management system (MS) standards have been released with regard to different disciplines and sectors, such as quality (ISO 9001), environment (ISO 14001), health and safety (OHSAS 18001 and ISO 45001), information security (ISO 27001), food safety (ISO 22000), information services (ISO 20000), supply chain security (ISO 28001), energy (ISO 50001), social accountability (SA 8000 and AA1000), and social responsibility (ISO 26000). These standards are not legislative documents and, hence, they are voluntarily adopted (Heras-Saizarbitoria & Boiral, 2013). Each one of the released standards addresses specific areas of business operations and offers a set of best practices and guidelines. However, certain complexity barriers are raised for organizations when trying to meet concurrently the requirements of more than one standard, as regards the handling of resources, processes, and

results. To this end, the concept of integration was born. According to Griffith and Bhutto (2009) an integrated management system (IMS) is "the single management system that delivers the processes of the business through modular and mutually supporting structured management functions configured around the wider needs of the organization".

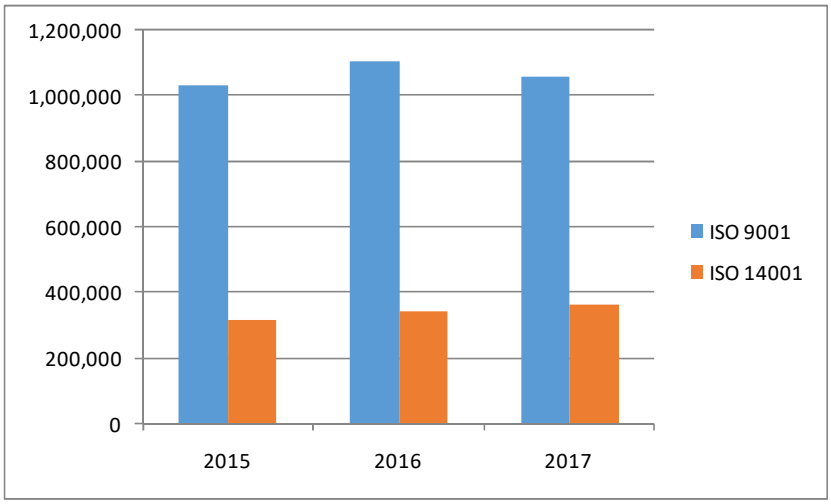


Figure 2.1 Evolution of ISO 9001 and ISO 14001 certifications

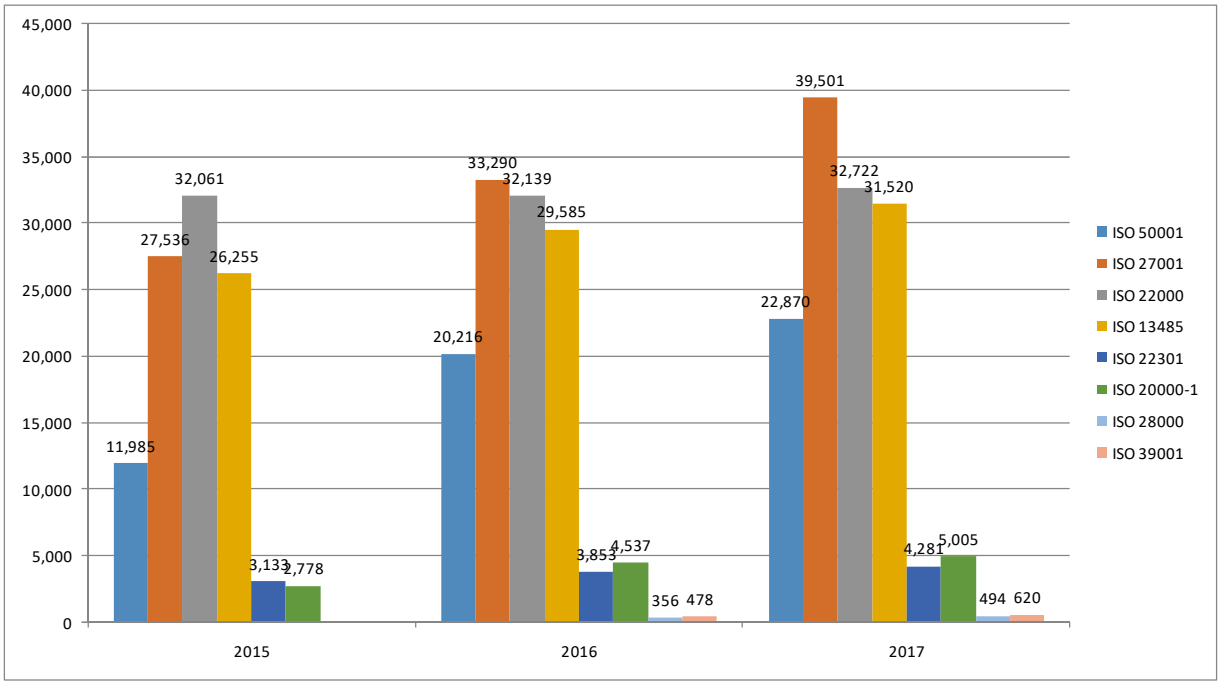


Figure 2.2 Evolution of ISO standard certifications (other than ISO 9001 and ISO 14001)

The empirical research on the integration of MSs classifies firms according to the main IMS attributes, i.e. the scope and the sequence of MS implementation, the level, the methodology, the motives, benefits and difficulties, the audits and the maturity/evolution (Gianni & Gotzamani, 2015). Basic cornerstones for the MS establishment are the model, the methodology and the tools. The lack of a worldwide accepted management standard to guide the development of an auditable IMS increases the variability and the flexibility of the forms of the applied integrated management systems. In this context, there is an ongoing debate on whether a standard can facilitate rather than complicate integration (Rocha, Searcy & Karapetrovic, 2007). Therefore, integrated management systems are currently implemented, acknowledged and researched in the absence of a universal standard, which would enable their formal auditing, certification and registration.

The alignment and, eventually, the MS fusion can be accomplished by the systems approach, which widens the perspective of corporate entities allowing them to embrace all activities and their interdependencies (Jonker & Klaver, 2004). The repeated sequence of "input, process, output" across a network of related processes and sub-systems is considered as a whole that keeps changing and interacting with the environment, namely the supply chain and all the stakeholders. Systems approach enables the balanced management of inter-related system modules towards the fulfillment of the corporate strategic goals and objectives without compromising any of the systems values, such as customer satisfaction, environmental protection, and occupational health and safety hazards mitigation. An efficient and effective integration may lead to the continuous monitoring and evaluation of the balanced performance of the management systems.

A literature review is conducted on the key integration topics, such as strategy, level, approach, audits, performance, motives, benefits and constraints. Literature is sourced from bibliographical databases using keywords and authors names. Secondary search using cited references was additionally carried out.

2.2 Integration motives and benefits

Asif et al. (2009) claim that an IMS implementation "stimulus" may be derived from various sources including regulatory, financial, marketing, social, and operational. Oskarsson and Malmorg (2005) identified two major driving forces for MS integration, i.e. the anticipation of a more effective and simpler management structure as well as a tighter connection between specific-discipline management aspects and the core values of a company, while Salomone (2008) highlighted the IMS motivation by the markets, the human resources and the continual improvement. The integration is proven beneficial to the internal cohesion, the use and performance of the systems, the corporate culture, image and strategy and the stakeholders' implication (Khanna, 2010; Simon et al., 2012b). Integration motives and benefits - as traced in relevant literature - are summarized in the following tables (see Table 2.1 and Table 2.2).

Table 2.1 IMS motives

Authors	Motives
Asif et al., 2010a	proactive: internal needs assessment to assure key stakeholders satisfaction reactive: response to pressure from competitors and consultants
del Brio et al., 2001	sharing of documentation, sharing of objectives, provision of more consistency to the sys
Jørgensen, 2008	to meet the expectations of the customers through a lean business system (to streamline and simplify the management systems, and to avoid conflicts between the systems) and to improve the awareness among employees.
Khanna *et al*., 2010	to reduce paperwork to combine objectives of different MSs due to top management of the company to reduce costs to improve communication to improve long term cost-competitiveness to improve efficiency of the system to reduce third party audits to combine process control to save time to avoid duplication of procedures due to pressure from customers due to pressure from government for continual improvement to improve the image of the company with general public to promote synergies among different MSs

Authors	Motives
Oskarsson & von Malmborg, 2005	anticipation of a more effective and simpler management structure and of a tighter connection between specific-discipline management aspects and the core values of a company
Salomone, 2008	markets (customers, image, competitiveness), human resources (to reduce lack of know-how and management difficulties), continual improvement based on Deming cycle
Wilkinson and Dale, 2000	building on the successful QMS, securing further improvements, reduction of costs, control and desire for common documentation

Table 2.2 IMS benefits

Santos et al., 2011	Simon et al., 2012a; Simon et al., 2012b, Simon and Douglas, 2013	López-Fresno, 2010	Zutshi and Sohal, 2005	Jørgensen and Simonsen, 2002
Simplified management systems resulting in less confusion, redundancy and conflicts in documentation	Improvement of the systems understanding and use	Improve employees' reaction to change	Simpler and more focused management systems	
Reduction of bureaucracy	Task simplification	Simplification of documentation, paperwork and audits	Reduction in duplication of policies, procedures and records, decrease in paper volume	less bureaucracy and less confusion between demands of the individual standards
Unification of internal audits	Better use of the external and internal audit results		More efficient use of internal audits	improved internal and external audits
Optimized resources to maintain a single goal		Reduction of costs and more efficient use of resources	Reduced costs and more efficient re-engineering	
Management costs reduction			Reduced audit cost reduced time for adopting different systems having continuous improvement as common objective	more focus on improvements of and the connections between quality, environment, OH&S and Social Responsibility
Increased employee training	Employee motivation improvement	higher acceptance by employees resulting in higher staff motivation and reduction of inter-functional conflicts	higher acceptance by employees resulting in higher staff motivation and lower inter-functional conflicts	
Better definition of management responsibilities and	Department barriers elimination and higher collaboration			

Santos et al., 2011	Simon et al., 2012a; Simon et al., 2012b, Simon and Douglas, 2013	López-Fresno, 2010	Zutshi and Sohal, 2005	Jørgensen and Simonsen, 2002
authority				
Better and easier communication system	Better communication	More effective internal communication	Improves communication across different organisational levels	
Increased performance and efficiency	Increase of organisational efficiency	Improved delivery of products and services to the customer	Demonstration of due diligence	
Improved external image of the company	Company image improvement	Enhanced confidence of customers and positive corporate image	Enhanced confidence of customers and positive market/community image	
Improved organization	Organisational culture improvement			
	Organisational strategy improvement	Better management decisions, enhanced organisation's vision		
	Better options to include new systems			
Easier compliance with legislation	Higher stakeholders implication		Better scope for input by stakeholders	

2.3 IMS scope, strategy, level

Karapetrovic (2003) understands the IMS as a single set of interconnected processes that share a unique pool of human, information, material, infrastructure and financial resources in order to achieve a composite of goals related to the satisfaction of a variety of stakeholders. IMSs are assessed according to their attributes or features, i.e. scope, strategy, methodology, level, audits, motives, benefits, difficulties, and evolution/maturity (Almeida et al., 2014; Domingues et al., 2014; Simon et al., 2012b). Scope refers to the type of integrated MSs either generic or sector-specific. Strategy refers to the MS integration sequence. Four options of implementation sequence have been identified: first QMS, then others; first EMS, then others; QMS and EMS simultaneously, then others; and a common IMS core, then IMS modules (Karapetrovic, 2002).

Several scales have been created to measure the level of integration (Bernardo et al**.,** 2009). More recently, Sampaio et al. (2012) proposed four evolution levels towards complete integration:

documentation integration, management tools integration, common policies and goals, and a common organizational structure. Simon et al. (2012b) evaluate IMS in terms of objectives, processes and resources. The level of integration can otherwise be assessed at a strategic, tactical and operational level as fully, partially or not integrated (Asif *et al.*, 2010a). According to the BSI, the integration level is classified as: "combined, integratable, integrating and integrated" (Pojasek, 2006).

2.4 Integration approaches and models

Because of its complexity, integration needs to be managed in a systematic manner. In this direction several attempts were made to generate national integration norms, such as the IMS guide issued by the Spanish Association for Standardization and Certification (AENOR) and the Publicly Available Specification (PAS 99) issued by the British Institute of Standards (BSI) (Bernardo et al., 2009; de Oliveira, 2013). The International Organization for Standardization (ISO, 2008; 2018) has published a "Handbook for the Integrated Use of MSSs".

The proliferation of MSSs and the lack of an IMS international guideline have shifted the research interest towards developing generic integration approaches for the multiple MSs. To this direction, certain conceptual IMS frameworks were composed to capture theoretically the strategic integration perspective (see, e.g., Karapetrovic, 2003; Rocha et al., 2007; Zeng et al., 2007). Other generic IMS models have been subject to implementation testing (Badreddine et al., 2010; Labodová, 2004; Wilkinson and Dale, 2001). Furthermore, some frameworks are tailored to meet the needs of specific sectors (Griffith and Bhutto, 2008; López-Fresno, 2010). In addition, certain sectoral integration case studies were followed by the development of a corresponding theoretical pattern or guideline (Asif et al., 2010a; de Oliveira, 2013; Pun and Hui, 2002). In this vein, Asif et al. (2010a) identified two integration "archetypes"; the "techno-centric" and the "systems approach". Despite the substantive amount of developed IMS models, there is empirical evidence that the vast majority of organizations integrate by using simple tools, such as process mapping and the analysis of MSSs common elements (Bernardo et al., 2011c; Simon et al., 2012a).

Taking into account that standards keep on proliferating, the integration of the normalized management systems needs to be addressed in a systematic way. So far, the International Organization for Standardization (ISO) has not released an integrated management standard. However, there are certain national standardization bodies that launched guidelines to foster the integration of management systems (Bernardo, Casadesús, Karapetrovic & Heras, 2009). As such, the Danish standard understands integration in three levels: the strategic (corporate governance), a generic platform comprising common elements and the distinct management components (Jørgensen, 2008). Apart from the national norms, certain generic integration approaches are developed, as well (Karapetrovic, 2003; Griffith & Bhutto, 2008; Zeng, Shi & Lou, 2007). Some models are tailored to meet the needs of specific sectors, such as the construction industry (Griffith & Bhutto, 2008) and the airline industry (López-Fresno, 2010). However, the vast majority of organizations integrate using widely known tools, such as process mapping and the analysis of common elements (Bernardo et al., 2011).

2.5 Integration constraints

Apart from the driving forces that enable integration there are several resistances divided into internal and external (Sampaio et al., 2012). Some of the drawbacks to implementing integration are the incompatible concepts between systems, the complex organizational systems, the initial higher organizational problems, the dissemination risk of a single component problem across the overall management system, the need for updated documentation at the expense of other management activities, and the initial cost increase associated with an increase in non-conformities (Santos et al., 2011). Salomone (2008) reported that the risk of not assigning the correct level of importance to each dimension was the most significant challenge during IMS implementation. In addition, among the difficulties often encountered are the lack of integration guidelines, the lack of management commitment, the demand for training and cultural change, the lack of skilled auditors and consultants, the inadequate audit approaches and the deficiency in human as well as other resources (see e.g. López-Fresno, 2010; Searcy et al., 2012; Simon et al., 2012b). Integration difficulties and barriers - as traced in relevant literature - are summarized in Table 2.3.

Table 2.3 IMS difficulties/barriers

Difficulties (Santos et al., 2011)	**Difficulties** (Simon et al., 2012a; Simon et al., 2012b; Simon and Douglas, 2013)	**Barriers** (López-Fresno, 2010)	**Barriers** (Zutshi and Sohal, 2005)
	Lack of integration guidelines	Lack of strategy model and methodology	
Insufficient integrability of the standards	Differences in scope of standards	Differences in the scope of the systems being integrated	
	Differences in models for implemented standards		
	Differences in elements of the standards	Misunderstanding of what integration means, thus focusing only on integration of documentation and records	Interests concerning the environment are more homogeneous internally than interest concerning assistance in product quality improvement
	Lack of administration support	Lack of relevant management commitment, especially from top-management	
	Lack of employees motivation	People's attitude, especially of those that lose "ownership" of existing systems prior to integration	
Deep changes in the management system due to operational changes			
Training needs and changes in the organization methods and culture	Lack of internal organisational culture	Lack of adequate organisational culture	
Long time to implement the integration process	Excessive time to conduct the integration		Devoting too many or too few resources to the system leading to costs exceeding benefits or not obtaining the full benefits
	Inefficient implementation of first system		
		Continuous change of regulations and guidelines	
Higher difficulty and cost to implement all systems simultaneously compared to individual implementation	Lack of human resources	Lack of resources, in quantity and qualification (relevant expertise)	Obtaining the relevant expertise to cover all system requirements
	Lack of department collaboration	Lack of communication	Separate competing staff groups to handle management areas
	Lack of government support		
	Lack of technological support		
	Lack of specialised auditors		
	Lack of specialised consultants		
	Lack of certifying organisations support		

2.6 Integration of audits

Audits have two objectives: first, to detect and 'cure' non-conformities to the management systems standards' requirements and second, to highlight opportunities for improvement of the implemented management systems. However, the performance of the audits is questioned from many academics and practitioners over the years (Kaziliũnas, 2008). To assess the level of audits' integration a four-level scale has been elaborated: sequential, overlapping, simultaneous and fully integrated (Kraus & Grosskopf, 2008). The inadequacy of audit methodologies is mentioned in the literature as one of the common barriers to integration (Searcy et al., 2012).

Several conceptual approaches to integrate audits have been proposed by academics (e.g. Domingues et al., 2011; Kraus and Grosskopf, 2008), while the empirical research progresses slowly (Bernardo et al., 2010; Simon et al., 2011). Karapetrovic and Willborn (2000, 2001) introduced a generic audit guideline based on the process approach. Multiple MS audits are classified into four categories; sequential, overlapping, simultaneous and fully integrated (Kraus and Grosskopf, 2008). The integration level of management system audits is assessed via the following parameters: the audit team, the scheduling, the frequency/simultaneity, the strategy adopted, the guidelines used, the audit plan, and the audit report (Bernardo et al., 2010; Simon et al., 2014). The inadequacy of audit methodologies and the lack of resources by the certification bodies are the major barriers to audit integration (Beckmerhagen et al., 2003a; Searcy et al., 2012).

2.7 Integration performance

An emerging research topic is the IMS performance assessment (Sampaio et al., 2012). Karapetrovic and Willborn (1998a) introduced the notion of an "integrated performance management system". Karapetrovic and Jonker (2003) recommend establishing a performance measurement system in parallel with MS integration. Tarí and Molina-Azorin (2010) propose an integration approach for the QMS and EMS based on the European Foundation for Quality Management (EFQM) excellence model, whereby the four EFQM results may be used as measures of the IMS. López-Fresno (2010) refers to the development of an integrated

performance measurement model used by an airline company and emphasizes evaluation of the long-term effectiveness of an IMS on an organization's overall performance. Garengo and Biazzo (2013) proposed a performance measurement system based on the balanced scorecard that was merged into an IMS encompassing the ISO 9001 standard and the EFQM model.

2.8 Integration underlying interrelations

In an investigation on interrelations among the aforementioned attributes of integration Bernardo et al. (2012) observed differences in the difficulties and the level of integration depending on the scope. While investigating possible correlations among methods or tools applied for integration and the achieved integration level, Bernardo et al. (2011c) concluded that organizations that used more than one method to inteate their MSs reach a higher level of integration. It is also stressed that a customized model does not necessarily yield a highest level of integration (Bernardo et al., 2011c).

Several researchers have also attempted to detect whether location, sector and firm size condition the level of integration as well as the perceived benefits and obstacles of integration (Bernardo et al., 2013; Salomone, 2008; Simon and Douglas, 2013). Zeng et al. (2011) used structural equation modeling to examine the correlations among related experience, IMS implementation and benefits of integration. Another study showed a positive affinity between the level of MS integration and the degree of the internal audits integration (Bernardo et al., 2011a).

2.9 IMS evolution

Another research stream is devoted on IMS maturity and evolution over the years (von Ahsen, 2014; Garengo and Biazzo, 2013; Simon et al., 2012a). Simon et al. (2012b) found that firms' IMS level reaches one of two "poles"; meaning that, firms either fully integrate their MSs or abandon MS integration in the long term (von Ahsen, 2014; Gianni and Gotzamani, 2015). Furthermore, Zeng et al. (2011) stressed that "related experience" measured by both "years of implementing IMS" and "experience of implementing ISO 9000" influences IMS benefits. In a

similar vein, Arifin et al. (2009) proposed an IMS maturity metric- called "readiness level" - comprised of the organization's awareness, the employees' knowledge and competency level, the management of the organization's information, the management commitment, the documentation and the awareness of the certification status. Domingues et al. (2014) understand IMS maturity via certain constructs, i.e. the "top management integrated vision", the "integration level classification" and the "audit typology".

2.10 Human resources within integrated management systems

Several researchers emphasized the human resources impact on management systems integration. Simon et al. (2012b) stress that integration of human resources increases over time within an integrated management system. Simon and Bernardo (2014) adopt a resource-based view and highlight the benefits and barriers of integration related to human resources, with culture building, awareness enhancement, top management commitment, motivation, communication and collaboration being the enablers of successful integration. Karapetrovic (2002) and Renzi and Cappelli (2000) contend that the degree of integration depends on the hierarchy level in such a way that management systems are completely integrated at the top management and shop-floor (operational) level, whereas they remain mostly function-specific and independent at the middle management level. Particularly, in food SMEs the plant or production manager is often overburdened with the quality management responsibility (Psomas et al., 2013).

Bernardo et al. (2010) identified a different level of the audit human resources "integratability" between firms and certification bodies, since it is easier for firms to identify and train technically skilled employees to conduct multiple MS audits. On the other hand, as far as the external auditors are concerned, it is a costly and complex task for a certification body to assure availability of skilled auditors fit to conduct joint audits covering two or more management disciplines. In line with this, Nowicki et al., 2013) claim that in the food industry the external auditors' multiple competence is limited to maximum two management systems. Renzi and Cappelli (2000) extend the skills' requirement as a counter-integrating factor of both the internal and the external audits grounding their argument with the case of a mineral water plant where the

external audits are non-integrated and the internal audits are integrated in methodology (at procedural level) but kept separate in practice, i.e. at organizational and operational level (Renzi and Cappelli, 2000).

2.11 Integration of environmental management systems

Integration-related research is focused on the disciplines of quality and the environment. In fact, the very concept of the integrated management system was based on the possibility of the harmonised adoption of the two respective management standards (Karapetrovic and Jonker, 2003). In a similar vein, Karapetrovic and Willborn (1998) introduce the system's view to allow the cohesion of the quality and environmental and other management systems into one integrated "supra" business system. Griffith and Bhutto (2008) identify the environmental quality system within construction firms contextualizing IMS into a framework of environmental performance. However, up to date the impact of integration on the development of environmentally sustainable strategies remains unclear (Abad et al., 2014).When viewed from the supply chain perspective the environmental management integration is considered to yield both a competitive advantage and more efficient processes by "understanding the conversion of raw materials into finished goods" (Handfield et al., 2005).

2.12 Integration of food management systems

According to the latest ISO survey (ISO, 2014) the number of ISO 22000 certified organisations grows steadily at an annual rate of 15%.In the same survey, Greece is listed in the top three countries world-wide in terms of certifications' number and growth rate. It is evident that Greek food sector is thriving in the current challenging times and food producers, due to the high market competition, seek ever more efficient and effective managerial practices. Since management standards are recognized as a means to articulate and diffuse recommended principles and practices, the adoption of management standards spreads across food companies. The ISO 22000:2005 standard integrates systems approach with the methodology used for the

hazard analysis and critical control points, widely known as HACCP (Teixeira and Sampaio, 2013). ISO 22000 certification is meant to satisfy customer requirements, to support marketing arguments and to assure full supply chain involvement in the food safety process (Teixeira and Sampaio, 2013) by establishing trust and enabling integration of food safety with other management systems (MSs) and, hence, reducing the need for customer audits (Escanciano et al., 2014). It is emphasized that the retailers - at the end of the agri-food chain - act as primary drivers for the adoption of management systems standards and the MSs integration in the food industry (Kafel and Sikora, 2014; Soderlund et al., 2008).

The agri-food chain is governed by strong interdependencies among its tiers, with retailers and control bodies imposing a variety of regulations, such as the Codex Alimentarius, and requirements, such as traceability. Therefore, the ISO 22000:2005 standard adopts a supply chain approach to manage food safety. Food sector issues aside, there are other economic, environmental and social aspects, common to all industry types, that need to be addressed, as well. In this context, Trienekens and Zuurbier (2008) seem to reflect the integrated management system (IMS) when they suggest a "modular system" encompassing all kinds of standards and norms. From the outcome perspective, Kafel and Sikora (2014) found that food companies implementing MSs acquire higher maturity level and, hence, increased financial performance. In a similar vein, the combined adoption of quality and food safety standards is found to contribute significantly to both food product quality and operational performance (Kafetzopoulos and Gotzamani, 2014). The International Organisation for Standardization (ISO) formalized safety management in the food chain through the release and revision of sector-specific standards, guidelines and prerequisite programmes (see Table 2.4).

Table 2.4 – ISO standards and guidelines for food safety management

Standard	**Title / Content**
ISO 22000:2018	Food safety management systems - Requirements for any organization in the food chain
ISO/TS 22002-1:2009	Prerequisite programmes on food safety – Part 1: Food manufacturing
ISO/TS 22002-2:2013	Prerequisite programmes on food safety – Part 2: Catering
ISO/TS 22002-3:2011	Prerequisite programmes on food safety - Part 3: Farming

Standard	Title / Content
ISO/TS 22002-4:2013	Prerequisite programmes on food safety – Part 4: Food packaging manufacturing
ISO/TS 22002-6:2016	Prerequisite programmes on food safety – Part 6: Feed and animal food production
ISO/TS 22003:2013	Food safety management systems - Requirements for bodies providing audit and certification of food safety management systems
ISO 22004:2014	Food safety management systems - Guidance on the application of ISO 22000
ISO 22005:2007	Traceability in the feed and food chain - General principles and basic requirements for system design and implementation
ISO 22006:2009	Quality MSs – Guidelines for the application of ISO 9001:2008 to crop production
ISO/TS 22002-4:2013	Prerequisite programmes on food safety - Part 4: Food packaging manufacturing

Empirical evidence shows that about 80% of the food companies in Spain implemented first a QMS, which facilitated the introduction of the FSMS (Escanciano et al., 2014). In the same survey Escanciano et al. (2014) found that 32% of the participating firms were ISO14001 certified, as well, with almost 95% of them having their MSs integrated either totally (73.2%) or partially (21.2%). De Oliveira Matias et al. (2013) contend that the integrated adoption of the food safety and occupational health and safety (OHS) standards enhances both the food safety and the prevention of occupational risks in a complementary manner, since the measures taken for food hazards mitigation coincide with the occupational hazards preventive actions. Likewise, several researchers highlight the increased compatibility of the occupational health and safety with the environmental management norm (Kraus and Grosskopf, 2008; Salomone, 2008; Sampaio et al., 2012).

Due to their prior experience and the compatibility of quality and food safety standards, ISO 9001 adopters are expected to be the first to integrate food safety within their quality system (Fotopoulos et al., 2010). In the years before the launch of the ISO 22000:2005 standard, Aggelogiannopoulos et al. (2007) refer to the benefits of integrating HACCP principles into the ISO 9001 based quality management framework to the organisational performance and the

required paperwork. In the same vein, Efstratiadis and Arvanitoyannis (2000) stress that HACCP as a part of a quality system not only manages to provide safety to the products, but also assure a better and more effective implementation of the "whole quality system". Similarly, Christaki and Tzia (2002) argue that quality and safety are both important in wine production, since quality assurance throughout the whole winemaking process is significant for the consumer acceptability, while safety assurance is necessary for the protection of human health.

It is noteworthy, that in the extant body of food IMS research, which follows the release and spread of the food safety standard (ISO 22000:2005), the focus on food safety management is missing. Fresner and Engelhardt (2004) understand the IMS as a step towards sustainable development and merely refer to the assignment of hygienic tasks to a brewery's environmental manager and the adoption of certain food safety practices, such as raw materials supply from integrated control farming. In a similar vein, Weyandt et al. (2012) from the social responsibility perspective, underline IMS positive impact on aquaculture sustainable development and competitiveness. Asif et al. (2010) used within and cross-case analysis on four big enterprises in the pharmaceutical, textile, automobile and dairy industry, where some sector-related differences are identified, yet not discussed in detail. The research gap is more emphasized when a sugar manufacturing unit integrates quality and environmental MSs omitting food safety MS (Satolo et al., 2013). Furthermore, only a single agri-food IMS model has been proposed so far (Proto et al., 2013). In summary, the scope and strategy in IMS food case studies are listed in Table 2.5. With respect to the sequence of implementation, in the majority of the cases, QMS is implemented either first followed by the EMS or concurrently with the EMS, in accordance with the respective generic IMS findings (Bernardo et al., 2009). It is also worth noting that research on food IMS is mainly located in European Countries following the ISO 22000 certification growth rate, which is higher in Europe (ISO, 2014). Kerhadia and Warriner (2013) provide an exception to this "rule" with their study of a warehouse IMS implementing quality and food safety MSs in compliance with the Food Safety Modernization Act in North America. However, the food manufacturer's perspective is still missing, since this exemplary case addresses the logistics actors' involvement in the food supply chain.

Table 2.5 Integration strategies in the food industry

Authors	*Country*	*Field of activities*	*Integration strategy*
Asif et al., 2010a; Asif et al., 2010b	Pakistan	Dairy plant	QMS-EMS-OHSMS HACCP
Bernardo et al., 2013	Greece (2)	Food and beverages Food	QMS-EMS-OHSMS-FSMS EMS-QMS-FSMS
Claver et al., 2007	Spain	Farming cooperative	QMS-EMS-EFQM-BRC*
Fresner and Engelhardt, 2004	Austria	Brewery	first QMS, then EMAS and ISO 14001
ISO, 2008	Spain	Beverages	QMS-EMS-FSMS
Kheradia and Warriner, 2013	Canada	Warehouse	FSQMS
Länsiluoto and Järvenpää, 2012	Finland	Food manufacturing	QMS-EMS-PMS
Nowicki et al., 2013	Poland (4)	Bakery and confectionery/ Beverage cans and bottles/ wet spices/ soluble coffee	QMS-FSMS-BRC* QMS-FSMS QMS-EMS-OHSMS-BRC-IFS*-FSMS QMS-HACCP-IFS
Renzi and Capelli, 2000	Italy	Mineral water	QMS-EMS
Proto et al., 2013	Italy	Processed tomatoes	QMS-FMS-BRC-IFS
Satolo et al., 2013	Brazil	Sugar and ethanol	First QMS and then EMS / IMS after several years

(*): BRC (British Retail Consortium) and IFS are retailers' food safety and quality standards

2.13 Integration of information management systems

2.13.1 Traceability

Traceability is an interdisciplinary concept with a variety of definitions and perspectives. According to ISO, traceability is defined as the "ability to trace the history, application and location of that which is under consideration", including the origin of materials and parts, the processing and the distribution. Karlsen et al. (2013) contend lack of a common understanding and a common theoretical framework with respect to implementation of food traceability. Moreover, traceability is a critical issue that MSs alone have failed to adequately address, so far. It requires the simultaneous and efficient alignment of several domains, i.e. quality, safety, supply chain, environment and information. The respective standards that interact are the ISO 9001 for quality, ISO 22000 for food safety, ISO 14001 for the environment, ISO 26000 for

corporate social responsibility, ISO 28001 for the supply chain security, ISO 27001 for information security and ISO 20000 for information service management (Gianni & Gotzamani, 2016).

Food traceability refers to "all stages in the food supply chain so that the product can be checked for safety and quality control, traced upward, and tracked downward at any time required" (Bosona and Gebresenbet, 2013). Legislative frameworks, such as Codex Alimentarius, have been developed nation-, Europe- and world-wide to enforce traceability measures in order to assure prevention of food contamination and to track any causes of compromising the pathway of the food commodities from farm to plate. Furthermore, voluntary schemes, such as the Hazard Analysis of Critical Control Points (HACCP) and the ISO 22000:2005 standard have been released and spread to support the efficient and effective establishment of the processes and procedures to facilitate traceability.

Traceability is anticipated to address sustainable development concerns about animal welfare, ethical production methods and environmental issues, including herbicides used in farming, animal feed and water, providing a fast and efficient support to decision making in the management of any identified quality incident in the food supply chain. Food incidents, such as "mad cow disease", dioxins in chicken feed and genetically modified crops (Aung & Chang, 2014), can provide illustrative examples of the transparency and inter-operational weaknesses in traceability systems that may endanger health and question consumers' trust.

Therefore, traceability is a highly significant issue that isolated practices and management systems (MSs) have failed to adequately address, yet. It requires the joint management of several domains, such as quality, safety, supply chain, environment, social responsibility, information management and decision support. Moreover, the lack of a theoretical framework to embrace all aspects and foster synergies is acknowledged (Karlsen et al., 2013). To this end, integration of MSs seems to be the most suitable approach. An Integrated Management System (IMS) builds upon the stand-alone management sub-systems aligning strategic objectives with business processes, allocating resources and meeting stakeholders' needs and expectations.

Information-wise, food traceability demands for multiple sourced data that needs to be uniquely codified and recorded. Next, data has to be interpreted within a legislative and managerial framework from a strategic perspective, since critical decision making is involved. In this

context, key challenges are the availability, content uniformity and sufficiency of information, the access velocity, and the strategic perspective of information use. Information availability and uniformity are addressed by regulations (Aiello et al., 2015). However, the degree of direct access to information depends on the stakeholders' communication, which is yet quite limited (Bevilacqua et al., 2009). Finally, the question of speed and accuracy is not at all under control. Indeed, a great amount of information is paper trailed, i.e. collected by hand and stored on sheets of paper (Bosona & Gebresenbet, 2013; Manos & Manikas, 2010). Consequently, data capture entails time-consuming and error-prone human interactions.

These observations advocate for a centralised and formalized access to information to meet the analytical needs that arise in a food chain. Stakeholders, including institutions, regulatory authorities, non-governmental organizations (NGOs), retailers, and consumers, raise their own needs and requirements in terms of food safety, quality and traceability. In this context, farmers and food manufacturers need support towards making decisions on the allocation of resources based on economic, social, and environmental criteria via metrics, such as the optimal information value and the economic traceability lot. In addition, given the lack of a common and centralized data base to capture food and feed processing data, the lack of a dedicated holistic ontology and the overlapping and non-harmonized regulations and standards, business intelligence (BI) platforms offer a typical architecture and framework to address these needs.

Despite the world-wide efforts for institutionalization and standardization in a holistic sense, food traceability solutions remain contingent and custom-made for specific parts of the food supply chain, within country- and industry-specific contexts, like for example the Cattle tracking system in the UK. Barge et al. (2014) examine the information flow at a dairy plant and identify factors affecting successful traceability beyond the RFID devices. Benefits accrued by the traceability system, such as labour and risk reduction, automation, transparency, improved logistics and increased data availability, are intertwined within the production process and the supply chain, as a whole, and, therefore, difficult to quantify (Barge et al., 2014). Ringsberg (2015) understands FT requirements overlapping across food safety, quality and sustainability domains among supply chain partners. In a similar vein, traceability is identified as a potential link of management sub-systems in order to achieve sustainable integrated management (Gianni et al., 2015). Traceability in global food supply chains can only be fully accomplished if organizations abide by regulations and agreements and apply standardized approaches that

enable interoperability and coordinate buyers and suppliers (Aung & Chang, 2014; Pizzuti & Mirabelli, 2015). FT links intra- and inter-organizational logistics and recordkeeping systems used for business, food safety and quality control (Bosona & Gebresenbet, 2013; Bourlakis & Bourlakis, 2006; Ringsberg, 2015). Thus, FT contributes to the timely withdrawal of unsafe goods from markets and mitigates product liability and control transaction costs (Bevilacqua et al., 2009).

2.13.2 Information asymmetry and traceability economics

In a principal-agent relationship, information asymmetry refers to a situation when one party in the relationship has more or better information than the other (Zu & Kaynak, 2012). Zu and Kaynak (2012) emphasize that quality management is "management by fact" and it requires the systematic collection and analysis of timely and correct quality-related data and information so that quality problems can be identified early and actions can be taken to rectify them. More specifically, since supply chain transactions are becoming increasingly distant and international, it is made more difficult for buyers to observe the qualifications of supplier raising problems of information asymmetry (Terlaak & King, 2006). In this context, Ringsberg (2015) highlights the perspective of transparency in the management of traceability information.

Resende-Filho and Hurley (2012) "define traceability by its precision, i.e. the probability of finding the source of the problem" and deepen into positive and normative issues via the economics of traceability. In this context, an organization's decision on the accuracy level of a traceability system depends primarily on the cost vs benefit ratio and not on technical implementation shortcomings. Resende-Filho and Buhr (2008) used the case of injection-site lesions in beef as an example to numerically simulate the economic value that can be attained through a reduction in information asymmetry. Aiello et al. (2015) underline the optimal value of information (granularity level) compared to the operational cost of automatic data collection via a stochastic mathematical approach (first and second type errors) and introduce the "Economic Traceability Lot".

2.13.3 Traceability and social responsibility

Since the Single European Market was launched and the mad cow disease scandal burst a debate was triggered over shared responsibility across all actors in the food supply chain encompassing institutional, ethical and societal aspects. In this context, a farm to table policy was introduced guided by five key principles: "Clear definitions of the roles and responsibilities of stakeholders in the food chain; traceability of feed and food and their ingredients; transparency of food policy; risk analysis as the foundation on which food safety policy is based; and the application of the precautionary principle in risk management decisions" (Halkier & Holm, 2006). With regard to consumer perceptions, Chrysochou et al. (2009) stress that the volume and the credibility of information provided, the perceived levels of convenience, the impact on product quality and safety, the impact on consumers' health and the environment, and the potential consequences on ethical and privacy liberties impact the opinion of consumers on technologies that provide traceability.

Many researchers (see e.g. Barnett et al., 2016; Jin & Zhou, 2014) understand traceability systems as an important means to provide food safety and quality information to consumers and, thus, (re)gain their confidence. In a similar vein, increasing the confidence of consumers in their food, the changing lifestyles, the increasing awareness of society about their health are some of social issues that motivate food companies to implement traceability systems (Bosona & Gebresenbet, 2013). Furthermore, Bourlakis et al. (2014) shed more light on the social perspective of traceability when the claim that by providing information on product flows consumer/stakeholder attention shifts away from product price and appearance towards its origin (place and people).

On the other side, the reluctance to share information and the lack of transparency raise ethical issues in terms of social responsibility principles. Traceability is linked to information visibility (transparency) and the need to preserve an enterprise's integrity. However, transparency increases the difficulties of protecting the integrity of a food commodities enterprise due to similarities in competitive interests (Trienekens et al., 2012). According to Pizzuti and Mirabelli (2015) the "information recorded on food labels refers to the last actor involved in the transformation process" usually missing the link with its predecessors in the supply chain. Beekman (2008) understands ethical traceability as both a management and governance tool and

emphasizes how the intermediate actors overpower the primary producers and the end-consumers in the food supply chain. Vasiliou et al. (2008) researched ethical traceability in the Greek olive oil chain and found that quality, trust, human health and origin were top concerns for all stakeholders. Consumers are concerned about the transparency of the olive oil production. However, traceability and mostly ethical traceability is compromised due to the blending/mixing of different batches of oil during packing and whole selling (Vasiliou et al., 2008).

2.13.4 Information domain within integrated management systems

To date, information systems have been found to support IMS in terms of documentation and procedures, such as corrective and preventive actions and complaints (Karapetrovic & Casadesús, 2009; Ivanova et al., 2014). In this vein, Ivanova et al. (2014) contend that "the integration and information technology pathways overlap". Gianni and Gotzamani (2016) extend the integration discussion to the internalization of multiple MSs into the fabric of an organization elevating information to knowledge - both explicit and tacit. Savino and Batbaatar (2015) underscore information technology systems and artificial intelligence as a means for continuous improvement within IMSs.

Barata and da Cunha (2014) composed a framework for the integration of information systems with quality MSs. Martins et al. (2011) understand the "merger" of information security management and business excellence within a total quality management framework. In a similar vein, Mesquida and Mas (2015) address the commonalities of the ISO 20000 standard for information service management and the ISO 9001 quality management standard and highlight their integration synergies. Hoy and Foley (2015) emphasize the benefits of joint quality and information management audits towards process improvement. Extant research on IMS incorporating information management is summarized in Table 2.6.

Table 2.6 Research on multiple management systems embedding information

Authors (publication year)	Research topic
Barata & da Cunha (2014)	Information systems and quality MSs
Martins, Bulkan & Klempt (2011)	ISO/IEC 17799 (Information technology – security techniques – Code of practice for information security management) and EFQM
Hoy & Foley (2015)	ISO 9001 and ISO 27001 integrated audits
Mesquida & Mas (2015)	IT service management (ISO/IEC 20000-1) and quality MSs
Crowder (2013)	Integration of QMS, EMS and Information Security MS

2.13.5 Integrated management systems and traceability

It is evident that, traceability demands for a transdisciplinary approach covering a broad range of activities in various domains within an organization and beyond the borders of a single company. In other words, food traceability "penetrates" a variety of disciplines to be managed following respective standards (Fig. 2.3). Wognum et al. (2011) stress the vertical along with the horizontal scope of traceability and discusses the "integrated or shared supply chain approach" where a common strategy is developed and integrated management and information systems are used. IMSs by definition may embed and bridge different management disciplines within a broad business scope both intra- and inter-organizationally. In a similar vein, scholars emphasize the quality and environmental management integration across supply chain actors (Wong et al., 2015; Zu & Kaynak, 2012). Particularly, with regard to "ethical traceability" IMSs embrace social responsibility principles both theoretically (Asif et al., 2013) and empirically (Botta et al., 2013; Weyandt et al., 2012). In this context, to adequately manage traceability the "conventional" IMS needs to adopt a stakeholders approach driven by social responsibility principles towards a "responsible IMS".

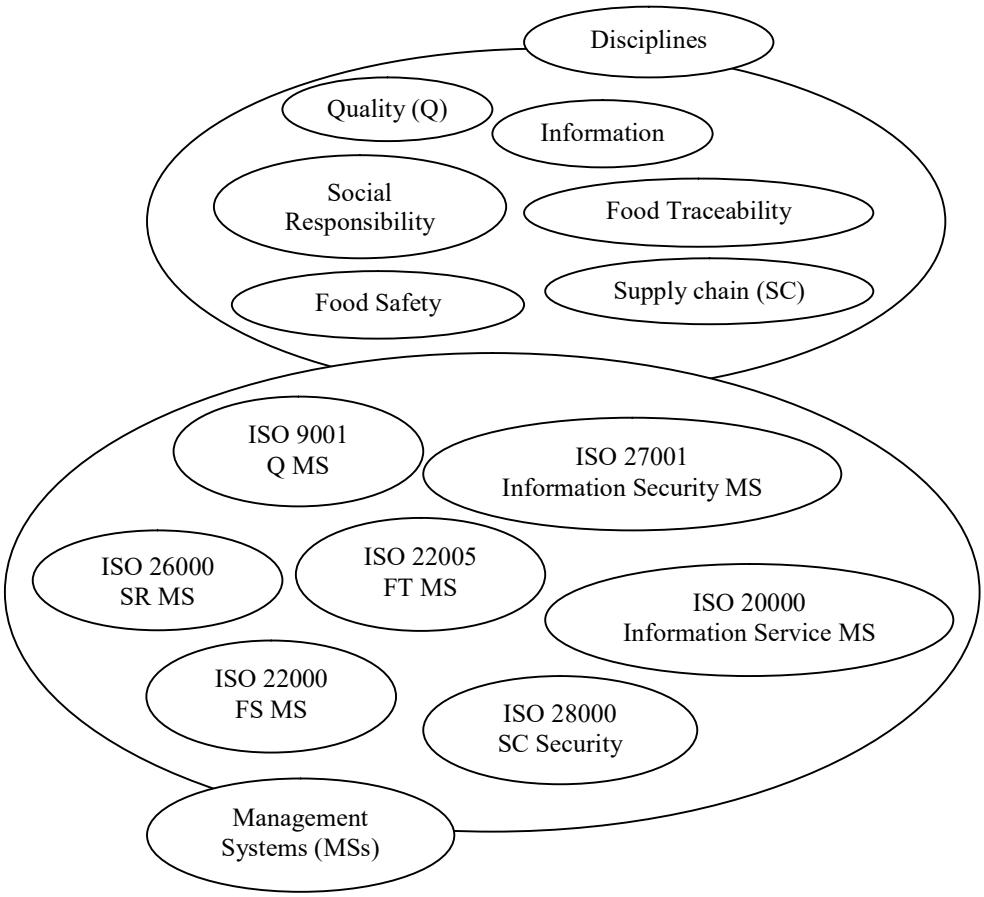


Figure 2.3 Integrated management systems and traceability

2.13.6 Integration of information management systems

Information systems rely on certain principles, including but not limited to the requirements elicitation and formalization, software engineering, and hardware adaptation, taking into account all stakeholders involved. On the other hand, "an integrated management system provides up-to-date information from a single source and hence improves the decision-making process" (Zutshi & Sohal, 2005). Interestingly, certain analogies are recognized between IT governance and MS integration. It is emphasized that effective IT governance is the organizational capacity exercised

by the executive and IT management that "aligns IT investments (resource allocation) with overall business priorities, determines who makes the IT decisions, and assigns accountability for the outcomes" using decision-making structures, alignment processes, and formal communications and, thus, ensuring fusion of business and IT (Niemann, Miede, Johannsen, Repp, & Steinmet, 2010; Seigerroth, 2011). Correspondingly, a successful IMS aligns objectives, processes and resources to meet stakeholder requirements (Karapetrovic, 2003) based on top management commitment and strategic orientation using MS structures and IMS models. The identified similarities underscore the adherence and potential trade-offs between information and operations management systems when integrated. In the following table (Table 2.7) a snapshot is provided on the IMS literature that refers to the integration of information management with other management systems.

Table 2.7 Research on multiple management systems embedding information

Authors (publication year)	**Research topic**
Barata & da Cunha (2014)	Information systems and quality MSs
Martins, Bulkan & Klempt (2011)	ISO/IEC 17799 (Information technology – security techniques – Code of practice for information security management) and EFQM
Hoy & Foley (2015)	ISO 9001 and ISO 27001 integrated audits
Mesquida & Mas (2015)	IT service management (ISO/IEC 20000-1) and quality MSs
Crowder (2013)	Integration of QMS, EMS and Information Security MS

Hoy and Foley (2015) focus on the integrated auditing of compliance to the ISO 9001 and ISO 27001 standards. Auditing is proposed as the interface element of the quality and information management sub-systems, the IT framework and performance assessment. It is emphasized that "a management systems auditor requires an understanding of all the management system standards within the purview of the IMS" (Hoy & Foley, 2015). Moreover, it is stressed that the ISO 9001 and ISO 27001 standards share certain requirements and processes, i.e. documentation,

training, internal audits, management reviews, corrective and preventive actions (Hoy & Foley, 2015). In a similar context, Crowder (2013) studies the integrated management of quality, information security and the environment. Mesquida and Mas (2015) elaborated a guide on the integration of IT service and quality management systems, which they subsequently tested in five service organizations belonging in the hospitality, urban planning and health care sectors. Furthermore, future research is directed towards further integrating the ISO/IEC 27001 requirements and COBIT best practices for the enterprise IT governance and management (Mesquida & Mas, 2015). The information-related standards that have been released by the International Organization for Standardization (ISO) – International Electrotechnical Commission (IEC) and are included in the relevant body of research are given in Table 2.8.

Table 2.8 Information management standards and guidelines

Standard code number	Title
ISO/IEC 20000-1:2005 (revised in 2011)	Information Technology - Service management - Part 1: Service management system requirements
ISO/IEC 27001:2005 (revised in 2013)	Information security management
ISO/IEC 90003:2004 (revised in *2014)*	*Software engineering - Guidelines for the application of ISO 9001:2000 to computer software*
ISO/IEC 12207:2008 (replaced version of year 1995)	Systems and software engineering - Software life cycle processes
ISO/IEC 15504-2:2003 (replaced version of year 1998)	Software engineering - Process assessment — Part 2: Performing an assessment

An overview of the standards that formalize information MS integration is provided in the following table (Table 2.9). At this point, it should be clarified that PAS 99:2012 is a public available specification (PAS) released by a national standardization body, i.e. the British Standards Institute (BSI), while the other guidelines are elaborated by the International Organization for Standardization (ISO).

Table 2.9 Standards, specifications and guidelines enabling integration of information systems

Name	***Title***
ISO/IEC TR 90006:2013	Information technology - Guidelines for the application of ISO 9001:2008 to IT service management and its integration with ISO/IEC 20000-1:2011
ISO/IEC 27013:2015	Information technology – Security techniques - Guidance on the integrated implementation of ISO/IEC 27001 and ISO/IEC 20000-1
PAS 99:2012	Specification of common management system requirements as a framework for integration
ISO 19011:2018	Guidelines for auditing management systems

Certain conceptual and empirical approaches have been identified in the extant body of literature addressing the integrated management of information along with other disciplines. Gillies (2011) combined the capability maturity model and the quality management approach to adopt the ISO 27001 standard. Crowder (2013) presents a comprehensive case of an integrated quality and information security and environmental management system. Hoy and Foley (2015) established a PAS 99-based framework for the integration of quality and information audits. Rebelo, Santos, and Silva (2014) composed a sustainable IMS model grounded on information security and social accountability. In the same vein, Jørgensen (2008) addresses corporate sustainability using a knowledge-based IMS. Furthermore, process improvement through a common documentation system, the creation of a system adequately defined, ensuring the commitment and meeting the needs of the stakeholders, the increase of business performance, and the improved allocation of resources are highlighted as the major advantages of the integrated quality and information service management systems (Mesquida & Mas, 2015). Management of IT service quality brought about improved customer satisfaction, enhanced stability and quality of services and reduction in the number of incidents, facilitation of growth and better alignment of people and information (Mesquida & Mas, 2015). The benefits of managing information security are found similar to those accrued when managing quality, i.e. awareness increase and continuous improvement (Fomin, de Vries & Barlette, 2008).

In as far as IT-MS auditing is concerned, Ferreira, Machado and Paulk (2011) introduced a conceptual framework where the principles of quality management and informatics are incorporated into an improvement and capability assessment scheme following the guidelines of

ISO 9001, ISO/IEC 15504-2 (information technology - process assessment) and ISO/IEC 12207 (systems and software engineering - software life cycle processes). Thus, the exploitation of interdependencies and trade-offs enhances the audit outcome by supporting management of quality goals information when conducting multi-model audits and assessments. Crowder (2013) contends that the scope of the information security management standard (ISO 27001) should extend beyond the information and communication technology (ICT) domain and highlights the lack of the auditors' readiness in auditing the compliance of an information security management system within a non-IT organization. In a similar vein, the auditors' reluctance to include the IT operations within the scope of management systems' audits is emphasized by Hoy and Foley (2015).

2.13.7 Information and management – current situation and trends

ISO standards facilitate international trade and improve international communication and collaboration (Hudson & Orviska, 2013). Moreover, by formalizing processes and procedures, information costs are reduced. Most of all, the mitigation of information asymmetries is highlighted as the ultimate goal of management systems standards establishment (Heras-Saizarbitoria & Boiral, 2013). In simple words, IT through the generated information systems receives data in oral or written form, introduces it into a codifying and storing bank and distributes it to the assigned points of delivery. However, information can only then be of use when it is transformed into knowledge, meaning when it is understood, given a context and assimilated within the body of tacit knowledge of employees. At this point a "language" is needed to accomplish the transformation both efficiently and effectively. Standardization bodies intend to play this "translating" role through dedicated standards and norms, such as the information security management and the IT - service management standards, and eliminate any information asymmetries (Heras-Saizarbitoria & Boiral, 2013). To the other end of the line (see Fig. 2.4) managers have to acquire the processed and formalized information and use it to establish and maintain the management systems.

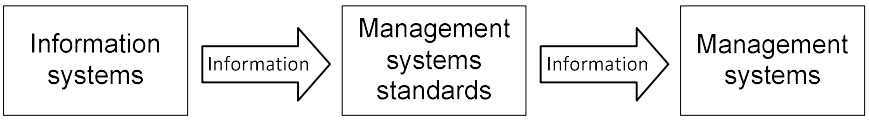


Figure 2.4 Information processing flow

2.13.8 Information standards uptake

The International Organization for Standardization (ISO) conducts an annual survey on the number of certified organizations to certain management standards. According to the ISO survey data (ISO, 2015) it is evident that the number of ISO 27001 certified organizations is constantly rising (Fig. 2.5). Moreover, Cots and Casadesús (2014) emphasize a correlation of the ISO 20000 standard's adoption rate to the technological development in services by identifying small yet technically advanced and service-oriented countries to be ranked among the top fifteen countries adopting the standard. However, the certification growth rates of the ISO 27001 and ISO 20000 standards are found significantly lower than the respective uptakes of the ISO 9001 and ISO 14001 standards (Cots & Casadesús, 2014; Fomin, de Vries, & Barlette, 2008).

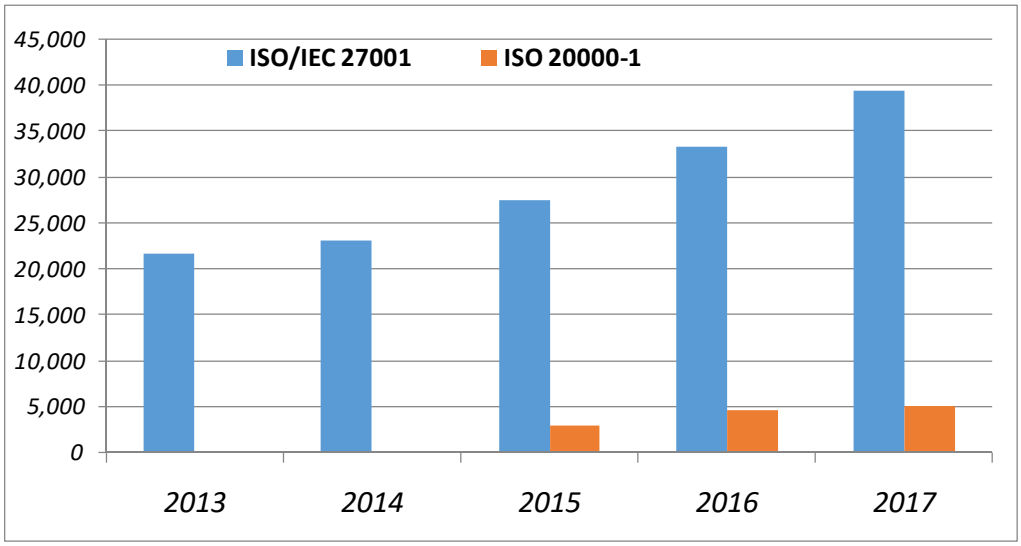


Figure 2.5 ISO 27001 and ISO 20000 certifications (source: ISO, 2018)

In this research context, certification data (ISO, 2015) was processed to measure the annual growth rate since the ISO 27001 standard was first launched. It is noteworthy, that the information-related standards were first released in 2005 (see Table 2.10), that is two decades later than the quality MS standard and a decade later than the environmental MS standard. Summarizing the results, compared to the ISO 9001 and the ISO 14001, the ISO 27001 standard certification rate seems to approach saturation in a time span of less than ten years and at far lower levels than the ISO 9001 and ISO 14001 standard certification rates (Table 2.10). In a similar vein, a trend to reduce the use of inter-organizational standard-based information technologies is recently identified and attributed to lack of strategic, long-term orientation (Power & Gruner, 2015).

Table 2.10 ISO 9001, ISO 14001 and ISO 27001 certifications and rates
(source: own elaboration of ISO survey data)

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
ISO 9001 certified	1.063.751	1,076,525	1,009,845	1,017,279	1,022,877	1,036,321	1,034,180	1,105,937	1,058,504
increase/ decrease rate (%)	8,51	1,20	-6,19	0,74	0,55	1,31	-0,21	6,94	-4,29
ISO 14001 certified	222.974	239,880	243,393	260,852	273,861	296,736	319,496	346,147	362,610
increase / decrease rate (%)	18,24	7,58	1,46	7,17	4,99	8,35	7,67	8,34	4,76
ISO 27001 certified	12.935	15.626	17.355	19.620	22.349	23.972	5.797	7.732	9.246
increase / decrease rate (%)	39,90	20,80	11,06	13,05	10,11	6,48	19,70	20,90	18,66

In terms of multiple management systems, unfortunately there is a paucity of IMS data, in general, let alone of data on information IMS. To acquire a hint of the proportion of organizations that adopt more than one system standard, with at least one being information-related, Gillies (2011) reports that in a survey, where 10% of the ISO 27001 certified companies worldwide have participated, it was found that around 80% were originally certified to the

quality management standard (ISO 9001). This implies that quality management culture fosters information management, since organizations become more "knowledgeable and amenable" (Gillies, 2011).

2.14 Information, energy and environmental management

Research on IMS and information-related systems refers mainly to the integrated management of information with quality. Nevertheless, there is a limited discussion on the integration of the environmental and the energy management systems with the information systems (Elliot, 2011; Watson et al., 2010). It should be clarified however, that this part of the literature lacks particular references to the information service and/or the information security management standards. Yet, the findings link the integrated implementation of the environmental and energy management systems with an information structure of some kind.

In this context, Watson et al. (2010) raise the issue of energy management through an information system when they propose an energy informatics model embedding corporate sustainability criteria, i.e. eco-efficiency, eco-effectiveness and eco-equity, policies, regulations, social and corporate norms. In a similar vein, Elliot (2011) focuses on the environmental sustainability when discussing the transdisciplinary perspectives of environmental management and information technology and introduces the "green IT". It is suggested that IT may intervene in the process coordination, management, monitoring, modeling, evaluation and reporting of measures to mitigate environmental impacts and allocate resources more efficiently. The proposed by Elliot (2011) conceptual model underscores the role of technology- primarily information technology/information systems - as both a mediator in stakeholder communication and a moderator of stakeholder actions, such as capital management capabilities and other resource-oriented capabilities. In another context, the use of ICT and knowledge management is incorporated within an integrated environmental and energy management system (Kostevšek, A., Petek, J., Čuček, L. & Pivec, A., 2013).

Parker (2013) adopts a different perspective to the integration of information when automated energy measurements carried out by "integrated information systems" and "technical diagnostics" outperform the established environmental and energy management systems. The

information system outputs are directly used by the assigned employees at the operational level with no apparent need for further and more advanced handling of the data. Moreover, the documenting, formalizing and certifying of both management systems was not found to increase performance.

2.15 Supply chain, information and food safety IMS

In manufacturing firms, mainly in the food industry, there is a high demand on information-based platforms to ensure food quality and safety mainly via traceability. Technologies for managing traceability data are mainly employed for product identification, quality and safety measurements, genetic analysis, environmental monitoring, geospatial data capturing, data exchange, and software development. In the food commodities identification process, the most common types of capturing data are paper records, barcodes, radio-frequency identification (RFID), voice recognition systems, biocoding, and chemical markers (Bosona & Gebresenbet, 2013). The information quality of a traceability system impacts not only the focal company yet spreads to the entire food supply chain.

Tracking and tracing along the agri-food chain is a requirement of the food safety management standard (ISO 22000). The ISO 22000 standard complements the Hazard Analysis of Critical Control Points (HACCP) principles by adding requirements for traceability, communication and emergency preparedness and, thus, assures compatibility of the food safety management standard with the ISO family standards. Moreover, HACCP, which is the 'heart' of the ISO 22000 standard, relies on the identifying and recording of detailed data on microbiological and other potential sources of food contamination hazards. Hence, information systems can provide both the dedicated software solutions, such as predictive microbiology application software, risk assessment software and decision support systems, and the necessary structured approach to facilitate traceability, e.g. "systems that communicate with finance software, business systems and work as an integrated part of production management" (McMeekin, Baranyi, Bowman, Dalgaard, Kirk, Ross, Schmid, & Zwietering, 2006).

Following this line of thought, the IMS supply chain perspective comes to the forefront. Drawing upon the IMS conceptual background, IMS approach may apply to diverse management domains

both intra- and inter-organizationally. Certain scholars stressed the quality and environmental MS integration across supply chain tiers (Wong, Wong, & Boon-itt, 2015; Zu & Kaynak, 2012). As aforementioned, food safety and quality management requires a cross-functional and cross-tier managerial approach so, that multi-sourced information is shared "symmetrically" among all interested parties. Trust and security barriers can be overcome by adopting a stakeholder IMS approach (Gianni, Gotzamani & Linden, 2016) complying with social responsibility (Castka & Balzarova, 2008) and information sharing guidelines (Table 2.11). In a broader supply chain context, Power and Gruner (2015) identified a decrease in the use of inter-organizational standard-based IT applications caused by lack of cohesion and strategic, long-term orientation. A tailor-made approach would in this case integrate the information and supply chain MS requirements within a strategic, top-down IMS structure.

Table 2.11 Supply chain standards

Norm	Description
ISO 28001:2007	Security management systems for the supply chain – Best practices for implementing supply chain security assessments and plans – Requirements and guidance
ISO/IEC 27010:2015	Information technology - Security techniques - Information security management for inter-sector and inter-organizational communications
ISO 26000:2010	Guidance on social responsibility
ISO 22005:2007	Traceability in the feed and food chain – General principles and basic requirements for system design and implementation.
GS1 Global Traceability Standard	Business process and system requirements for full supply chain traceability

2.16 Integration, information management and performance

With regard to IMS performance, Karapetrovic and Willborn (1998) introduce the concept of an "integrated performance management system". Karapetrovic and Jonker (2003) recommend the establishment of an IMS performance measurement system. Tarí and Molina-Azorin (2010) propose an integration approach of the quality and environmental management systems based on the excellence model of the European Foundation for Quality Management (EFQM), where the four 'results' components may be used as outcome measures of the integrated management system. Garengo and Biazzo (2013) present an IMS performance measurement system based on the Balanced Scorecard.

From the IT perspective, Kumbakara (2008) identifies Balanced Scorecard as the means to align business strategy with IT strategy and highlights the use of information management standards to provide the common "language" for the efficient and effective communication on his quest for monitoring the performance of "managed" (outsourced) IT services. In a similar vein, Peppard and Ward (2004) contend that IT has no inherent value by itself and cannot constitute an independent source of sustainable competitive advantage. Thus, they propose the alignment of information systems capability with the organizational performance by interlinking business strategy and operations along with IT strategy and operations. Furthermore, the relationship between firms' information management practices and their business performance is recognized by both academics and practitioners (Mithas, Ramasubbu & Sambamurthy, 2011). Martins, Bulkan, and Klempt (2011) align information security requirements with business objectives using a security excellence approach combined with results-oriented metrics. In a similar vein, Disterer (2012) argues that the IT service MS standard offers a normative alignment of the IT service performance.

On the one side, integrated management systems unlike information systems lack so far an internationally established standard against which they could be audited and certified. Instead, they are empirically evaluated according to the integration level of their goals, processes and resources (Karapetrovic, 2002; Simon, Karapetrovic & Casadesús, 2012b). Information systems, on the other side, lag in terms of the holistic managerial perspective which an integrated management system is able to provide for the organization's decision-making process. To address bilateral shortcomings in a balanced and consolidated mode, an integrative framework is coposed that incorporates all aspects related to information, both managerial and technological (Fig. 2.6). Within this framework, all standardized management sub-systems including the information security and the information service management modules are fused into a homogenized texture. Apart from the quality and the environmental, other standards, such as the OHSAS 18001:2007 occupational health and safety assessment specification and the ISO 50001:2011energy standard are jointly adopted. Moreover, certain sector-specific standards, such as the ISO 22000:2005 on food safety and the ISO/TS 16949:2009 specification for the automotive industry, and corporate sustainability standards, such as the social responsibility (ISO 26000:2010) guidance, are compatible to the proposed framework, as well.

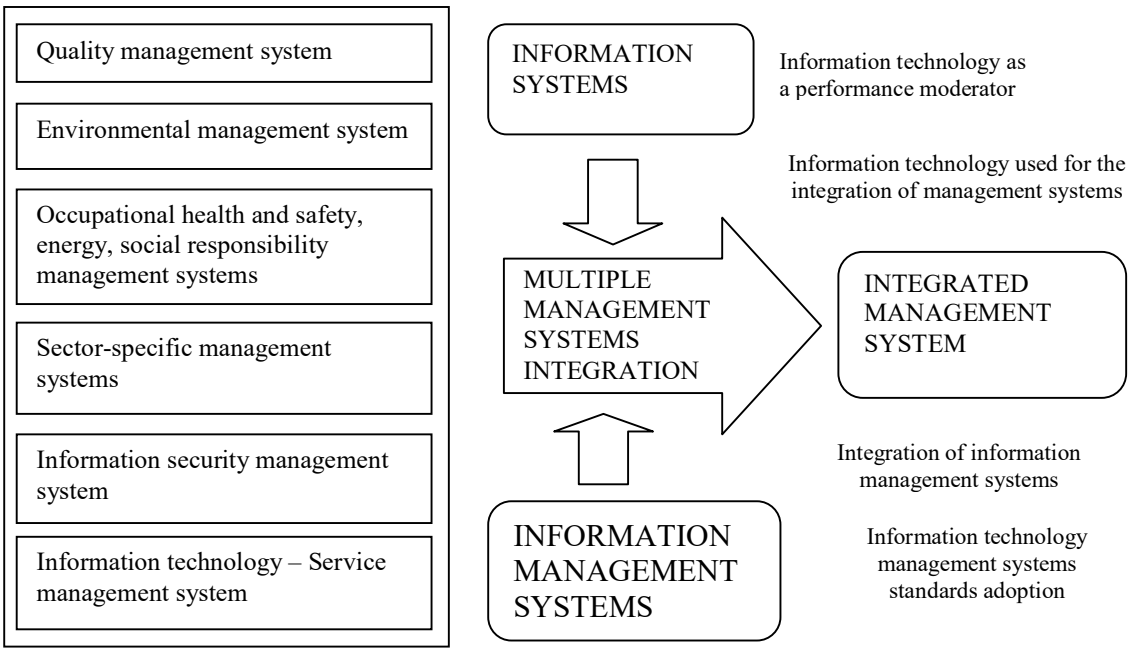


Figure 2.6 IMS including information management systems

The assimilation of all interrelated functions is improved by the information systems that are designed to support the mechanisms of recording, coding, processing and auditing the continuous flow of information related to the management modules. Information systems are used to facilitate performance measurement, as well. Thus, information is leveraged to a management moderator and acts as a catalyst to the integration of all management modules in the same logic that different types and sources of information are integrated within the operations structure of an organization. In the proposed framework, the information service management sub-system (according to the ISO 20000-1:2011 standard) is embedded to address the particular needs of service firms and of those manufacturing firms that provide services of some kind, as well. Hence, it is not included, when "non-service" companies integrate their management sub-systems.

2.17 Services and information management

At the time the first version of the ISO 9001 "flagship" standard was launched in the late 80's certain accompanying guidelines were issued to assist organizations operating in specific sectors to adopt and comply with the ISO 9001:1987 standard's generic requirements. As such, the ISO 9004-2:1991 guidelines were focused on services. The guidelines' structure was based on a key concept, i.e. the service quality loop, which included the service brief, the design process, service and delivery specification, the quality control, the service delivery, the service result (supplier's/customer's assessment), the service performance analysis and improvement. Standards and management systems have come a long way since then, along with the four generic product categories that were then identified, i.e. software, hardware, processed material and service. However, it seems that even nowadays organizations, particularly with non-manufacturing activities, encounter impediments when adopting the generic requirements of the ISO 9001 (Hudson & Orviska, 2013). Moreover, service provision industries, such as the education and health-care, look for a service-dedicated approach to manage their quality, environmental, health and safety and sustainability aspects (Lezcano, Adachihara & Prunie, 2010). To address this need, the scope of the ISO 20000 standard is gradually extended to other types of services different than information technology. Moreover, certain trade-offs take place between the initially IT-oriented ISO/IEC 20000 service management standard and the generic ISO 9001 quality management standard. As such, the integrated adoption of both standards is highlighted as a recommended practice within the service sector (Cots & Casadesús, 2014).

2.18 Knowledge management and management systems performance

As shown above, there is a growing interest in combining the formalized management of information and its related risks (information security management) with the management of generic, such as quality, environment, health and safety and sector-specific disciplines, such as food safety, education, health-care, and hospitality. As regards the distinct management domains, there is an ongoing criticism over the motives and the benefits of standards adoption and management systems implementation and certification, otherwise emphasized as "impression

management" (Disterer, 2012). Often organizations adopt standards and undergo certification audits just to signal their quality awareness to their current and potential customers. Within this line of reasoning, many auditors oversee certain indications of low MS performance levels, carry out mere conformity audits and keep their customers, namely the auditees, satisfied. However, the auditing of compliance with standard requirements does not guarantee the actual implementation of the MS principles, moreover the deepening and spreading of the MS scope towards MS and corporate performance.

Internal motivation is claimed to be the critical factor for the meaningful adoption of the MS standards (Gotzamani & Tsiotras, 2002). On one side, top management has to be really committed and allocate the necessary resources. On the other side, the employees need to actively participate in the continuous improvement process. This way, MS standards are internalized, i.e. the standards' requirements penetrate deep into the daily operations by "consciously" using management practices to modify behavior and decision making (Nair & Prajogo, 2009). In a similar vein, Gotzamani & Tsiotras (2002) stress that the "long-term effectiveness and real value of the quality assurance standards is not based on their content and requirements but on the way that companies adopt and implement these requirements. The key for their success is the depth to which a company desires to proceed satisfying their requirements".

The internalization concept is by its definition related to both the knowledge and the management systems implementation, since it refers to the "process of absorbing both tacit and explicit information into the organisation and translating it into knowledge, which is then applied to purpose" (Nair & Prajogo, 2009). Knowledge can be either explicit or tacit. Explicit knowledge is the codified information that can be stored and transmitted using formal and systematic means, whilst tacit knowledge is embedded among a system's users through underlying practices in a management system (Nair & Prajogo, 2009). Hence, information is being transformed into knowledge which is then assimilated into the management system. Knowledge management systems use IT systems to manage organizational knowledge, namely to support and enhance the processes of knowledge creation, storage/retrieval, transfer, and application (Alavi & Leidner, 2001) yet keeping in mind that information technology alone cannot leverage knowledge (McDermott, 1999).

It is claimed that, knowledge management and quality management are considered interdependent, and the absence or insufficiency of one of them may lead the other one to fail (Akdere, 2009). Business excellence frameworks, like the Baldrige Award, increasingly recognize the importance of knowledge, e.g. the MBNQA category "Information and Analysis" was changed to "Measurement, Analysis, and Knowledge Management" (Linderman, Schroeder, Zaheer, Liedtke & Choo, 2004). This category of the Baldrige Award examines how an organization selects, gathers, analyzes, manages and improves its data, information, and knowledge assets and how it manages its information technology. The same category examines how the organization uses review findings to improve its performance (Akdere, 2009). Through this lens, organizations are considered learning organisms that accumulate information, transform it into knowledge and make decisions. Therefore, "the semiotic link between knowledge and performance is crucial in the success and well-being of the organization" (Akdere, 2009). In the same vein, it is stressed that within normalized management systems information and data transformed into knowledge are used for performance evaluation and improvement and, thus, influence corporate sustainability (Ejdys & Matuszak-Flejszman, 2010).

2.19 Integration and internalization

Afore discussion emphasizes that integration requires the intertwining of management principles and practices across the organization in an internalized mode. Therefore, a more sophisticated way is needed to manage information and documentation and meet standards' requirements and audits' specifications. However, there is a link missing from the chain connecting the incoming data to the manageable information resources. Data needs to be transferred into a more meaningful and adaptable form. In this context, the concept of knowledge is more comprehensible than ever. The necessity for this concept to be formalized and introduced to the management world is realized by the standardization bodies. So far, two relevant guidance standards have been released, one by the Australian standardization body (AS 5037:2005 – "Knowledge management - a guide") and one by the British Standards Institution (BS PAS 2001:2001 – "Knowledge management - Guide to good practice").

Moreover, MS integration and internalization rely on the internally driven commitment, since there is no "signaling" effect expected. The lack of an auditable IMS standard not only detaches IMS from mere compliance but also demands for a knowledge-based approach to adequately addres the extent and the impact of an integrated-internalized MS. Researchers and practitioners in the IT and management fields need to collaborate in order to develop a common "interface". Thus, exchange of knowledge will facilitate organizational learning through more efficient and effective combination of resources, such as standards, guidelines and software. Within this context, it is implied that embedding knowledge in the form of a knowledge-MS will enhance the capacity of the integrated management system structure towards an efficient and effectivecision-making.

2.20 Information, knowledge internalization and performance

In terms of world-wide diffusion, the quality and environmental MS standards follow a pattern similar to product's life cycle with annual certification rates plotted on an S-shaped curve (Franceschini, Galetto, Maisano, & Mastrogiacomo, 2010). The "old" standards certification rates are now reaching saturation or decline (Marimon, Heras, & Casadesús, 2009). However, the information MS standards are found to disseminate slower and at lower levels than expected considering their "young age". From the IMS perspective, the strong "attachment" to the ISO 9001 of all subsequent standards - with the information-related standards included - in combination with the decline of the "aged" ISO 9001 annual certification rates over the last years, due to saturation, lack of internalization and financial benefits (Cândido, Coelho, & Peixinho, 2016; Gianni & Gotzamani, 2015), generates another barrier to the diffusion of information MSs and their further fusion within an IMS. To overcome the raised barriers managers should integrate information MSs within an internalized integrated framework. Moreover, manifold sector- and function- specific topics, such as food traceability, supply chain, services, and energy and environmental MS performance assessment are found to be dependent on information management intensifying the need for the formalization of all information-related activities within a broader web of management sub-systems. Furthermore, it is induced that the subsequent adoption of a knowledge management sub-system into an integrated platform already

encompassing information management may multiply the IMS synergistic effect on business performance.

2.21 Corporate sustainability performance

Sustainable development concerns "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987). Elkington (1997) introduced the concept of the "triple bottom line" (TBL) for sustainable development performance depicted by a triple line with fluctuating interfaces between social, economic and environmental "shear zones". Triple bottom line approach was later adopted by the Global Reporting Initiative (Moneva et al., 2006). In a business context, sustainable development is termed "corporate sustainability", meaning the sustainable development ability of a firm within its environment. In turn, sustainable development performance of a firm or otherwise called "corporate sustainability performance" can be defined as **the meeting and balancing of current and future stakeholder needs and expectations on behalf of the firm by ensuring profitability while safeguarding human and natural resources in both the short- and long-term** (Artiach et al. 2010).

Although environmental and financial performances are hardly related in a direct manner, a "virtuous circle" is identified between intangible resources, such as innovation capabilities, human capital and sustainability-centred culture (Maletič et al., 2015). Moreover, the three-dimensional integrated management of sustainability, quality and the environment driven by the ISO 26000 social responsibility principles is proposed emphasizing stakeholder and holistic perspectives (Maletič et al., 2015). In a similar vein, Epstein and Roy (2001) compose a framework with a distinction between intermediate results, such as improved environmental and social performance, enhanced public image, and increased market share, and financial outcomes via measuring the reactions of seven stakeholder groups: shareholders, customers, staff and their families, suppliers, local communities, national and international society, and past and future generations of co-operators.

2.22 Integrated management systems and corporate sustainability

Business sustainability and corporate social responsibility are jointly considered in literature in the wider term "corporate sustainability" (Will et al., 2019). Moreover, corporate social responsibility is often used interchangeably with corporate sustainability (Dyllick and Muff, 2016). In this sense, corporate social performance generally reflects how well a company transforms stakeholder orientation, a managerial attitude, into stakeholder satisfaction (Luk et al., 2005). Literature emphasises the dual role of stakeholders providing both inputs (requirements) and outputs (satisfaction) for the management systems (Rocha et al., 2007). Hence, academics and practitioners seek ways of meeting stakeholder expectations in a wider management framework driven by accountability and social responsibility (Maletič et al., 2014). Recent research stresses the importance of integration for the successful linking of corporate social responsibility with existing management systems (Will et al., 2019).

2.23 IMS Case study research

In this section pertinent literature has been reviewed in order to sort out the IMS case studies (see Table 2.12).

Table 2.12 Case studies on IMS

Authors	Country (No of cases)	Type of company/ Field of activities	Aspects studied
von Ahsen and Funck, 2001	Germany (1)	Automobile supplier	QMS and EMS integration on the basis of ISO 14001
von Ahsen, 2014	Germany (7)	Car manufacturers	QMS, EMS and/or Energy MS and OHSMS – longitudinal
Asif et al., 2010a; Asif et al., 2010b	Pakistan (4)	Pharmaceutical plant Textile plant Automobile plant Dairy plant	Organizational changes Integration strategies and outcomes
Azadeh et al., 2009	Iran (1)	Gas refinery	Health and Safety, Environment and Ergonomics IMS
Badreddine et al., 2010	Tunisia (1)	Petroleum plant	Bow-tie risk analysis transformed to Multi-objective influence diagram (MID) technique for QSE management planning
Bamber et al., 2000	UK (1)	Sheet metal processing and assembly Pre-wiring of cable management systems	Total Productive Maintenance and 5S as key connecting factors of Quality, Environment and Occupational Health & Safety MSs to form an Integrated Manufacturing System
Beckmerhagen et al., 2003a	Germany (1)	Nuclear waste disposal facility	Auditing of a combined quality and safety management system
Bernardo et al., 2018	Greece (5)	Chemical (1) Food (2) Aluminium products (1) Flexible packaging (1)	Integration patterns, location
Bernardo et al., 2013	Greece (7)	Chemical (1) Food and beverages (2) Aluminum products (1) Flexible packaging (1) Cement (1) Lifts (1)	Certification maturity as a diffusion factor for management systems integration
Bernardo et al., 2011b	Greece (5)	Chemical (1) Food and beverages (2) Aluminum products (1) Flexible packaging (1)	Integration characteristics (strategy, level, methodology, and audits)
Blecken et al., 2010	Germany (2)	Precision machine parts (1), Utility vehicle industry (1)	Lean Quality Management System
Bonk-Kassner et al., 1997	Germany (1)	Laboratory	GLP, DIN EN 45001, GMP, ISO 9001 IMS

Authors	Country (No of cases)	Type of company/ Field of activities	Aspects studied
Botta et al., 2012	Italy (1)	Municipality	Integrated Environmental (ISO 14001 certified and EMAS registered) and Social (SA 8000) management system
Campos et al., 2009	Brazil (1)	Electricity distribution	IMS model based on linear programming, set theory and combinatorial mathematics
Chan et al., 1998	Hong Kong (1)	Railway corporation	IMS (quality, safety, and environment) based on the MBNQA
Crowder, 2013	UK (1)	Local authority bereavement service	Integration of QMS, EMS and Information Security MS
Fresner and Engelhardt, 2004	Austria (2)	Anodizing (metal coating) plant Brewery	Environmental and economic performance improvement through IMS applying Cleaner Production approach
Fresner, 1998	Austria (1)	Textile mill	Cleaner production project followed by QMS development
Garengo and Biazzo, 2013	Italy (1)	Kitchen furniture manufacturing	Stepwise approach of IMS (ISO/ EFQM/ BSC)
Griffith and Bhutto, 2008	UK (5)	Construction contracting companies	IMS framework to enhance environmental performance
Grosskopf et al., 2007	U.S.A. (1) Israel (1)	Plastics and metals manufacturing, Aerospace, medical, and military parts	Integrated Quality (AS9100/ISO 9001:2000), Environmental EMS, OH&SMS and security (draft USISTF SMS standard)
Hacham et al., 2007	Israel (1)	Public Health Laboratory	ISO 9001, ISO 17025, and ISO 15189 augmented IMS
Ho, 2010	Malaysia (1)	Construction	Integrated lean TQM model integrating ISO 9001, ISO 14001, OHSAS 18001 and six-σ with a 50-point audit checklist
Hughes and Karapetrovic, 2006	Canada (1)	Electric utility	ISO 9001 QMS augmented by ISO 10002 complaints MS
ISO, 2008	Germany (1), Canada (1), Spain (4), Chile (1), worldwide (3), Costa Rica (1), UK (1), Malaysia (1), France, Israel	Aluminum, chemical (3), professional Services, Mining, Automotive (3), Construction, Beverages, IT, Hotel, Defense, and Consulting	Drivers, objectives, starting points, methodologies, tools, impediments, lessons learned, and benefits for IMS in organizations of different size, activity, sector, and location
Jørgensen, 2008	Denmark (1)	Electrical & mechanical components manufacturing	Common elements, barriers/Knowledge management and a basic standard as the basis for IMS and sustainability reporting
Karapetrovic and Willborn, 1998b	South Africa (2) & Canada (1)	Hotel National Institute for Standards University Department of Engineering	Integration QMS and EMS of a service organization based on systems approach
Karapetrovic and Casadesús, 2009	Spain (4)	Paper filters manufacturing Chemical products for automobile repairs Solid waste treatment plant Professional services provision	Scope of standardization, sequence and time required for implementation, scope of integration
Khanna et al., 2010	India (1)	Refractory	Business excellence model

Authors	Country (No of cases)	Type of company/ Field of activities	Aspects studied
		manufacturing	Advantages achieved by IMS implementation
Labodová, 2004	Czech Republic (2)	Heat production for central heating Supply of drinking water and wastewater treatment	Testing of a risk-based IMS model
López-Fresno, 2010	Spain (1)	Airline	IMS model based on systemic approach
Leopoulos et al., 2010	Greece (1)	Chemical industry	Suppliers evaluation process - organization/decision view
Mackau, 2003	Germany (1)	Construction	Employees involvement even at strategic level
Milliman et al., 2011	U.S.A. (1)	Electrical and Electronic Equipment Waste management and recycling services	Integrated Sustainability Management System
Milliman et al., 2005	U.S.A. (1)	Water and sanitation services	Security, EH&S Integrated Management System
Moore, 2013	Australia (1)	Water and sewerage services	Environmental, risk and sustainability management
de Oliveira, 2013	Brazil (14)	Industrial	Development of guidelines for the integration of certifiable MSs
Oskarsson and von Malmborg, 2005	Sweden (3)	Submersible pumps and mixers	Integration of Management Systems and Sustainability
		Rolling bearing and seals	Organization of management, communication, and driving forces
		Power and automation technologies	
Pun et al., 1999	Hong-Kong (1)	Laboratory services	Self-assessed QMS framework integrating MBNQA, ISO 9001 and ISO 14001
Renzi and Capelli, 2000	Italy (1)	Food industry (dairy products)	Opportunities and drawbacks of integration
Rondinelli and Vastag, 2000	USA (1)	Aluminum plant	Supplement and extent of QMS to embed EMS, overlaps identified
Sampaio et al., 2012	Portugal (3)	Two (2) from the industrial and one (1) from the service sector	Integration process time evolution / Standards integration
			Motives, drawbacks, benefits and integration level
Santos et al., 2011; Santos et al., 2004	Portugal (1)	Foundry	Implementation of the quality, environment and health and safety management systems' integration in a casting plant
Satolo et al., 2013	Brazil (1)	sugar and ethanol production	First QMS and later on EMS to comply with the Green Ethanol Protocol / motives, benefits, difficulties, integration level
Simon and Douglas, 2013	UK (3)	Fabric manufacturing	Cross-case analysis
	Spain (3)	Scaffolding Software developer Energy management Metallurgic manufacturing Railway administration	Differences in integration level, sequence of implementation, integration tools, benefits and difficulties of integration between UK and Spain located firms
Simon et al., 2013	Spain (6)	Paper production	Cross-case analysis
		Plastic vinyl compounds production Lubricants production Energy management	Differences in integration level, sequence of implementation, integration tools, benefits and difficulties of integration between chemical and non-chemical firms

Authors	Country (No of cases)	Type of company/ Field of activities	Aspects studied
		Metallic components production Railway infrastructure management	
Simon et al., 2011	Spain (4)	Paper chemicals manufacturing Plastic vinyl compounds manufacturing Lubricants manufacturing Road transportation services	Integration of Management Systems audits
Spilka et al., 2009	Poland (1)	Production plant	IMS (Q-E-H&S) - efficiency and effectiveness evaluation
Wilkinson and Dale, 1998a	UK (5)	Certification bodies	Training, auditing, attitude to integrated documentation, and benefits
Wilkinson and Dale, 1998b	UK (5)	Chemicals for water treatment and paper processing Measuring equipment Fine chemicals Tire manufacturing Foundry	Existing/proposed integration, reasons, and problems
Wilkinson and Dale, 2000	UK (3)	Gas measuring equipment Casting Healthcare products	Key issues for integration/culture, audits, motives, benefits, barriers, and enablers
Zeng et al., 2010	China (1)	Construction company	Integrated QEH&S risk management approach using FMEA
Zutshi and Sohal, 2005	Australia (3)	Pharmaceutical Furniture Radio and telecommunication components	Problems and benefits of integration

The literature review findings show a paucity of research in Greece. To delve into the process of integration and identify the modes and the reasons – or otherwise to address the 'hows' and the 'whys' (Yin, 2003) - for IMS success or failure - particularly within the Greek business context - case research method is considered to be the most suitable approach. In the next chapter, case research method is described and two cases are analyzed and discussed in correspondence with the literature review findings.

CHAPTER 3. INTEGRATED MANAGEMENT SYSTEMS IN GREECE: EMPIRICAL EXPLORATION

3.1 Background and research questions

In the following paragraphs an outline is given on the two main IMS topics – successful and unsuccessful integration – that have been addressed by using case study analysis and the research questions are posited.

3.1.1 Unsuccessful integration of management systems

In the extant body of literature several frameworks can be found for the MS integration. However, there is a missing link in the chain to connect the theoretical development in the field of integration and the actual implementation in a real-world setting. Furthermore, empirical research in the field mainly considers the IMS development at its initial stage of establishment. Thus, the way that an IMS evolves over time in a business context remains unclear (Asif et al., 2010b; Simon et al., 2012a). Moreover, the possibility of IMS failure has not yet been investigated. To address this gap, this study aims at studying the evolution of an IMS in a real-world setting and identifying the reasons for its abandonment by providing answers to the research questions posed. The lessons learned from this case can be used to other business settings, in the design of the IMS, in order to avoid IMS failure.

The possibility of complete integration failure during or after the initial implementation has not been sufficiently addressed yet. The potential reasons for quitting IMS implementation, such as culture incompatibility (Zeng et al., 2007), increase in bureaucracy (see, e.g., Matias and Coelho, 2002), and employees resistance (Karapetrovic, 2002), have only been theoretically reported (Asif et al., 2009). Zeng et al. (2007) argued that it is not easy for companies to manage the activities and processes that affect quality and the environment. López-Fresno (2010) used the Greek term “apoptosis” to reflect the “decline towards non-existence” of an IMS.

Literature on IMS evolution boils down to three empirical research attempts (von Ahsen, 2014; Garengo and Biazzo, 2013; Simon et al., 2012a), with only one addressing the partial IMS abandonment to a limited extend (von Ahsen, 2014). More importantly, von Ahsen (2014) emphasizes, that the design of the IMS should be founded on the theoretical principles of operations mangement. Moreover, the ever-increasing integration that is reflected to the majority of the extant research is scrutinized (von Ahsen, 2014). Therefore, aiming to gain insight into the

actual IMS evolution and its possible decline over time the research questions are formulated as follows:

RQ1: How does an Integrated Management System evolve over time in a real-world setting?
RQ2: Why may an Integrated Management System fail in a real-world setting?

3.1.2 Successful integration of management systems

According to the contingency theory, organizational performance depends on the fit (i.e. proper alignment) of internal structure and strategy with external context variables, so-called contingencies (Schneider et al., 2014). Academics have long recognized the importance of contingencies in operations research (Ketokivi and Schroeder, 2004; Maletič et al. 2018; Sousa and Voss, 2008). Most importantly, the challenge is highlighted to explain the highest possible portion of performance variance by contingencies (Sousa and Voss, 2008). Total quality management practices have been studied within different contexts (Prajogo, 2005; Singh et al., 2018). It is generally stressed that while manufacturing firms focus on process management improvement, services focus on people management improvement (Prajogo, 2005). Several researchers have addressed the differences of TQM practices adoption and other management practices, such as lean or just-in-time, between service and manufacturing firms (Alsmadi et al., 2012; Bouranta and Psomas, 2017; Ooi, 2015; Psomas and Jaca, 2016). Corporate sustainability practices and performance are found to be context dependent (Maletič et al. 2018; Savino and Shafiq, 2018). Heck and Marcoulides (1989) stressed the importance of situational variables related to the organizational size in determining administrative decision making processes.

To date contingency-based IMS research is evolving, particularly in terms of location (Simon and Douglas, 2013), sector and size (Salomone, 2008; Savino and Batbaatar, 2015). Integration patterns have been explored across countries (Bernardo et al., 2018; Bernardo et al., 2017; Salomone, 2008; Simon and Douglas, 2013). Other IMS researchers adopted a contingency approach and have unveiled integrated audit as a key IMS resource for Small and Medium Enterprises (Savino and Batbaatar, 2015). The IMS contingency factors that are identified in extant relevant literature include: industry sector or activity (Lopéz-Fresno, 2010; Manzanera et al., 2014), company size (Tsai et al., 2009) and IMS “age”. Garengo and Biazzo (2013) recognize the characteristics that differentiate small and medium from large enterprises in adopting performance measurement and management practices: lack of formalized strategy,

entrepreneurial behaviour considering MS as a constraint to change, limited managerial capacities “fuelled by implicit and context-specific knowledge”, operational focus, limited capital and human resources, and poor understanding and therefore scarce adoption of management tools. Zeng et al. (2011) have introduced the years of IMS implementationas a variable contributing to the IMS benefits. Melnyk et al. (2003) emphasize that the age of the environmental management system, or how long it has been in place, should affect corporate performance and how the firm makes use of environmental options.

A positive relationship exists among less IMS mature companies between size and environmental and social performance (waste reduction, environmental investment, health and safety of employees and consumers, ethics training, legal compliance, supplier selection based on social criteria, development of local communities), whilst there is a negative relationship between size and economic sustainability performance among more mature companies (i.e. the larger the company the less it purchases from local suppliers) (Poltronieri et al., 2019).

Furthermore, to date, there is a paucity of research on the contextual IMS factors. Generally, it is stressed that organizations size and economic sector may condition the decision to integrate systems and the breadth or depth of integration (Jørgensen et al., 2006; Salomone, 2008). Later on, von Ahsen (2014) draws attention to the sector and size potential impact on the IMS benefits and drawbacks. In a similar vein, Savino and Batbaatar (2015) identified relationships of core IMS resources with firm size. The IMS context, as outlined above, generates the following research question:

RQ3: How can the integration of management systems succeed over time?

To address the posited research questions case study method has been considered the most suitablesince it provides answers to the ‘hows’ and ‘whys’ scholars (Yin, 2003). Case research methodology is described in the following chapter of this thesis.

3.2 Single case approach

This thesis uses single cases to study in depth the integration of MSs in the long-term in a real-life business context and to answer the aforementioned questions. An IMS includes a broad range of interrelated processes that must be planned, implemented, verified and revisited. Therefore, the case study research approach is used since it enables the understanding of such a

complex phenomenon through direct observation in a natural setting without experimental control or manipulations considering both temporal and contextual dimensions (Meredith, 1998). Moreover, "case studies have been done about decisions, programs, the implementation process, and organizational change" (Yin, 2003).

A single case is considered appropriate for processing sufficient levels of data over a long period of time (Eisenhardt and Graebner, 2007; Voss et al., 2002; Yin, 2003). Furthermore, scholars claim that a fewer number of cases provide a greater opportunity for in-depth observations (Voss et al., 2002). Although there is an ongoing debate over whether case studies can be "persuasive" (Siggelkow, 2007), it is gradually recognized that case studies bring more clarity and rigor to theory building and testing (Barratt et al., 2011; Ketokivi and Choi, 2014). A single case may be a powerful example and can be expanded to more firms through illustrating its conceptual background (Siggelkow, 2007).

The external validity, otherwise called generalizability, of a single case is doubted by certain academics (Bryman and Bell, 2007:63,410; Saunders et al., 2009:158). However, it is stressed by other researchers that case study enables the analytic, not the statistical, generalization of its findings (Yin, 2003:32-37) since it involves drawing theoretical propositions to be further tested (Jupp, 2006:21). Bearing this in mind, this research was designed and carried out to gather as many relevant data as possible guided by the research questions in order to be able to gain insight into the complex background of the case IMS and identify the mechanisms that connect causes and effects or, in other words, to balance the "contextual idiosyncrasy" with an examination of the more general theoretical implications (Ketokivi and Choi, 2014). The internal validity of the case is assured by making inferences and comparing the empirically observed patterns to the ones identified in prior research (Eisenhardt and Graebner, 2007; Yin, 2003). In respect with the research questions posed in this study the unit of analysis is the organization's IMS.

3.2.1 Data collection

Data was drawn from multiple sources, i.e. interviews, records and direct observations on-site "encouraging convergent lines of inquiry" to ensure construct validity (Saunders et al., 2009:68; Yin, 2003:36). To assure reliability (Miles and Huberman, 1994:278; Yin, 2003:34-36) an interview protocol was designed in a semi-structured form and includes questions related to the

motives, level, approach, performance, benefits, difficulties, audits, performance (see Table 3.1). The interview pattern was based on the protocol elaborated by Asif et al. (2010a), since, firstly, it has already been applied in studying IMS cases, and, secondly, it includes questions for employees of different ranks, and, thus, reduces "elite" bias (Miles and Huberman, 1994:266). Furthermore, using existing questions is a recommended practice that enables comparability of results (Bryman and Bell, 2007:274). The researchers used prompts to direct the conversation and to keep the interview focused on the research topic. To ensure that the research framework was made clear to the interviewees and valid answers would be obtained, a set of initial questions was posed with regard to the purpose of the study, the interview procedure, and the overall research content. Moreover, an additional set of questions was formed to capture the consultants' perspective. Interviewees were urged to expand on the topics. Most of the employees that participated in the research worked in the company for many years. Hence, they were aware of the operations before and after the integration took place. Triangulation of data was pursued through the on-site observations and the IMS documentation comprising the IMS manual, written procedures, work instructions, archives and records, and concluded to convergence of evidence (Yin, 2003:97-99). Interviews and observations data was collected by taking notes. Field notes were typed up after each visit. Data was filtered by relevance to the unit of analysis and pertinent elements were grouped according to the IMS features identified in literature, such as level, strategy, approach, motives, difficulties, audits, performance. Repeated contacts by phone or e-mail were needed to confirm the chain of evidence. The steps of the case study are depicted in Figure 3.1.

Table 3.1 Interview protocol

Interview protocol for managers
• Why did you decide to integrate? • Which elements / processes of your management systems are integrated? • What guidelines / models / tools did you apply for the integration? • What guidelines / models / tools do you apply for the implementation of the IMS? • What are the benefits perceived during and after the establishment of the IMS? • What are the difficulties encountered during and after the establishment of the IMS? • How is IMS performance measured?

- How is QMS performance measured?
- How is EMS performance measured?
- Are you aware of the ISO 19011 auditing guidelines?
- Do you perform integrated audits? Why?
- What are the reasons for keeping/leaving the IMS?

Interview protocol for medium- and low-rank employees

- What management systems does your company apply?
- Do you know your company's policy regarding quality, environment, health and safety?
- What training programs did you take part in?
- What is your contribution in the management systems' implementation?
- Are you informed of management review's minutes?
- What benefits / difficulties in your work come from integration?
- Did you notice any change in your working conditions during/after the introduction of the IMS?
- Why in your opinion did integration succeed/fail?

Interview protocol for consultants

- How did you integrate? What guidelines, methods and/or tools did you apply?
- What positive or negative forces did you encounter during integration?
- Did you advise management to assess performance of QMS/EMS/IMS?
- Which performance assessment method did you propose/apply?
- Did you advise management to perform internal/external integrated audits?

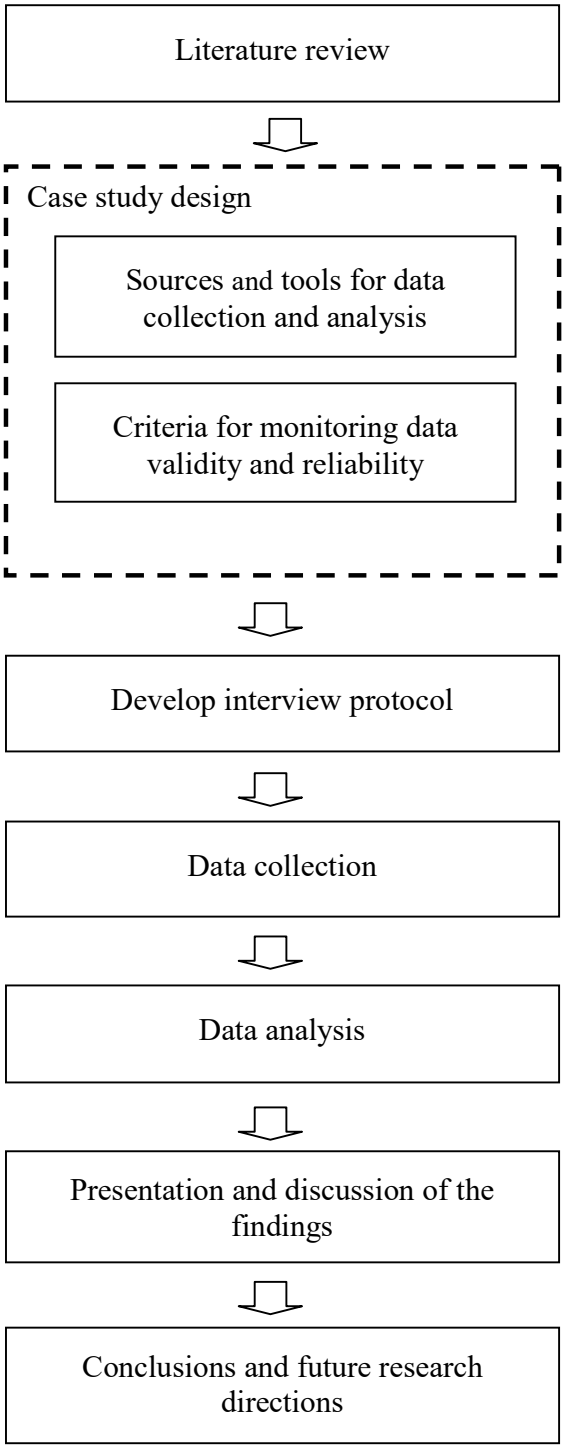


Figure 3.1 Case research stages (Adapted from Satolo et al., 2013)

Construct validity reflects the extent to which a study investigates what it claimsto investigate, or in other words, the achieved level of reality's accurate observation (Gibbert and Ruigrok, 2010). Thus, within this research framework construct validity is assured via triangulation of methodological perspectives and the establishment of a clear chain of evidence (Yin, 2003). The internal validity of this research is defended through making inferences and juxtaposing the empirically observed patterns to the ones identified in prior research (Eisenhardt and Graebner, 2007; Yin, 2003). Regarding the external validity of this research, it should be noted that case research aims at the analytic, not the statistical, generalization of its findings by investigating "decisions, programs, the implementation process, and the organizational change" (Yin, 2003).

3.3 A case of IMS abandonment

The firm is a medium-sized enterprise of 80 employees that has specialized in finishing garments for more than 25 years. To protect confidentiality the name of the firm is not disclosed. The firm's IMS is described based on the collected data, which is classified according to the integration features, i.e. motives, strategy, level, approach, audits and constrints, as explained in the literature review section.

The firm is a subcontractor for garment producers. Sewn garments are treated according to the clients' specifications. The treatment process demands an excessive use of resources, such as water, energy, and treating agents, and releases wastewater. Top management focusing on continuous improvement, mainly as regards the resources and effluents management, pursues opportunities for investment and research projects. As such, a state-funded project subsidized the supply of equipment for the restructuring of the wastewater treatment plant. Both the quality and the environmental management systems were prerequisites in this project. The case is analyzed in the following paragraphs based on the attributes of the IMS as identified through the literature review.

Integration motives

The organization developed an integrated quality and environmental management system with the aid of two consultants. One of the motives to integrate was the enhanced compatibility of the

adopted ISO 9001 standard and EMAS regulation. As reported, at the time of the IMS development the revised version of EMAS regulation was issued having the ISO 14001 standard requirements incorporated. The integration process was further enabled by the top management through its commitment - as declared with the IMS policy document and corroborated by the interview data and the management review records - and by the consultants through their confirmed awareness and willingness to collaborate.

Integration strategy and degree

The QMS was already in place when the firm decided on integration. However, it had to be updated to comply with the revised ISO 9001 (2000) standard's requirements. On the other hand, the EMS had to be developed from scratch. Hence, the integration sequence corresponds to a hybrid of the "QMS first, EMS second" and "QMS and EMS simultaneously" strategies as identified in literature.

A detailed analysis of common elements and process mapping were used for the IMS to be formed. To establish the common procedures, it was necessary to identify the corresponding elements of the ISO 9001 standard paragraphs and the EMAS regulation appendix comprising the ISO 14001 standard requirements. The degree of integration corresponds to the "integrating" level according to the BSI classification. Interchangeably, using a three-level scale (Bernardo et al., 2012) a partial integration is achieved, since only some components of the two MSs are integrated.

Integration of documentation and audits

Common elements, such as the manual, the quality and environmental policy, the management review procedures, records and document control, internal audits, suppliers' selection and evaluation, and job descriptions and work instructions, were identified and jointly written down. The training procedure was part of the human resources process for the ISO 9001-compliant QMS. EMS training was incorporated in the same process. Environmental legislation record-keeping, identification of environmental aspects, environmental impacts assessment, and environmental planning (Fig. 3.2) were included in the documentation with the other procedures and processes.

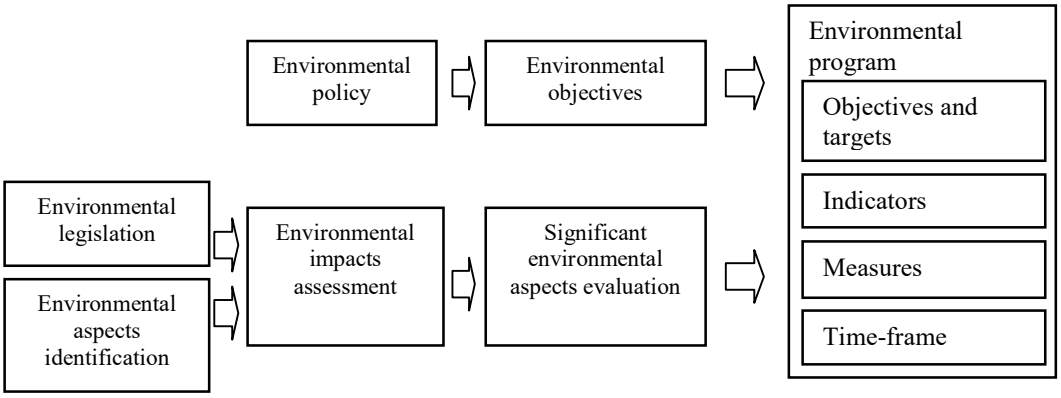


Figure 3.2 Environmental management planning process

A training session was arranged upon completion of the documentation divided into two sub-courses, one for the quality and one for the environmental management system. Key employees, including the production manager, the person in charge for maintenance, an accounting department employee responsible for the supply of raw and auxiliary materials, and the human resources manager attended the courses. Next, the trained employees conducted the internal audits and traced certain non-conformities that were considered and discussed during the management review. Preventive and corrective actions were planned and executed. For the initial certification both the internal and the external (third-party) audits were conducted by different auditors and in distinct time-tables. The implementation steps are depicted by the following waterfall model (Fig. 3.3).

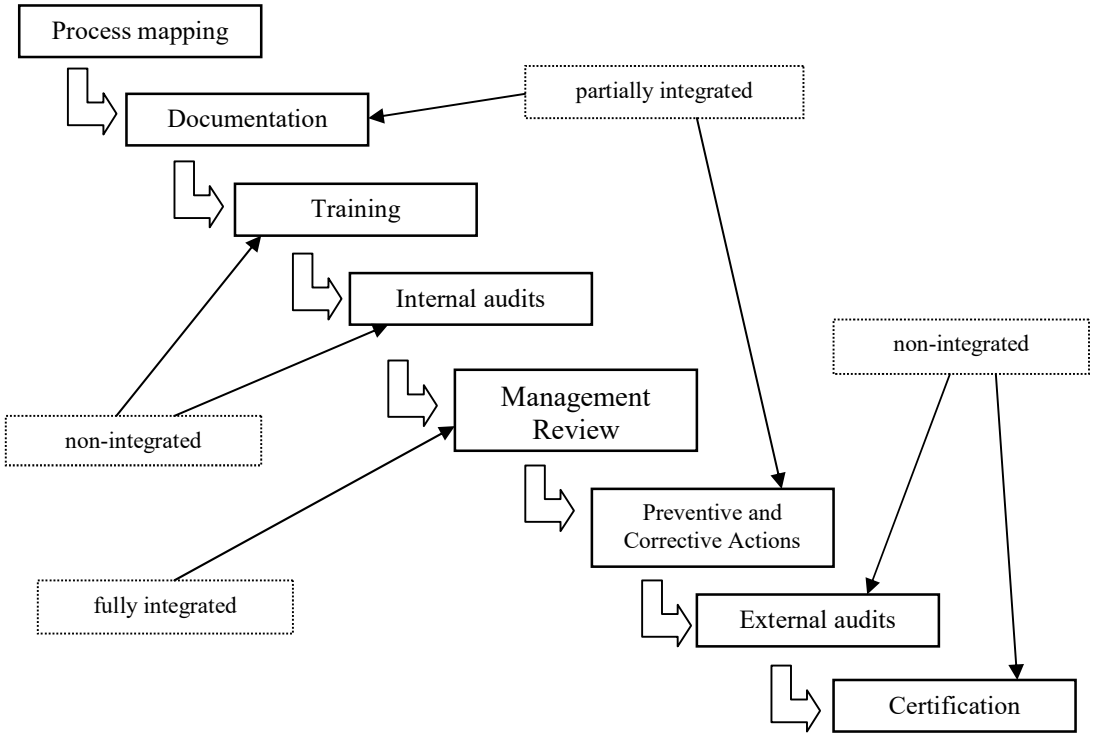


Figure 3.3 IMS development process

In the following subsection the first research question is answered on the way integration evolved.

IMS evolution

The IMS lead time was nine months. In the years that followed the initial certification, the IMS maintenance and improvement was challenged. According to the employees and the system's records the IMS procedures were performed separately even though they were jointly documented. Hence, at the third annual management review the feasibility of the integrated management system was on the table. In the review's minutes it was recorded that, the QMS was seen as a costly bureaucratic mechanism whilst the EMS was evaluated positively for its contribution to ensuring legal compliance and satisfying stakeholders. This divergence led the firm to withdraw from QMS certification. Since the decision was made, all the documentation

was revised to exclude the bureaucratic burden of the QMS component and the IMS turned into an EMS.

In the following years, the EMS, on the one hand, improved following the regulation's guidelines and the auditors' remarks. In this context, environmental impacts are evaluated based on weighted criteria, such as severity of impact to humans, ecosystem and legal compliance, both regularly and occasionally, when modifications in processes or equipment may affect their significance, as in the case of the replacement of oil by natural gas as energy source. Moreover, when the revised EMAS regulation entered into force (2010), the organization adopted sustainability indicators, such as land coverage (biodiversity) and greenhouse gas emissions. QMS, on the other hand, is claimed to be still in place, but in a tailored, uncertified form. As the firm's production manager stated, the company continues to run its own "quality system" based on a software program linked to a barcode system, which marks each incoming lot with a unique number, ensuring traceability and production quality control. Furthermore, the case-organization is primarily a sub-contractor for multi-national companies, which occasionally perform second-party audits. According to the top management, the internal and second-party audits are sufficient for the quality auditing needs. As regards the external environment, senior executives seem convinced that further integration efforts are not necessary, since EMAS registration and the clients' quality audits are considered enough to maintain the firm's position in the market.

Integration constraints

This subsection will aid in answering the second research question, by addressing the difficulties encountered and the causes of integration failure in the company.

Lack of human resources

The lack of human resources was one reason reported for the IMS malfunction. The employee appointed by the administration as the Quality and Environmental (QE) manager was also the ironing department supervisor. Moreover, the quality management (QM) consultant terminated the collaboration with the company some months after the certification. The QE manager's inadequate training and skills and the lack of outsourced QM support were identified as the main causes of the low performing QMS. In contrast to the quality component's limited resources, the environmental component of the IMS was supported by a team comprising a technical expert to supervise the wastewater treatment plant, an environmental management consultant, and a health

and safety engineer. The outsourced experts assisted the QE manager in handling all the aspects of the organization's activities that interacted with the environment.

Inadequate training

As regards the training, when interviewed, medium-level employees claimed that they attended an initial course on management systems and had additional information when needed by contacting the external consultants. Low-level employees had no training officially recorded (employees' training records). The training sessions that are arranged twice a year by the safety engineer are limited to health and safety issues. Furthermore, the firm's managers, when asked, were unaware of the ISO 19011 guidelines for quality and environmental management systems auditing.

Non-integrated audits

The interviewees corroborated the records' evidence that throughout the IMS implementation time both the internal and the external audits remained non-integrated. The QM audits aimed at simply verifying compliance with the ISO 9001 standard requirements without assessing the effectiveness of the quality system to meet quality objectives. As regards EMAS, the need to validate an annual Environmental Declaration led both the auditor and the auditee to conduct performance-oriented environmental audits. Thus, the EMS's internal and external audits were performed efficiently and effectively according to the management review archives and the auditor's performance sheets. It became evident by the interviewees that the possibility of an integrated audit was never contemplated.

Top management's commitment withdrawal

Top management withdrew its commitment to the IMS, when it decided not to undergo a second three-year certification audit cycle for the QMS. In fact, there was no shift in this decision even when the next revisions of the ISO 9001 standard and the EMAS regulation entered into force and the reinstatement of the integrated management system was back on the table. As the medium- and low- rank employees stated, without top management's commitment there was no way that the IMS could be kept in place.

Integration performance

Going through the IMS records it became clear that the EMS performance was regularly assessed through indicators and targets. Environmental planning defined the appropriate measures to fulfill certain objectives in a particular time frame. The environmental program was audited both internally and externally. For the environmental statement to be validated, all of the relevant records (e.g., legislation, solid, liquid, air waste measurement sheets, lab test results, recycling rates, and waste disposal invoices) had to be audited, as well. Thus, the annual results provided the top executives with processed data that were useful when communicating with the authorities and other stakeholders. Conversely, QMS performance was poorly evaluated. QM-related issues, such as defective item returns and customer complaints were handled directly by the top management. QM documents, such as the non-conformity reports, seemed typically filled out including only minor misinterpretations of the quality system record keeping. Moreover, in the yearly reviews minutes no conclusion was drawn toward the improvement of the QMS.

Discussion

The case study findings are discussed in the following paragraphs to shed light on the underlying mechanisms that relate the IMS's longitudinal evolution and the root causes of its "apoptosis".

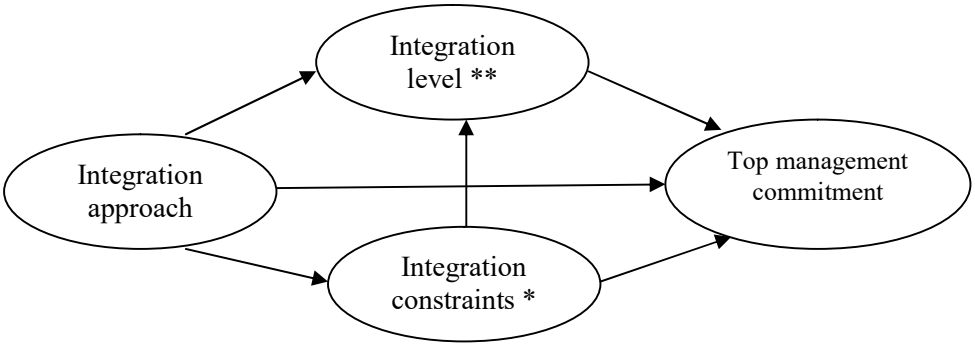
As regards the strategy employed, it would be expected that QMS and EMS were established concurrently, since both the quality and the environmental dimensions were considered equally important for the company's market position and the legitimacy of its business activities. A "pure" simultaneous strategy would have enabled synergy effects from the start (Karapetrovic, 2002). However, the sequence of implementation followed partly the timely evolution of the standards and partly the significance level of the two dimensions. This "mixed" strategy rather conditioned the integration approach, since previous experience on the non-process based ISO 9001 standard's former version was more of a drawback.

Considering the integration level of the IMS it was found that it did not improve throughout the implementation period, which contradicts with the dynamic nature of integration (Karapetrovic, 2003; Rocha et al., 2007). The integration process was based on the common elements and,

hence, corresponds to the reactive "techno-centric" approach, as identified by Asif et al. (2010a). It is stressed that an approach of the kind yields benefits mainly at the operational level, whilst maximum benefits are achieved by using a systems approach (Asif et al., 2010a). Eventually, the company chose not to integrate any more, in line with the "polarization" effect found by Simon et al. (2012a), according to which companies that have a partly integrated MS tend to either fully integrate or give up the IMS completely in the long-term.

It became evident that top management's commitment withdrawal had the major impact to the IMS abandonment. Sampaio et al. (2012) have already stressed the need for "sustainable" top management commitment. However, what seemed inconsistent in this case was that top management was found to be highly motivated and actively involved in the integration process at the beginning. This finding is supported by the fact that the resource-intensive EMS is still in place. Hence, the analysis went further into the potential hidden interactions to determine the deeper reasons for the commitment's withdrawal. The related factors that have driven top management to reject the IMS are found to be the approach and level of integration.

The findings underline that the integration level and the constraints encountered in the long-term were conditioned by the integration approach originally adopted by the organization. Had top management focused on the strategic dimension of the IMS by applying a proactive systems approach, instead of the techno-centric one, all stakeholders would have been involved, and long-term benefits would have been achieved, in line with Asif et al. (2010a). As a result, the integration level would have improved in the years that followed the initial development of the unified system. In this context, constraints, such as the lack of human resources and training, would have been adequately addressed. Therefore, noting the firm's internal motivation to integrate and the initial high commitment level, it can be safely concluded that the top management would have renewed its commitment to the IMS if the involved parties' attention were drawn to the aforementioned factors in a timely manner. The underlying relations that were investigated are illustrated in Figure 3.4.



(*): constraints encountered in the post IMS establishment period
(**): level modification over the years of IMS implementation

Figure 3.4 Investigation of IMS interdependencies in the long-term

Following the case line of inquiry, the imbalanced evolution of the IMS components was also recognized as a potential risk in the integration process, as supported by scholars (Jørgensen, 2006; Salomone, 2008). In this case, the company had, on the one hand, a QMS that merely complied with the standard's requirements and passed the certification audit. Hence, the managers misperceived the resulting bureaucratic structure as the only possible way to adopt the ISO 9001 standard. On the other hand, the EMS was continuously improving with its outcomes being assessed through key performance indicators (KPIs), environmental planning, auditing and environmental impacts rating (Zhao et al., 2006) in order to monitor and mitigate degradation effects, such as groundwater pollution and water resources depletion (Chau, 2007). However, this "know-how" of the environmental dimension was not disseminated to the IMS quality dimension to create an IMS performance management sub-system, as emphasized in the literature review (Karapetrovic and Jonker, 2003; Karapetrovic and Willborn, 1998a; Sampaio et al., 2012). Instead, a "ranking system" (Jørgensen, 2006) was formed that prioritized environmental issues over quality concerns.

In this case the IMS was "trapped in a controlled bureaucracy with limited effectiveness", which is highlighted as a potential cause for quitting (Asif et al., 2009; Matias and Coelho, 2002; Zeng et al., 2007). Compliance auditing, which was performed in the quality dimension, is a common

practice and has been emphasized as a factor for poor MS performance (see, e.g., Power and Terziovski, 2007; Wilkinson and Dale, 1998a). Since the value of the certified QMS was disproportionate to its certification cost the organization "downsized" it to a customized, non-certified QMS. The QMS decline is partly attributed to the "decertification" trend emphasized in prior research (Casadesús et al., 2008; Heras-Saizarbitoria, 2011; Karapetrovic et al., 2010) and partly to the lack of an auditable international IMS standard, which is one of the encountered integration constraints (Bernardo et al., 2012). Furthermore, non-integrated audits were an additional factor that held the two IMS components apart, in line with prior research (Bernardo et al., 2011a; Simon et al., 2011). All parties involved showed a low level of awareness and maturity in implementing the IMS auditing process, in compliance with similar research (Beckmerhagen et al., 2003a; Searcy et al., 2012).

Case conclusions

This case study followed the path engraved by the literature findings in order to answer the research questions aiming to gain insight into the case IMS which was compromised over time. While investigating how the IMS evolved, which was the first research question, the case analysis focused on the imbalanced performance of the integrated system's components. As shown above, synergies did not prevail in the integration of the two discipline-specific MSs, as it would be expected in the case of a successful integration (e.g., Casadesús et al., 2011; Zeng et al., 2007). It has become evident through this case study that in order for an integrated system to be sustainable, multiple MSs should act complementary wherever possible. More specifically, performance-oriented management and integrated auditing are recognized as key processes that could lead the IMS components to a higher level of fusion. Since these key processes were not applied, what was originally a merged system gradually faded into a two-level multiple MS. Therefore, managers and auditors are urged to manage and audit in an integrated manner to sustain the IMS.

Aiming to answer the second research question concerning the reasons for the IMS abandonment, it is concluded that the integration approach originally adopted was principally responsible for the IMS "apoptosis". It is revealed that the integration level and the constraints

encountered in the post-establishment period were conditioned by the integration approach. Not rising to the occasion, top management was unable to detect and address the root decline cause and, consequently, lost its appreciation to the IMS. By using the case research method the empirical context with its peculiarity acted as a means to seek theoretical generality. Thus, the hidden causal interdependencies have been brought to surface and, it became evident that, when the strategic perspective of the IMS is missing or undervalued, the sustainability of the system is at stake. Therefore, this research provides useful insights in order to stress the need for both scholars and practitioners to coordinate their efforts in a proactive way. The lessons learned from this case can be used to other business settings, in the planning, checking and acting phases of the IMS so that disintegration risks are identified in time and addressed effectively. Furthermore, this case analysis brings to light the potential long-term impact of the adopted integration approach to the top management commitment and the intervening variables. Thus, future research needs to focus on under-researched integration topics, such as the interaction between the integration approach and the level of integration over the long-term.

3.4 A successful IMS case

The case company is a small dairy mill processing around 25 tons of milk per week. The company is currently certified to the ISO 9001:2008 and the ISO 22000:2005 standards. Its products are certified by AGROCERT, which is the national standardisation and certification body for agricultural products and processes.

A total of nine participants provided data input. The profiles of the interviewees are summarized in Table 3.2. In terms of their MS experience, six of the interview participants had more than five years' MS experience, while the remaining participants had MS experience of one to four years. Senior management interviews (n=2) lasted approximately 60-90 minutes and middle/low-level management interviews (n=7) lasted approximately 30–45 minutes. Relevant literature review findings also facilitated the data collection phase.

Table 3.2 Interviewees' profile

Code No	Position in the company	Years of MS experience	Role in the IMS / decision level
1	Medium-level (production) manager	12	Food safety and quality control manager / tactical
2	Senior manager (Assistant director)	6	FSMS-QMS manager / strategic
3	Senior manager (Director)	15	IMS manager / strategic
4	Shop-floor employee	2	Food operations
5	Shop-floor employee	8	Food safety and quality / operational
6	Driver	2	Food operations
7	Administration employee	4	IMS maintenance / operational
8	Administration & production (packaging) control	7	IMS maintenance & food operations control / tactical
9	Production manager assistant	9	Quality control – food safety operations/ operational-tactical

The interviews' and observations' data was collected through taking notes while the information was filtered by relevance to the IMS features. Repeated contact with the company by phone and e-mails was additionally used to clarify any points that were missed during the visits. The interview discussions were transcribed into text and analysed with the techniques of qualitative content analysis. Literature background on technical and managerial topics related to the case

was reviewed in order to avoid any possible misinterpretations and, hence, to increase validity of data (Maxwell, 2005). Documentary evidence is used to supplement the data gathered via interviews and fieldwork (Myers, 2008).

Case findings

Integration scope and strategy

The owner's expertise in the food sector and, particularly, in the quality management field was the critical factor for the top management's commitment to the quality and food safety management systems. Both the top management and the employees confirm that the firm's culture and the operating conditions have been quality-oriented since the ownership transition. Hence, quality management is considered of strategic importance for the firm and, as expected, the QMS was found to be implemented and certified first. However, the integration of the two systems did not follow the sequence of their implementation. More specifically, the IMS documentation was based on the ISO 22000 standard's requirements. The interviewees attributed this reverse prioritization to the food safety significance and the long established HACCP principles. Moreover, the bureaucratic burden of the FSMS is regarded by the participants as "mandatory", since it is audited by the authorities, as well, whereas QMS's bureaucracy is characterized as "100% voluntary". Case company is certified to both the ISO 9001 and ISO 22000 standards and has already completed two three-year certification cycles. With respect to the scope's expansion top management plans to implement and integrate an environmental management sub-system, since it anticipates to gain competitive advantage by being a front-runner in creating a three-dimensional IMS.

Integration methodology and level

Following prior research, the case IMS advancement level is estimated in terms of objectives, processes and resources. Objectives are fully integrated, as evidenced by the IMS policy document and confirmed by the senior managers. The procedures are integrated based on the common elements of the standards. The employees that were assigned to prepare and keep track of the IMS documents and records were not aware of any externally sourced or customized model adopted to integrate the MSs. Management review is conducted twice a year for the food

safety MS whereas for the quality MS only once a year. As far as the audits are concerned, on the one hand, the internal audits are conducted twice a year by a single team in conformance with the IMS documentation (common manual, common procedure) following a unified plan and producing a single report. On the other hand, the external audits are scheduled by different auditors in different time frames addressing the requirements of the two separate standards. Summarizing, based on the documents, the records and the interviews data the MSs are found partially integrated. Resources are understood in the framework developed by Barney (1991) and adapted from Savino and Batbaatar (2015) as physical (know-how, IT systems and assets, location, proximity to raw materials), human (knowledge, experience, relationships), and organizational (structure, systems, operations). The resource integration level is analyzed in the following paragraphs.

Integration of audits

As mentioned above, the internal audits are performed jointly for both systems. More specifically, the auditing team, the timetable, the process and the reports were unified. Particular importance was given to the IMS training. Quoting shop-floor employees: "*we attended training courses and devoted time during our working hours to familiarize with the integration concept*". Medium-level managers confirmed that "*training concentrated on the understanding of the two MSs as a single, dynamic system identifying challenges, synergies, and opportunities for improvement*". With regard to the external audits, top management reported that the agri-food authorities, being unfamiliar with integration, acknowledged the merging of food safety with quality principles as a source of risk shifting focus and weakening the efficiency and effectiveness of the food safety processes. Thus, the IMS triggered more frequent and intensive audits. In addition, the multiple public auditing bodies that share responsibilities in the agri-food chain are found to detect conflicted non-conformities. In this context, multiple flowcharts of the same processes are included in the system's records to comply with the contradicting requirements. In general, it is clear that the company needs to respond reactively to the governmental audits, since continuous improvement actions often prove far apart from the authorities' perspective.

Integration of human resources

The IMS documentation is updated by two appointed administration employees. All related documents are collected and processed on a weekly basis. The procurement and production personnel operate quality and food safety tasks in an integrated way following the respective integrated work instructions. The production manager is assigned the responsibilities of the quality and food safety manager, as well. The IMS manager reported that because of the work overload the IMS performance is not properly assessed. Moreover, certain MS standards principles, such as continuous improvement, are not adequately addressed either due to lack of expertise or lack of time. According to the top (senior) managers, the IMS-oriented organizational culture fosters the development of specific employees' skills -keeping the employee turnover ratio low -to counterweigh the limited available resources. However, drawing from the collected data it is substantiated that the lack of a dedicated human resource department maintains internal communication at an informal level and, hence, impedes the evaluation of the employees' improvement needs and satisfaction.

Benefits and difficulties

The interviewees reported better understanding of the processes, improved internal communication and organizational structure, and enhanced corporate image. With regard to integration barriers, when inquired about the possibility of embedding the environmental MS into the quality-food safety IMS, the executives highlighted the limited resources and the lack of state funding as the main withholding factors. In general, senior executives perceive that the IMS performs at a high level. However, they were not able to provide any supporting evidence. Moreover, any relative documentation was missing to substantiate quantified IMS results.

Food traceability

In the framework of a state-subsidized project, a barcode traceability system was installed with the aid of an IT consultant. This system was acknowledged as a major improvement step by both the executives and the shop-floor employees having replaced a huge amount of paperwork by an electronic data base. The resulting tracing of batches of milk and other raw materials made processes more transparent and established trust with the authorities. It is worth noting that this measure was initially considered a cause for production slowdown, since it not only required the

adoption of a different perspective in collecting information but had to be accompanied by precise identification of tracking nodes backwards to the bulk milk production, as well. The installed traceability system was seen as a means to manage not only food safety, but quality, as well. For instance, the production manager, who is also food safety and quality control manager, identified the food traceability system as an opportunity to control the quality of the packaging material coming from different suppliers.

Integration of the environmental management system

Currently, the highly saline organic waste flows directly to the wastewater treatment plant. According to the interviewees the waste treatment is proven inadequate to handle the specific load and properties of the wastewater. Top management traced several problems in the operation of the waste treatment that range from the original design of the treatment plant to the input of waste. Measures, such as reuse through condensation, recycling, and modifications in the plant are recognized as potential mitigation solutions. However, senior managers emphasize that the cost of equipment, transportation and operation impedes the improvement measures due to the small size of the company and the current economic situation.

A view of the firm operations is provided in the following figure (Fig. 3.5) depicting the inputs, the management and production processes and the outputs of the dairy plant. It is evidenced, that the internal production processes are already managed within the established integrated quality and food safety MS. Moreover, raw materials are introduced into the production line through the input management processes. Outputs are forwarded to the next links of the supply chain through the dedicated management processes of the established IMS. The interactions of the firm's activities with the environment are also charted. Energy, water and packaging resources need to be managed by the environmental dimension of the "evolved" IMS. Moreover, the environmental impacts of the plant's by-products and waste are expected to be mitigated within the "evolved" IMS, as well.

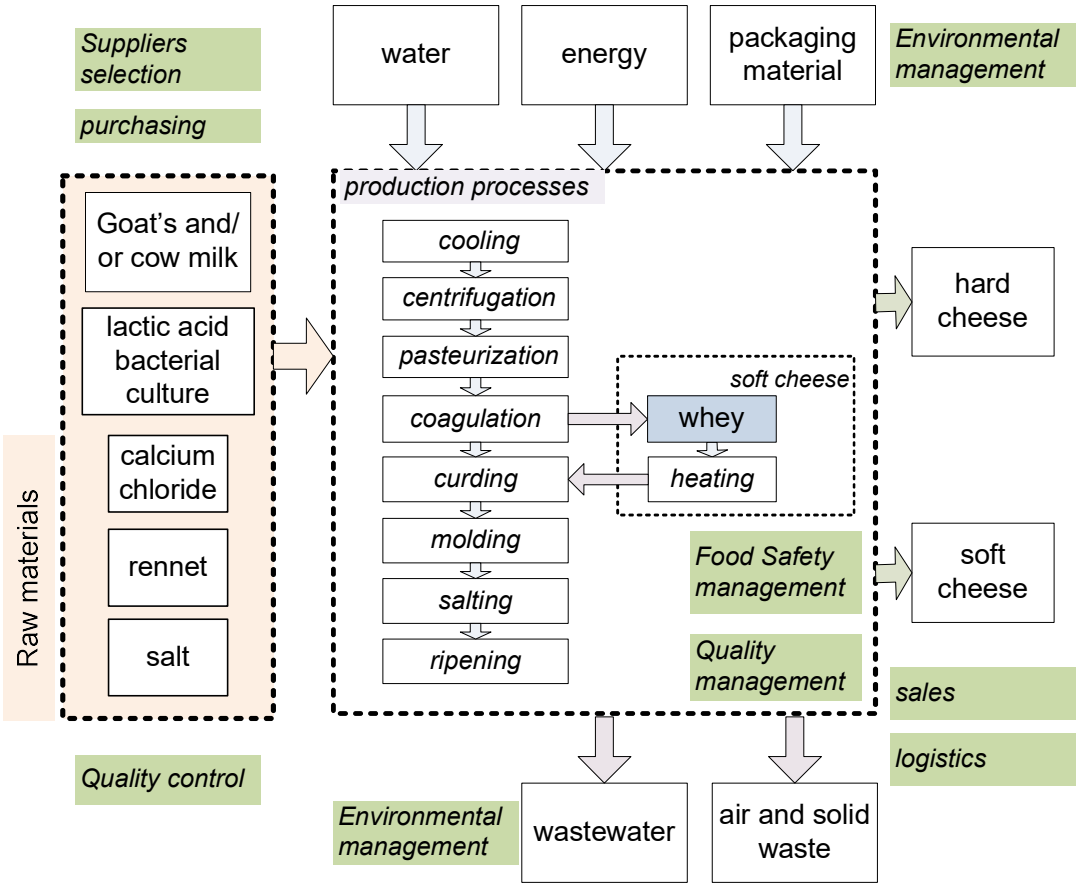


Figure 3.5 Dairy plant: inputs, processes, outputs

Compiling the case findings, most of the IMS features areto some extent contingent on the food sector and/or the small size of the company. Table 3.3 summarizes sector and size effects on the case IMS features.

Discussion

The shift in culture and operations, which followed the proprietorship transition in this case, is supported by prior research findings of quality and food safety management limitations due to family-ownership in dairy plants (Karaman *et al.*, 2012; Vladimirov, 2011). Top management commitment is identified as the primary integration driver, in line with pertinent research (Sampaio *et al.*, 2012). Moreover, corporate management culture encompassing innovation and

the anticipation to gain competitive advantage motivated the firm to integrate, as elsewhere highlighted (Simon and Petnji Yaya, 2012; Wagner, 2009).

In this case the integration pattern is found identical to the most common as identified in literature, i.e. "QMS first and then other MSs" (Karapetrovic, 2002). However, sector specific prior experience and familiarity of the firm with the HACCP framework made it easier for the ISO 22000 standard to be used as the IMS foundation instead for the ISO 9001 standard. The fact that both standards follow the process approach made the two components of the IMS fully compatible and fusible. However, compatibility issues may arise with the adoption of the ISO 14001 standard, since this is based on the PDCA cycle (Karapetrovic, 2003). The IMS maturity (Domingues *et al*., 2014; Zeng *et al*., 2011) measured by continuing MS certification and sustained top management commitment is expected to overcome such drawbacks.

Table 3.3 IMS contingencies in a small food organization

IMS features	Description	Sector effect	Size effect
Scope and strategy	FSMS first – QMS second	Food safety is of top priority. Regulatory and institutional enforcement of food safety requirements	No size differentiation found.
Integration level	MSs partially integrated (single policy and manual, separate management reviews, semi-integrated procedures)	Focus on food safety management Food traceability identified as MS linking factor	Limited resources and less need to integrate certain procedures, due to small scale.
Audits	Internal audits fully integrated External audits non-integrated	Lack of skilled food safety and quality IMS auditors Lack of IMS knowledge by food state authorities	Internal positive effect: Less employees - easier coordination, multi-tasking Internal negative effect: lack of audit training resources
Human resources	Fully integrated (single food safety-quality manager)	Food industry requires high technical and knowledge expertise.	Multiple tasks assigned to a single employee due to limited resources (small firm) Lack of a human resource department
Physical resources	Non-integrated	Food traceability IT and knowhow demand	Outsourcing
Operational resources	Non-integrated	Food-specific operations, high-load waste treatment cost	Resource short-comings due to firm size limitations (lack of pollution control equipment and limited maintenance investments)

Motives	External and internal	External: mandatory compliance with food regulations and standardized requirements	External: Stakeholder pressure lower in small firms. Internal: IMS culture more easily diffused within small organizations.
Benefits	Improved food traceability Improved environmental perspective	IMS perspective enhances food traceability Integrated managerial view of inputs-processes-outputs highlights IMS benefits in food companies	IMS within and across firms enhances supply chain perspective and, hence, fosters cross-firm synergies and economies of scale.
Difficulties	Bureaucratic burden	Red tape procedures and legislation are strict on food companies and increase audit complexity	Environmental MS integration postponed due to size limitations (limited resources)

The integration method seems to be operations-oriented, since the documentation is based on the common elements of the standards. Yet, the IMS improvement actions are based on decisions taken at the strategic level and aimed at addressing both the internal weak points and stakeholder needs. This indicates a holistic view of the IMS, which is ensured by a strategic systems approach in compliance with prior research (Asif *et al.*, 2010). However, there are certain weak points that need to be addressed, such as the reactive approach to the authorities' post-audit requirements.

Human resources

As far as the human resources are concerned, it seems that in this case - in contrast to prior research findings (Karapetrovic, 2002; Renzi and Capelli, 2000) - middle management is also integrated. However, this is not considered as an indicator of a higher integration level, since it was attributed to the limited available human resources. In other words, in the company under study, due to its small size, many different tasks are appointed to a single person.

Apart from the lack of human resources, limitations in other resources, such as time and cost for the IMS adoption and training, are among the integration barriers encountered, in line with prior research (Simon *et al*., 2012a). Moreover, in this case, the low level of integration awareness by the regulatory authorities appears to have caused a bureaucratic burden to the company being obliged to deal with conflicted audits. Furthermore, having to reach out for help to solve the

traceability problem the company faced size-related barriers, that all boil down to limited resources.

This understanding, along with the positive experience gained by the outsourcing, may contribute to the successful implementation of the next integration step. In line with prior research (Claver *et al*., 2007; Grekova *et al*., 2014), it is found, also in this case, that environmental management requires legislative and technical knowledge background and expertise that a small company has to outsource, probably in cooperation with other food processors.

Environment

Particularly in the food sector, environmental management has become part of the food safety and quality agenda, due to the impact of pesticides, nitrogen and phosphate concentration in water and soil to both food safety and the environment (Grekova et al., 2014). The integration of the EMS into the Performance Management System (PMS) using the Balanced Scorecard (BSC) in a large food manufacturing firm shows how the environmental standard may assist to the performance appraisal by applying integration principles (Länsiluoto and Järvenpää, 2012). Nestlé factories use a TQM framework complemented by environmental and social performance aspects to evaluate the quality, safety, cost, flexibility and sustainability of suppliers' processes (Hamprecht et al., 2005).

Food processing across the agri-food chain interacts with the environment in many ways, such as the consumption of resources and the production of waste. However, many food manufacturers show a low perception level of their activities' impact on the environment, mainly due to the lack of environmental knowledge and awareness and the confusion between hygienic and environmental management practices (Massoud et al., 2010). Djekic et al. (2014) studied seven Serbian dairy plants and found only one of them with an environmental MS in place.

Dairy factories consume water and energy and produce large amounts of wastewater with a high organic load (González-García et al., 2013; Lagodimos et al., 2007). Potential environmental problems of cheese making result from the lack of a managing system for the whey, part of which is removed and substituted by warm water during curd washing, and in a lesser extent, from brine used in the salting step (Ferragut and Trujillo, 2008). Boudouropoulos and Arvanitoyannis (1999) predicted a rising ISO 14001 standard uptake in the food industry, since

relative environmental issues, such as wastewater treatment, can be effectively managed by adopting the standard. Moreover, Augustin et al. (2013) claim that "minimizing waste at all points across the entire supply chain will be a hallmark of a sustainable dairy industry in the future".

Regarding health hazards emanating from cheese making being an open process, such as the pathogenic bacteria from raw milk, hygienic conditions of installations must be controlled and adequate personnel training needs to be performed following the Hazard Analysis of Critical Control Points (HACCP) principles (Ferragut and Trujillo, 2008).

As regards the IMS expansion in the case under study, the significance of the environmental impacts is recognized. However, the progress towards the adoption of environmental measures seems rather slow. Certain sector-related barriers are detected, in line with prior research (Claver *et al*., 2007), such as the lack of dairy waste treatment equipment and waste reduction measures, i.e. whey protein reclamation and biogas energy recovery. These shortcomings, given the small company size, need to be addressed via cross-firm synergies (Grekova *et al*., 2014). As such, business networks and logistics outsourcing would enhance quality management and reduce the waste treatment and recycling cost due to economies of scale (Bourlakis *et al*., 2014; Gotzamani *et al*., 2010).

From the institutional perspective, this dairy mill, like all other food organisations, has to comply with different authorities' regulations and satisfy the needs of various stakeholders. In this case, the integrated management approach has proven useful in addressing those diverse requirements in a synergistic way. However, it is evidenced that IMS performance is evaluated in a qualitative, rather perceptive way. In order for the firm to acquire a clear view of the IMS continuous improvement, performance has to be quantified through the setting and monitoring of objectives and indices (Claver *et al.*, 2007; van der Spiegel *et al*., 2005).

In sum, the case company addresses the needs of its customers and food inspection bodies while gradually raising its environmental awareness. However, another significant stakeholder, the employee, seems to be neglected. The harmonized adoption of the occupational health and safety management norm (Occupational Health and Safety Assessment Series - OHSAS 18001:2007) into the existing IMS would enhance its excellence in risk mitigation (Santos *et al.*, 2013). Furthermore, the integration of health and safety, energy and environmental practices may foster

a triple bottom line perspective towards corporate sustainability in the food industry (Olajire, 2012).

Traceability

Food scares nowadays enhance the need for transparency. Moreover, the intense impact of information diffusion assuring health, safety and traceability has led the food processing industry to monitor and record the use of critical substances, such as additives (Ionescu-Somers and Steger, 2008). Food traceability refers to "all stages in the food supply chain so that the product can be checked for safety and quality control, traced upward, and tracked downward at any time required" (Bosona and Gebresenbet, 2013). From the consumers' perspective "traceability helps to build trust, peace of mind, and increase confidence in the food system" (Aung and Chang, 2014). Particularly, regarding dairy products consumers it is stressed that traceability is anticipated to address sustainable development concerns about animal welfare, ethical production methods and environmental issues (Augustin et al., 2013). Zhang et al. (2010) reflect the streamlining of the IMS with traceability when they suggest integrating internal traceability with MSs, meaning food safety (hygiene) management, quality management and environmental management, within a production unit.

As regards traceability in the case under study, the transition from the paper-trailed to the IT-based tracking and tracing system improved productivity and regulatory compliance bridging quality and food safety management aspects. This system may further assist to the tracing of environment-related aspects of food processes, i.e. herbicides used in farming, animal feed, water quality, in line with previous research (Hamprecht *et al.*, 2005; Zhang *et al.*, 2010).

Audit-wise, the case findings underscore the impact of the authorities' audits of compliance to the highly complex food regulatory framework. In this context, voluntary standards' third-party audits seem to work only complementary. Furthermore, the integrated internal audits are unable to assure compliance, since the training and expertise needs of internal auditors are costly and difficult for the company. Thus, the small firm size challenges IMS improvement, in compliance with prior research (Grekova *et al.*, 2014; Karaman *et al.*, 2012; Karipidis *et al.*, 2009; Vladimirov, 2011).

Size of companies

Size seems to influence integration, since small companies have limited internal resources, both financial and human, to adopt food safety, quality and environmental standards (Grekova et al., 2014; Karaman et al., 2012; Vladimirov, 2011). In this vein, Karipidis et al. (2009) propose the release of an intermediary quality management standard to be adopted by small companies. In particular, as regards the wastewater effluent treatment, it is common that small scale cheese mills have no specific equipment for whey processing and, thus, whey stream is sent together with the wastewater for treatment (González-Garcíaet al., 2013). The influence of local business and social structures to small firms is also highlighted (Bourlakis et al., 2014; Grekova et al., 2014). Local sourcing and selling is also linked to the increased profit-margin of micro-manufacturers (Bourlakis et al., 2014). Comparing micro, small and medium-sized firms Bourlakis et al. (2014) contend that small firms excel in sustainability performance. Medium-sized firms are found to be closer to the large firms in terms of environmental practices (Grekova et al., 2014). As regards traceability, it is argued that micro and small food producing and processing companies lack financial capacity, traceability information and knowledge to implement it (Bosona and Gebresenbet, 2013; Bourlakis et al., 2014).

From the environmental perspective, the company under study being fully aware of the dairy effluents' highly polluting load seeks sustainable solution for the management of its waste. This contradicts with the low level of environmental awareness of food manufacturers, particularly of the small ones, which is emphasized by researchers (see e.g. Karaman *et al.*, 2012; Massoud *et al.*, 2010). Regardless of the degree of awareness, additional support is needed for the small food companies, such as the standards "adjustment" depending on firm size (Karipidis *et al.*, 2009), state funding and cross-organizational collaboration (see e.g. Fotopoulos *et al.*, 2010).

Case conclusions and future research directions

In this case the IMS is seen as a means to cope with challenges and sustain. Internal factors, such as the organizational culture and top management commitment, are found to foster IMS towards improving business performance. Certain sector- and size-specific difficulties are met in the audits and resource allocation. Multiple auditors with different levels of IMS awareness and lack in sophisticated corporate know-how and funding are the main difficulties encountered. In addition, food waste asks for costly environmental measures. Prior research suggests that

collaborative initiatives of food companies similar in size and activity address such shortcomings. It is underlined that despite the competitive market conditions, food producers are, like other manufacturers, strongly attached to all upstream and downstream parties along the agri-food supply chain. Integration of management systems within and across organizations may provide the foundation for intra- and inter-organizational relationships. Moreover, certain sector-dependant particularities, as the increased audit complexity and food traceability, are identified in this case study. Furthermore, traceability with and across chain actors – independent of sector or industry - is identified as an IMS catalyst. However, further research from the supply chain perspective would contribute to the understanding of the way this streamlining potential can be exploited.

The case findings may be applied in other business settings, yet with caution. In Greece, where food companies - mostly small and medium-sized - own a big market share, this case provides significant insights for managers to achieve sustainable competitive advantage particularly under the current economic downturn. From a wider perspective, IMS development in the food sector provides an example for different industries to follow and disseminate multiple MS implementation. Firms tend to imitate each other in terms of organizational behavior (Chandler and Hwang, 2015; Lieberman and Asaba, 2006). Furthermore, research on IMS would enhance the understanding of IMS contingencies towards a sustainable IMS improving business performance.

The review of IMS literature and the subsequent analysis of the two cases highlight the lack of theoretical foundation linking integration and corporate sustainability. Therefore, in the next chapter, a conceptual framework is composed including two key constructs, i.e. the internalization of integrated management systems and corporate sustainability performance.

CHAPTER 4. DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK: MAIN RESEARCH HYPOTHESIS AND KEY CONSTRUCTS

4.1 Introduction

In the previous chapters the background review and the exploratory empirical research have emphasized the need for theoretical grounding of the key research concepts in order for further testing of any relationships to be performed. Therefore, in this chapter a systematic literature review is conducted to identify and clarify all relevant concepts and their attributes. Furthermore, management theories pertinent to the key concepts are invoked to enable their operationalization.

From the standardization perspective, certain attempts have partially addressed the complexity of corporate sustainability management (Maletič et al., 2016). The certifiable social accountability (SA 8000) standard is incompatible with the ISO standards structure and fails to address other stakeholders apart from employees and suppliers/subcontractors. Complementary, the non-certifiable ISO 26000 social responsibility guidance encourages firms to communicate with stakeholders and local communities (Botta et al., 2013). The triple-bottom line approach of corporate sustainability (Elkington, 1997) outlines three dimensions that need to be addressed. Drawing upon stakeholder theory corporate sustainability performance can be analysed as perceived by stakeholders depending on their involvement and contribution to firm performance (Gianni et al., 2017; Wiengarten et al., 2017). Following this line of thought, this research operationalizes corporate sustainability performance reviewing relevant literature (see Annex).

In light of the above, this research aims at conceptualizing the identified commonalities and complementarities using theories of the firm. The theories of the firm are invoked in operations management research in order to "provide a perspective for thinking about organisational objectives and a framework for analysing important research problems" (Seth and Thomas, 1994). Institutional theory, resource-based view, natural resource-based view, contractual/agency theory, evolutionary theory, transaction cost, resource dependence theory, stakeholder theory, strategic choice theory and social network theory are included in the sustainability research agenda (Lozano, 2015; Starik and Kanashiro, 2013). Operations management researchers often draw on the institutional, the stakeholder and the resource theories to frame "the response of firms to stakeholder demands" (Wagner, 2015). Institutional theory enables clarifying the

"institutionalisation" of sustainability throughout firm operations (Maletič et al., 2016). Institutional theory and stakeholder theory have been related to study the factors undermining the assimilation of firms within their environment (Martínez et al., 2016; Wagner, 2011). The resource and stakeholder theories are paired to conceptualize corporate social responsibility in operations (Sodhi, 2015). In IMS literature, resource theory has already been used to investigate the impact of IMS resources on the operational performance of the firm (Savino and Batbaatar, 2015). However, to date, the IMS effect on sustainability and performance is hardly investigated (Nunhes et al., 2016; Siva et al., 2016). To address this gap, this research attempts to jointly conceptualise IMS and corporate sustainability performance in order to ground theoretically a future empirical investigation through the following research questions:

- *How can the theories of the firm be used to identify CS and IMS relationships?*
- *How can the theories of the firm be used to relate IMS and CS performance?*

In the following paragraphs, a literature review covers the aforementioned topics of interest. Firstly, the relationship of corporate sustainability with integrated management systems is explored. Then, corporate sustainability performance is discoursed using triple bottom line approach and stakeholder perspective. Next, IMS literature is reviewed from the resource and institutional perspectives. Discussion of literature findings leads to certain research propositions and a research hypothesis.

4.2 Methodology

To serve the purpose of this research, a comprehensive (systematic) review is performed on the integrated management system and corporate sustainability literature. Firstly, an exploratory search on corporate sustainability and integrated management system journal articles and books revealed certain voids. The limited volume of theory-driven IMS research directed the design of the next phase. Hence, a content analysis (Duriau et al., 2007; Seuring and Gold, 2012) enabled the thorough investigation of the concepts of interest drawing on the theories of the firm (Lozano et al., 2015).

Academic journals and books were accessed over a thirty-year time period since 1987 in the scientific databases, i.e. Scopus, Google Scholar, EBSCO, ProQuest, Web of Science and the journal electronic depositories of Elsevier, JSTOR, Emerald, Wiley, Taylor & Francis, Springer

and Sage Publications. Sentences and paragraphs were used as recording units (Tangpong, 2011). Keywords included “corporate sustainability”, “corporate social responsibility”, “corporate sustainability performance”, “integrated management system”, “stakeholder theory”, “resource-based view”, “resource theory”, “institutional theory”. An author search has also been performed, since there are certain authors that have repeatedly dealt with the main research topics, i.e. IMS and corporate sustainability management, such as Asif, M., Bernardo, M., Casadesús, M., Domingues, P., Karapetrovic, S., Salomone, R., Sampaio, P., Simon, A., Wagner, M. etc. Meta-analysis of the references sections of the literature review papers and of the most recent publications was a secondary source of relevant papers (Morioka et al., 2016). Content categories were IMS resources, IMS or integration level, stakeholders, performance dimensions and outcome metrics (see Fig. 4.1 and Table 4.1 for sampling process and coding criteria).

This conceptual study focused on identifying the gaps and, then, in an iterative way to shed light on the under-researched areas of the IMS-CS field. Theories of the firm served as interpretation tools (Lozano, 2015). Recent literature review papers (Engert et al., 2016; Morioka and di Carvalho, 2016; Siva et al., 2016) were used as springboards to establish voids and clarify patterns and trends in the relevant literature via content analysis (Tranfield et al., 2003).Thus, the study of the theories of resources, stakeholders and institutions provided novel insights for further and deeper understanding of the IMS and CS concepts, and the IMS-CS relationships. Consequently, a model has emerged using resources as inputs and stakeholders as outputs.

Table 4.1 Coding criteria (adapted by Barratt et al., 2011)

Coding criteria	Description/details
Article authors	Who are the authors of the article?
Major focus of the article	Is the major focus of the article relevant to the main research topics?
Theoretical lens	Which theories, if any, influenced the authors?
Role of existing theories	Were existing theories used to develop constructs and/or used to interpret the findings?
Research outcomes	Can the findings be used to justify and operationalise the proposed relationships/ constructs?

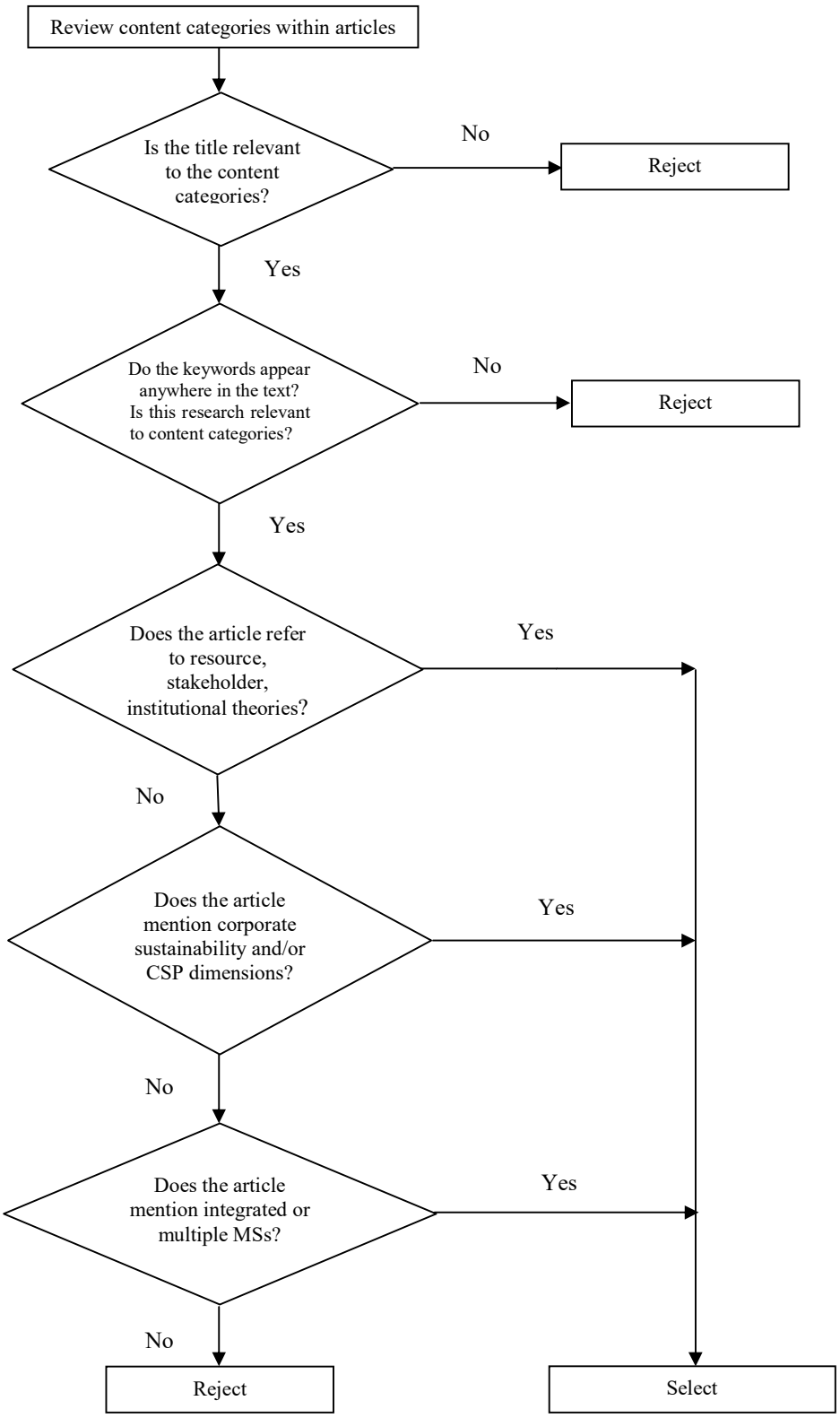


Figure 4.1 Article sampling procedure (adapted by Barratt et al., 2011)

4.3 Corporate sustainability and stakeholder theory

Stakeholder theory was born in an attempt to understand how value is created and traded and how ethics and profitability may be connected, and to aid managers addressing these two issues (Freeman et al., 2007; Galbreath, 2009; Parmaret al., 2010).Stakeholder identification and salience is based on managerial assessments of stakeholders' possession of power, legitimacy, and urgency (Mitchell et al., 1997). Power is the ability to impose one's will and accrues to those who control resources needed by the organisation, creating power differentials among parties (Mitchell et al., 1997). Legitimacy reflects operating under normative conditions and urgency is understood as the 'degree to which stakeholder claims call for immediate attention' (Mitchell et al., 1997).

To adapt theory to corporations three theoretical aspects are identified - descriptive/empirical, instrumental, and normative - and stakeholders have been generally classified into governments, communities, political groups, trade associations, investors, suppliers, customers, employees (Donaldson and Preston, 1995). Education, regulation and value creation are alternatively used as devices to interrelate financiers, customers, employees, community, suppliers and other groups with particular interests (Hörischet al., 2014). Stakeholder theory approach to the (natural) environment is dichotomous, in that nature is either the direct stakeholder or human beings, groups, and organisations are considered as "nature representatives" (Hörisch et al., 2014). Another duality exists in the stakeholder role within organisations in that stakeholder needs are identified as drivers while meeting those -needs is set as a management goal (Maletič et al. 2014; Rocha et al., 2007).

Rocha et al. (2007) emphasize the stakeholders' dual role when integrating sustainable development into management systems in that they "both provide input to the organisation's systems and receive output from those systems". Corporate sustainability is by definition stakeholder-oriented both from a systematic and a holistic perspective (Lozano et al., 2015). Several scholars have addressed systematically the satisfaction of multiple stakeholders, by either by composing IMS models (Asif et al., 2011; 2013; Jonker and Karapetrovic, 2004) or by identifying stakeholders within standard requirements (Genaro and Loureiro, 2015). In a similar vein, Tarí and Molina-Azorín (2010) adopted an EFQM (European Foundation for Quality Management) approach to management system integration and emphasised that while quality

management systems focus on customers, the environmental management systems address the needs of regulators, governments, the general public, local communities, consumer groups and environmentally aware investors.

Strategically integrated corporate sustainability management fosters not only the quality of the product or service; it also has an impact beyond the immediate level of production and is correlated with stakeholder satisfaction (Engert et al., 2016). So far, scholars address stakeholder identification and engagement failing to investigate how stakeholder satisfaction influences the financial performance of the company, or its impact in generating sources of corporate advantage (Engert et al., 2016).

An entire research stream is dedicated on the triad of sustainability performance dimensions (Lozano, 2008). Corporate sustainability assessment is conducted through the development and monitoring of various set of indicators. Formalized sets of indicators have emerged along with guidelines for their understanding and implementation. However, there is an imbalanced focus of research on indicators, favouring the environmental and social (Cheng et al. 2010; Figge et al., 2002; Rocha and Searcy, 2012) over the economic. Moreover, despite some systemic efforts (Asif et al., 2011a, 2013; Azapagic, 2003) corporate sustainability management and sustainability performance evaluation are hardly related in practice. To this end, only certain research models have been composed and empirically tested linking stakeholder demands and sustainability practices with performance (Maletič et al., 2016; Wagner, 2011; 2015). Bearing this in mind, relevant questions are generated, such as:

- *How are stakeholder demands managed in literature?*
- *How are stakeholders engaged with integrated management systems in IMS and multiple MS literature? (identification, evaluation)*
- *Which stakeholders are identified?*
- *Which indicators are used to identify and evaluate the effectiveness/impact of multiple/integrated management systems on those stakeholders?*
- *How are performance and multiple / integrated management systems are connected in literature?*

Stakeholders and corporate sustainability performance as correlated in IMS literature are given in Table 4.2. The corresponding metrics (performance indicators) per stakeholder and/or performance dimension are presented in Table 4.2, as well.

Table 4.2 Stakeholders and corporate sustainability performance

Stakeholder/ performance dimension	*Outcome metrics*	*Researcher(s)*
Employees, customers, regulators	Internal and external audit results	Asif et al. (2013)
Non-governmental organisations (NGO), local community, municipal government representatives, general public	Quality of life, community reinvestment, public safety, culture and recreation, education, economic vitality, health, housing, and transportation. Land use and infrastructure, natural environment, public well-being	Asifet al. (2013)
Customer	customer/stakeholder satisfaction, percentage of defects, on-time delivery, and satisfaction with the environmental characteristics of products	Tarí and Molina-Azorín (2010)
People (employees)	employee morale, quality and environmental training results, quantity and quality of improvement provided by employees related to quality and environmental issues	Tarí and Molina-Azorín (2010)
Society / environment	resource consumption, emissions, toxic waste, support for social activities	Tarí and Molina-Azorín (2010)
Economic performance	financial results, productivity, cost of quality, product quality	Tarí and Molina-Azorín (2010)
Environmental performance	Use of water, energy, renewable resources, use of toxic inputs, soil contamination, air emissions, landscape damage	Wagner (2011)
Economic performance	Corporate image, sales, market share, new market opportunities, short-term profit, cost savings, productivity, improved insurance conditions, better access to bank loans	Wagner (2011)
Owner/shareholder	owner/shareholder satisfaction	Wagner (2011)
Management	management satisfaction	Wagner (2011)
Worker	worker satisfaction	Wagner (2011)
Environmental performance	Inputs: water inputs, energy inputs, toxic inputs, non-renewable inputs	Wagner (2015)
	Emissions: soil contamination, air emissions, landscape impacts	Wagner (2015)
Regulatory	National legislators European legislators	Wagner (2015)
Internal	Managers Shareholders Parent firms	Wagner (2015)
Public	NGOs Communities Press/media Scientific institutes	Wagner (2015)
Value chain	Suppliers Distributors Competitors Corporate buyers	Wagner (2015)

Stakeholder/ performance dimension	*Outcome metrics*	*Researcher(s)*
Economic performance	Market: new market opportunities, sales, market share Risk: bank loans, insurance conditions Efficiency: short-term profits, cost savings, productivity Image: corporate image, management satisfaction, employee satisfaction	Wagner (2015)
Employee	employee motivation improvements, department barriers elimination and higher collaboration organizational culture improvements better communication	Simon, Karapetrovic&Casadesús (2012b)
External stakeholders	Higher stakeholder implication	Simon, Karapetrovic&Casadesús (2012b)
Economic performance	company image improvements organisational global strategy improvements increase of organisational efficiency	Simon, Karapetrovic&Casadesús (2012b)
Customer satisfaction	Product quality (improved by IMS) Customer service quality Perceived value Firm image Customer complaints handling	Simon and Yaya (2012)
Information on customers	Economic value of the customer complaints/ turnover Type of more frequent complaints Customer satisfaction Number of questionnaires returned Number of positive questionnaires returned by customers	Garengo and Biazzo (2013)
Trade function analysis	Turnover, market share, payment terms Previous year turnover/year turnover New customers Number of audits Agents involvement Agents satisfaction Outstanding agents	Garengo and Biazzo (2013)
Suppliers performance	Change in supplier list % of non-conforming supplies	Garengo and Biazzo (2013)
Employees	Absenteeism Employee satisfaction Accidents at work Training costs Employees training cost/turnover (Employee) decision-making capacity Employee satisfaction with management (Employee) improvement plans	Garengo and Biazzo (2013)
Audit results	Number of observations accepted in audit Number of non-conformities accepted in audit	Garengo and Biazzo (2013)
Production efficiency	Micro non-conformity Turnover per person	Garengo and Biazzo (2013)
Corrective actions	Effectiveness of corrective actions	Garengo and Biazzo (2013)

Stakeholder/ performance dimension	*Outcome metrics*	*Researcher(s)*
	Effectiveness of corrective action planning % of new validated projects	
Maintenance	Cost of maintenance	Garengo and Biazzo (2013)
IMS potential (operational) benefits	Better and greater visibility of operation of the company in the concerned MSs Elimination of conflicts between individual MSs, and consequent resources optimization, namely human resources Elimination of several organisational and operational waste, resulting from an individual implementation of each MSs Common management policy, objectives, goals and key process indicators (KPIs) related to the performance of the concerned MSs Improvement of the internal and external image and credibility of the company with focus in the areas of Quality, Environment, Occupational Health and Safety Involvement and consolidation, by all collaborators, of a culture of continuous improvement, attitudes and values in the scope of the concerned MSs Reduction of the number of internal and/or external audits Improvement at the level of the risk management through an integrated and systematized approach Integrated management of the several components of sustainability	Rebelo et al. (2016)
IMS potential (sustainability) benefits	Improvement of the internal and external image and credibility of the company with focus in the areas of Quality, Environment, Occupational Health and Safety Involvement and consolidation, by all collaborators, of a culture of continuous improvement, attitudes and values in the scope of the concerned MSs Greater employee valorization and motivation as a result of greater scope of its competencies, tasks and responsibilities with consequent "empowerment" Improvement of the partnership relationships with suppliers and of dialogue and compromise with others relevant stakeholders, contributing to the competitiveness of the company	Rebelo et al. (2016)
Sustainability performance	% Supplying companies owned by minority groups % Women in senior positions Working hours / wages Air emissions Discharge to water Cases of bribery	Epstein and Roy (2001)
Stakeholders reactions	By-product revenues Improved image (survey) New product development (time)	

Stakeholder/ performance dimension	*Outcome metrics*	*Researcher(s)*
	Absentee statistics Increased market share Credit rating Awards	
Corporate social performance	Levels of customer satisfaction achieved Levels of customer loyalty achieved Levels of employee satisfaction with their jobs Levels of employee retention Providing employment and income locally	Luk et al. (2005)
Financial and market performance	Overall profit levels achieved Profit margins achieved Return on investment Sales volume achieved Market share achieved Shareholder satisfaction with financial performance	Luk et al. (2005)
Social Performance	Health and safety performance has improved The employees' satisfaction has increased The employees' motivation has increased Employee education and training (man-days per employee per year) have increased Corporate image has improved during the last 3 years	Maletič et al. (2015)
Financial and non-financial performance	Sales growth has increased above industry average Customer satisfaction has increased Operative costs have decreased The quality of our products and services has been improved during the last 3 years	Maletič et al. (2015)
Environmental performance	The efficiency of the consumption of raw materials has improved The resource consumption (thermal energy, electricity, water) has decreased (e.g. per unit of income, per unit of production) The percentage of recycled materials has increased The waste ratio (e.g. kg per unit of product, kg per employee per year) has decreased during the last 3 years	Maletič et al. (2015)
Customer	Customer satisfaction has improved Communication with customers has improved Customer complaints have decreased Services offered to customers are better than competitors	Bou-Llusar et al. (2009)
People (employees)	Employee motivation and commitment Employee willingness to work extra time has improved High employee organisational commitment has improved Employee achievement Employees identify and provide solutions to work problems Employees share organisational values Employees show high levels of initiative Employee satisfaction	Bou-Llusar et al. (2009)

Stakeholder/ performance dimension	*Outcome metrics*	*Researcher(s)*
	Employee absenteeism has decreased Employee turnover has decreased Employee opinions contribute to improving work performance Employees have high levels of know-how Communication with employees has improved Employee satisfaction has improved Employee involvement at work has improved	
Society / environment	Protection of environment has improved Noise levels have decreased Pollution levels have decreased The organisation has a positive impact in society*	Bou-Llusar et al. (2009)
Economic performance	Financial results Market share has improved Sales per employee have improved Profit levels have improved There has been a noticeable improvement in financial results	Bou-Llusar et al. (2009)
Suppliers	The number of suppliers has decreased Quality of raw materials has improved Relationships with suppliers have improved Supplier management has improved	Bou-Llusar et al. (2009)

Corporate social responsibility (CSR) is often used interchangeably with corporate sustainability (Dyllick and Muff, 2016). In this sense, corporate social performance generally reflects how well a company transforms stakeholder orientation, a managerial attitude, into stakeholder satisfaction (Luk et al., 2005). However, the ISO 26000 guideline clearly identifies that "being accountable for the impacts of business decisions and activities on society and the environment" is an ethical concern of corporate entities against their stakeholders in respect of human rights, fair operating practices and community involvement and development" (Ranängen, 2015). It has been evidenced that corporate social and financial performance when addressed by a stakeholder-driven framework may influence perceived trustworthiness and company reputation, organisational commitment, consumer-company identification and firm innovativeness (Perrini et al., 2011).

Corporate sustainability performance (CSP) reflects the level of penetration of economic, environmental, social and governance factors into a firm's operations and the impact of those factors on the firm and the society (Artiach et al. 2010). Sustainability performance of organisations is usually proxied by universally established sets of indicators, such as GRI, Dow Jones and Sustainable Asset Management - SAM (Alonso-Almeida et al., 2014; Lourenço et al.,

2012; Llach et al., 2014). According to the perspective adopted by this research framework the use of indicators entails the risk of acquiring mere numbers non-corresponding to the inter-organisational sustainability practices and the management of sustainability within firms. Based on the stakeholder theory and the understanding that companies strive to address the needs of multiple stakeholder groups CSP can be assessed in stakeholder terms (Artiach et al. 2010). Thus, corporate sustainability performance is expressed by identifying the outcomes of business operations against different stakeholder groups. As a result, the following research proposition is generated:

Proposition 1. *Relationships with firms' stakeholders reflect corporate sustainability performance.*

4.4 Integrated management systems and resource theories

Resource-based view shifted focus from product to resource perspective and defined resources as those (tangible or intangible) assets that are tied semi-permanently to the firm (Wernerfelt, 1984). According to Barney (1991) firm resources include all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive and implement strategies that improve its efficiency and effectiveness. Resources are split into three forms of capital (Barney, 1991), i.e. physical capital (know-how, assets, location, proximity to raw materials), human capital (knowledge, experience, relationships) and organisational capital (structure, systems, relations). In a similar vein, from a total quality management (TQM) perspective, resources are classified into "technological", such as information, equipment, techniques and processes, "organisational", including culture, policies, management systems and relationships, and "human" (Alidrisi and Mohamed, 2012).

Bozbura et al. (2007) define a three-component intellectual capital consisting of the human capital (the individual-level knowledge that each employee possesses), the organisational capital (the sum of all assets that make the creative ability of the organisation possible) and the relational capital (the sum of all assets that arrange and manage the firms' relations with the

environment). The relational capital contains the relations with customers, shareholders, suppliers, rivals, the state, governmental institutions and society, while talent, integration, enabling a performance-based culture/climate, capability and leadership are the main attributes to maximize human capital in an organisation (Bozbura et al., 2007).

Further to conventional resources, "dynamic capabilities" are highlighted as sources of competitive advantage and performance of organisations operating in high velocity and dynamically changing markets (Teece, 1997). Dynamic capabilities (DC) are linked not only to the economic but to the social and the environmental dimensions of sustainability (Beske et al., 2012), as well, and lie upon path-dependent processes that are embedded within organisations (Eisenhardt and Martin, 2000). In this context, preceding management systems, i.e. systems that are initially adopted - affect the adoption and integration of subsequent management systems (Zhu et al., 2013). Simon et al. (2012a, b) study IMS evolution and the integration benefits and difficulties relationships with IMS level in terms of goals, resources and processes. IMS tangible resources are found to outperform the intangible ones on operational performance (Savino and Batbaatar, 2015). Human resources, such as culture building, awareness enhancement, top management commitment, employee motivation, communication and collaboration, are highlighted as the most prominent IMS drivers (Savino and Batbaatar, 2015; Simon and Bernardo, 2014).

In this context, the literature review with regard to resource perspective on IMS is guided by questions, such as the following:

- *How are resources connected to integrated management systems in literature?*
- *Which resources are identified?*
- *Which indicators are used to identify and evaluate those resources?*

4.4.1 IMS resources

Resource and stakeholder perspectives are combined to interpret the integrated management system as "a single set of interconnected processes that share a unique pool of human, information, material, infrastructure and financial resources in order to achieve a composite of goals related to the satisfaction of a variety of stakeholders" (Karapetrovic, 2002; 2003). In a similar vein, Zeng et al. (2007) understand human resources, organisational culture, technical

guidance, and stakeholders including customers, certification bodies, and institutions, as factors affecting the implementation of integrated management systems and compose a "synergetic" IMS model, where resource, structural and cultural synergies interact serving strategic synergy across multiple management sub-systems. Research has, also, stressed the inclusion of information management systems and resources within IMS (Crowder, M., 2013; Mesquida and Mas, 2015; Savino and Batbaatar, 2015). Table 4.3 provides a summary of the literature findings regarding IMS resources.

Table 4.3 IMS resources/capabilities

Resource variable/ Researcher(s)	***Resource items***	***Researcher(s)***
Safety and social issues	OHSAS 18001 implementation Ethics	Savino & Batbaatar (2015)
Effectiveness of operational resources	TQM principles and top management strategic perception Measuring firm's performances associated with environmental/ safety performance	Savino & Batbaatar (2015)
Assets for IMS	Pollution control assets Machines and pollution equipment maintenance Human resources Formal IMS structure Procedures and proprietary processes Updates and safety device investments	Savino & Batbaatar (2015)
Cross-functional operation	Design and product engineering Production management Integrated internal audit Integrated external audit Purchasing and suppliers management	Savino & Batbaatar (2015)
IT systems	Information systems development Enterprise resource planning systems Decision support systems	Savino & Batbaatar (2015)
IMS awareness	Sharing on IMS principles and tasks by the managers Sharing on IMS principles among employees and workers	Savino & Batbaatar (2015)
Human resources	Culture building, awareness enhancement, top management	Simon & Bernardo (2014)

Resource variable/ Researcher(s)	*Resource items*	*Researcher(s)*
	commitment, employee motivation, communication and collaboration	
Human resources	Management system representative Management system manager Inspector	Simon, Karapetrovic & Casadesús (2012a,b)
Documentation & processes	Control processes: manual, internal audits, management review, control of nonconformities, preventive and corrective action, improvement, document control, record control, internal communications Strategic and operating processes: policy, objectives, planning, product realization, determination of requirements Documentation resources: procedures, instructions, records	Simon, Karapetrovic & Casadesús (2012b)
Leadership	Quality and environmental issues addressed in company's mission and vision. Quality and sustainable values in actions and behaviour Commitment to quality and environmental efforts	Tarí and Molina-Azorín (2010)
Strategy	Mission and vision are implemented by developing a strategy that focuses on customers/stakeholders, and that takes account of the market and sector. Policies, plans, objectives and processes reflect quality and environmental issues Policies, plans, objectives and processes are communicated to all employees in a straightforward way.	Tarí and Molina-Azorín (2010)
People	The full potential of employees is released at an individual, team-based and organisational level. Quality and environmental training is provided for all employees. Ideas provided by employees regarding quality and environmental improvement are recognised and rewarded, in a way that motivates staff and builds commitment to using	Tarí and Molina-Azorín (2010)

Resource variable/ Researcher(s)	*Resource items*	*Researcher(s)*
	their skills and knowledge for the benefit of the organisation.	
Partnerships and resources	In a QEM system, external partnerships, suppliers and internal resources are managed in order to support quality and environmental efforts. The current and future needs of the organisation, the community, and the environment are balanced when managing partnerships and resources. Quality and environmental aspects are considered during the supplier evaluation process. Long-term supplier relationships are emphasized.	Tarí and Molina-Azorín (2010)
Processes, products and services	Processes are designed, managed and improved in order to satisfy and generate increasing value for customers and other stakeholders with regard to quality and environmental aspects. Quality and environmental performance outcomes are used to improve processes.	Tarí and Molina-Azorín (2010)

4.5 Management systems and institutional theory

Institutional theory understands organisations "comprised of many institutional elements, some rules, norms, or beliefs being forged in on-going interaction and others being borrowed from their environments" (Scott, 2008). The institutional perspective addresses the similarities in organisational behaviour in terms of coercive isomorphism, mimetic processes and normative pressures (DiMaggio and Powell, 1983). In this context, management system standards can be seen as a means of "imposing" isomorphism across organisations via increasing -homogenisation (Beckert, 2010). Furthermore, certified management systems codify voluntary practices that are socially desirable (legitimated) and economically viable in areas as diverse as quality, the working environment, environmental management, labour management and e-commerce security

(Rocha and Granerud, 2011). Following this line of reasoning, Maletič et al. (2014) suggest that "institutional isomorphism, as underlined by self-regulatory and voluntary initiatives, such as environmental and quality management approaches, could be a useful theoretical underpinning for investigating sustainability practices orientation. Furthermore, it is stressed that ISO 14001 should be integrated with quality management, strategically oriented and coupled with suitable performance measurement system to enable effective measurement and improvement of corporate sustainability initiatives in alignment with TBL (Maletič et al., 2015).

Quality management systems alone meet customer and shareholder demands. Environmental management systems address environmental concerns trying not to "harm business goals". However, pursuing social benefits supersedes the scope of both the ISO 9001 and the ISO 14001 standards (Maletič et al., 2015). Moreover, single standard adoption fails to spread on all three dimensions of sustainability simultaneously. In addition to this "triple-aim" challenge, there is an entire research stream dedicated on the gap between certification and actual implementation of management systems in terms of their respective standard requirements. Ceremonial or symbolic adoption serves the legitimacy purpose and meets the superficial and short-term stakeholder satisfaction goal whereas the internalization of management practices leads to the in-depth, long-term stakeholder satisfaction. At this point, integrated management systems seem as the fit-for-purpose answer to manage corporate sustainability.

Standards may apply their isomorphic pressures and set their individual requirements while integrated management systems provide the necessary framework towards meeting the strategic CS objectives through the joint, coordinated use of resources across and within processes. IMS certification remains out of the picture and, hence, there is no debate on any symbolic or ceremonial implementation. On the other hand, the lack of an international IMS-dedicated standard and the subsequent inability of "stamping" the joint or integrated audit outcome hamper IMS legitimization. In this regard, IMS literature is reviewed from the institutional perspective driven by questions, such as the following:

- *Which institutional elements are identified?*
- *Which institutional elements are used to identify and evaluate the effectiveness of integrated management systems?*

- *How are the institutional elements of integrated management systems measured in literature?*

Several management standards are available to manage different aspects of firms' sustainable development. Table 4.4 depicts the scope of sustainability related standards. To date, empirical IMS scope is rather limited to quality and the environmental management. Less is the research on the further integration of health and safety, food, information and energy management systems (von Ahsen, 2014; Mesquida and Mas, 2015; Satolo et al., 2013). The study on the integration of corporate sustainability management has emerged, both empirically (Botta et al., 2013; Maas and Reniers, 2014) and theoretically (Asif et al., 2011; 2013; Rocha et al., 2007).

Table 4.4 Standards, regulations and guidelines managing corporate sustainability aspects

Standard/Guideline/Regulation	***Scope***
ISO 9001:2015	Quality management systems – Requirements
ISO 9004:2018	Managing the sustained success of an organisation – A quality management approach
ISO 14001:2015	Environmental management systems – Requirements with guidance for use
EMAS regulation 1221/2009	Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC
ISO 14031:2013	Environmental management – Environmental performance evaluation – Guidelines
ISO 14044	Environmental management – Life cycle assessment – Requirements and guidelines
ISO 45001	Occupational health and safety management systems – Requirements
ISO 26000:2010	Guidance on social responsibility
ISO 50001:2011	Energy management – Requirements

Standard/Guideline/Regulation	*Scope*
SA 8000:2014	Social Accountability 8000 International Standard
AA1000AS (2008)	AccountAbility Assurance Standard
AA1000SES (2015)	AccountAbility Stakeholder Engagement Standard
ISO 28001:2007	Security management systems for the supply chain – Best practices for implementing supply chain security assessments and plans – Requirements and guidance

4.5.1 IMS level

As already discussed, several management systems may be integrated to form an IMS. To understand and measure how far this integration of multiple management systems has gone within firms is a major concern of IMS researchers. The IMS level refers to the degree of integration of the initially independent management systems within a firm. Several researchers have produced IMS scales (see e.g. Abad et al., 2014; Bernardo et al., 2009). IMS level is substantiated (operationalized) in every single research framework independently based on generally accepted metrics, including the integration level of documentation, procedures and audits. Furthermore, a "polarisation" effect on the IMS level is identified, meaning that integrated management systems reach either full or zero completion over time (Simon et al., 2012a). Literature suggests that the integration "device" - whether it is a theoretical framework, a standard or a tailored model - and the various constraints imposed on integration may condition the IMS level in the long-term (Gianni and Gotzamani, 2015). Integration strategy, methodology, maturity/experience, and internal motivations are found to condition the integration level (Bernardo, 2014). A summary of IMS level parameters as found in literature are presented in Table 4.5.

Table 4.5 IMS level components

IMS Level	**Pertinent literature**
Multiple management systems (MS) policies	Asif et al. (2010), Simon et al. (2012b)
MS objectives	Simon et al. (2012b)
MS human resources (operation, training procedure)	Simon and Bernardo (2014)

IMS Level	Pertinent literature
MS design and documentation	Simon and Bernardo (2014), Von Ahsen (2014)
management review, performance evaluation	Abad et al. (2014)
management of preventive and corrective actions, control of non-conformities, document and data control	Abad et al. (2014), Simon et al. (2012a)
production operations, waste monitoring, health and safety daily routines	Asif et al. (2010)
MS internal audits	Abad et al. (2014); von Ahsen (2014); Simon et al., 2011)
MS external audits	Abad et al. (2014), Von Ahsen (2014); Simon et al. (2011)

4.5.2. IMS effectiveness

The impact of IMS is found generally positive, with accrued benefits such as increased customer satisfaction, service quality and stability, reduction of failures, facilitation for growth and certification and better alignment of people and information, being the business aspects mostly affected (Mesquida and Mas, 2015). Siva et al. (2016) stress that IMS positive effect can be maximized when integrated with corporate governance and core business processes, as well as implemented into every level of the organisation. However, performance of integration is assessed mostly in a qualitative and perceptual manner (Sampaio et al., 2012).

Evidence has proved that IMS benefits increase proportionally to the IMS level (Abad et al., 2014). What is still missing is the way to evaluate the outcome of the integration process through objective business results (Abad et al., 2014). In this vein, Tarí and Molina-Azorín (2010) propose using the EFQM result components to measure the influence that integrated systems have on firm performance. Garengo and Biazzo (2013) present an IMS, where ISO 9001 standard requirements, EFQM principles and performance measurement and management tools are incorporated. Bernardo (2014) proposes a model where integration aspects, including strategy, methodology, maturity/experience, and internal motivations condition the integration level influencing innovation management performance.

The performance assessment of an IMS requires an analytic process to encompass its multiple dimensions possibly in the form of an embedded "integrated performance management system", with only few attempts empirically researched (Gianni and Gotzamani, 2015). IMS performance and benefits are found contingent on certain factors, such as the industry sector or activity (Lopéz-Fresno, 2010; Manzanera et al., 2014), the company size (Iatridis et al., 2016; Garengo and Biazzo, 2013; Salomone, 2008) and the years of IMS implementation (Zeng et al., 2011).

So far, the results of standalone management systems on financial performance are contradictory (Siva et al., 2016). Interestingly, the results of integrated management systems on performance, whether financial, operational or environmental, are found only positive (Ferrón Vílchez and Darnall, 2016; Martí-Ballester and Simon, 2017; Savino and Batbaatar, 2015). However, the IMS impact on a combined form of business performance is unknown. On the other hand, there is hardly any empirical evidence of MS effect on a three dimensional performance. More specifically, the relationship of economic/financial performance with respect to the other two types of the triple bottom line CSP approach has been hardly investigated (Wagner, 2015). It is rather difficult to operationalise corporate sustainability due to its complicated nature. Therefore, the performance of organisations with regard to corporate sustainability and its three different dimensions remains vague. Prior research has established and tested multi-dimensional indicators of the impact of sustainability practices on firm performance (Maletič et al., 2016). Evidence suggests that the extant body of literature on the association of corporate sustainability performance and firm performance narrows down to the financial performance of the firm (Goyal et al., 2013; Jain et al., 2016).

Bearing in mind, that integrated management systems may offer multi-disciplinary sustainability insights, this research suggests to operationalise the effectiveness of a firm's integrated management system on corporate sustainability, i.e. the IMS impact on the firm's economic, environmental and social interactions with stakeholders. As discussed in the previous section, resource and stakeholder perspectives can provide a rather comprehensive and substantial view of integration. However, integration is defined as the alignment or the harmonization of goals, processes and resources (Karapetrovic and Willborn, 1998; Sampaio et al., 2012) and is analyzed in strategic, tactical and operational dimensions (Asif et al., 2010c). Thus, the "technical" component (IMS level), which is discussed in this section, should be added in order to provide

the missing operational dimension of the stakeholder-oriented IMS effectiveness. Hence, the following propositions are generated:

Proposition 2. *Corporate sustainability performance is related to the resources allocated for the integration of management systems.*

Proposition 3. *Corporate sustainability performance is related to the integration level of multiple management systems.*

4.5.3 Internalization

The internalization can be defined as **the substantial rather than superficial integration of specific practices and principles - as stated in management system standards - within organizations' daily activities** (Testa et al., 2018a). Internalization is considered as the means to prevent 'symbolic' (or 'ceremonial') implementation of management systems (MS), e.g. against mere certification or even 'greenwashing' in the case of environmental management systems (Testa et al., 2018a) and 'bluewashing' in the case of corporate social responsibility practices (Testa et al. 2018b; Will et al., 2019). External institutional pressures usually drive organizations to certify just to 'exhibit' compliance. However, when MS implantation is internally motivated, MS standards become intertwined within corporate strategy and culture. Thus, organizations allocate resources and absorb knowledge - both tacit and explicit - to cognitively comply by the standards and improve actually benefiting from this compliance by changing internally (Nair and Prajogo, 2009; Nunhes et al., 2016). Despite the isomorphic pressures emphasized by the institutional theorists (DiMaggio and Powell, 1983; Scott, 1987; 2008) heterogeneous adoption of management system standards is evidenced (Tarí et al., 2019) depending on the internal regulations, objectives, resources and needs of organizations (Heras-Saizarbitoria, 2011; Heras-Saizarbitoria and Boiral, 2015)

Institutional theory acknowledges three pillars of an "institutional profile", i.e. the regulatory, the cognitive and the normative (Scott, 1987). Kostova and Roth (2002) draw from institutional theory and conceptualize the adoption of quality practices in terms of practice implementation

and internalization. Implementation reflects compliance with regulations and standards in terms of regulatory compliance, while 'internalization' is interpreted through the employees' perceptions (cognition and norms of behavior), that enable its persistence and stability over time (Scott, 1987; Tolbert and Zucker, 1996). Thus, implementation and internalization reflect the overall penetration or "depth" of adoption of the practice within the organization. "Minimal adoption" is established in organizations with both low implementation and low internalization, whilst "active adoption" is established in organizations with both high implementation and high internalization (Kostova and Roth, 2002).

Long-term effectiveness and value addition of management system standards do not depend on the standard requirements themselves but on the way that companies adopt and implement these standards or otherwise the depth to which a company decides and commits to meet their requirements (Gotzamani and Tsiotras, 2002). The internalization of management system standards' requirements is measured through management planning (policy, objectives), training and employee involvement (motivation, teams, identification of needs), operational activities (work instructions, risk management procedures), monitoring and checking (performance, non-compliance, audits) (Testa et al., 2018b).

Some of the quality tools and practices that have been connected in literature with internalization include but are not limited to, process-based management, strategic planning, indicator-based management, internal audits, quality training for managers and quality training for employees, the integration of the quality system in daily routines, the updating of quality policy and processes, and the investment of time and resources in quality issues focusing on innovation and improvement (Christman and Taylor, 2006; Erlantz et al., 2014; Tarí et al., 2013; Tarí et al., 2019). The main indicators (measuring items) for the internalization of individual management systems that are found in pertinent literature are summarized in Table 4.6.

Table 4.6 Operationalization of internalization of stand-alone management systems

Manifest (measuring item)	***Researchers***
MS engagement of employees	Nair and Prajogo, 2009; Qi et al., 2012; Tarí et al., 2013; Tarí et al., 2019
MS engagement of managers	Nair and Prajogo, 2009; Qi et al., 2012;
MS training	Erlantz et al., 2014; Chappin et al., 2015; Tarí et al., 2019

MS documentation	Tarí et al., 2013; Tarí et al., 2019
MS internal audits	Erlantz et al., 2014; Nair and Prajogo, 2009; Qi et al., 2012
MS external audits	Tarí et al., 2013; Tarí et al., 2019
Resources	Heras-Saizarbitoria, 2011; Heras-Saizarbitoria and Boiral, 2015; Nair and Prajogo, 2009; Tarí et al., 2019
Outsourcing (MS external consultants)	Heras-Saizarbitoria and Boiral, 2015
Strategic view; decision-making	Erlantz et al., 2014; Nair and Prajogo, 2009; Qi et al., 2012
Assigned responsibities	Chappin et al., 2015
Use of information systems	Chappin et al., 2015

So far, several researchers have studied the internalization of stand-alone management (e.g. Escrig-Tena et al., 2019; Heras-Saizarbitoria, 2011; Qi et al., 2012; Tarì et al., 2013; Testa et al, 2018a,b). However, there is a paucity of research, when it comes to the internalization of integrated management systems (Bernardo et al., 2015; Nunhes and Oliveira, 2018). Similarly to the IMS approach adopted in this thesis, resource and institutional theories have been invoked to operationalize internalization drivers (Nair and Prajogo, 2009). In this vein, it has been suggested that an internalized IMS may outperform a non-internalized one (Bernardo et al., 2015; Bernardo et al., 2018). Interestingly, several researchers underline the importance of the indirect assessment of internalization so, that the expected bias - due to social desirability load of the concept - is reduced (Heras-Saizarbitoria, 2011; Erlantz et al., 2014). Therefore, this research adopts an indirect approach of internalization using IMS level and IMS resources as proxies and posits the following propositions:

Proposition 4. *The resources dedicated to the integration of management systems reflect the internalization of integrated management systems.*

Proposition 5. *The level of multiple system integration reflects the internalization of integrated management systems.*

4.6 Proposed conceptual framework - Key research constructs

In summary, this research identifies a mutually beneficial agenda for IMS and CSP. On the one side, the IMS impact on firm performance needs to be investigated both theoretical and empirically (Siva et al., 2016). On the other side, corporate sustainability performance needs to be embedded within business operations so, that corporate sustainability performance evaluation will reflect sustainability management practices (Asif et al., 2014; Searcy et al., 2012).

Corporate sustainability refers to sustainable development ability of companies within the business environment. This business environment is defined via the stakeholders influencing and being influenced by the operations of companies (Maletič et al., 2014) both directly and indirectly (Searcy, 2012). The relationship of corporate sustainability (CS) with stakeholders is used as a means for the interpretation of CS performance. Furthermore, CSP tri-dimensional approach is juxtaposed to the multiple scope of an integrated management system, i.e. the economic (quality), environmental and social (health and safety, social responsibility and accountability) management standards and systems (see Table 4.4).

Integrated management systems and corporate sustainability are both novel concepts. Pertinent research is continually evolving and expanding. So far, IMS performance remains a rather uncharted territory. To address this gap, IMS resources and level are used as "interpreters" of IMS MS results or outputs are viewed as the effectiveness of the IMS through the lenses of different stakeholders. Stakeholders are "assigned" or "attached" to different components of corporate sustainability performance. Hence, the effectiveness of multiple management standards is "measured" by their implementation impact on firms' stakeholders. The key constructs of this research framework are analyzed in the following figure (see Fig. 4.3).

Drawing upon Table 4.3, IMS resources are analysed into human, strategic, information and external resources, methods and tools. Based on the findings summarized in Table 4.2 corporate sustainability performance is analysed in three dimensions, i.e. the economic – and relevant stakeholders: the shareholders, customers, suppliers, and investors; the environmental – and relevant stakeholders: the regulatory authorities and the environment; and the social-and relevant stakeholders: the employees, the community. In Table 4.2 (and Fig. 4.3) the corresponding metrics (performance indicators) per stakeholder and/or performance dimension are presented, as

well. Figure 4.3 also includes outcome metrics for IMS performance directly related to each stakeholder group. IMS level is measured against certain parameters of the multiple management systems as found in literature (see Table 4.5), i.e. the objectives, the policies, the documentation, the procedures and the audits.

In line with the research propositions, the literature findings suggest that management theories can be used to conceptualize corporate sustainability performance and integrated management systems. More particularly, as depicted in Figure 4.2, the three selected theories of the firm have been used to conceptualize 'sustainability performance of the firm' or otherwise called 'corporate sustainability performance', IMS resources, IMS level and IMS internalization.

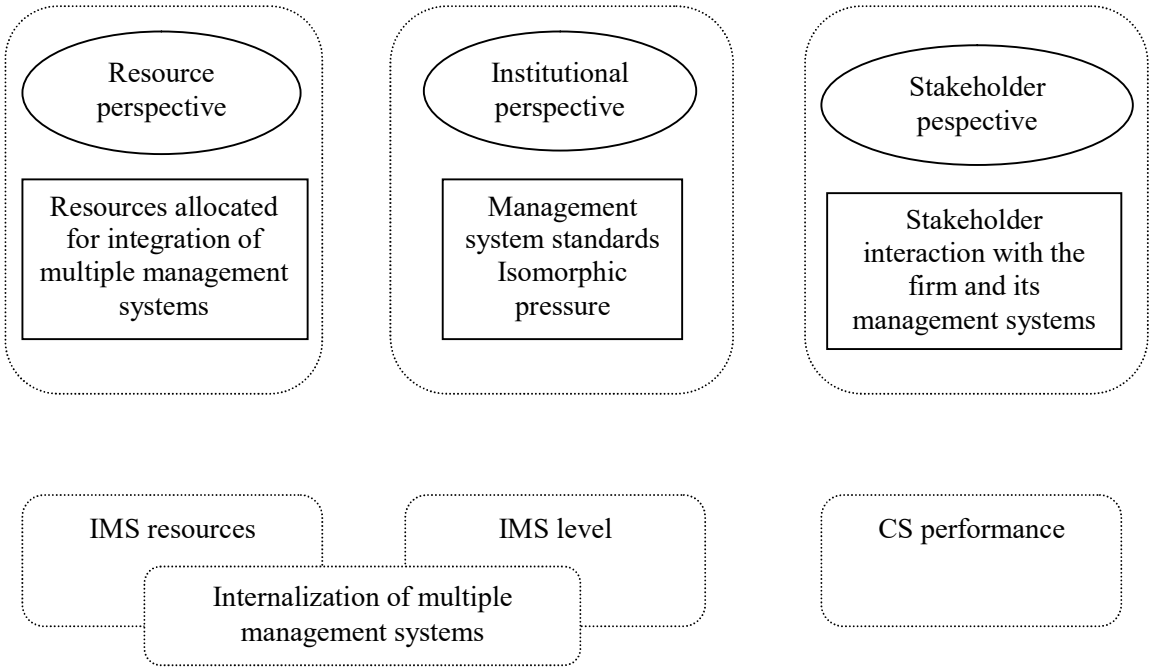


Figure 4.2 Conceptual framework

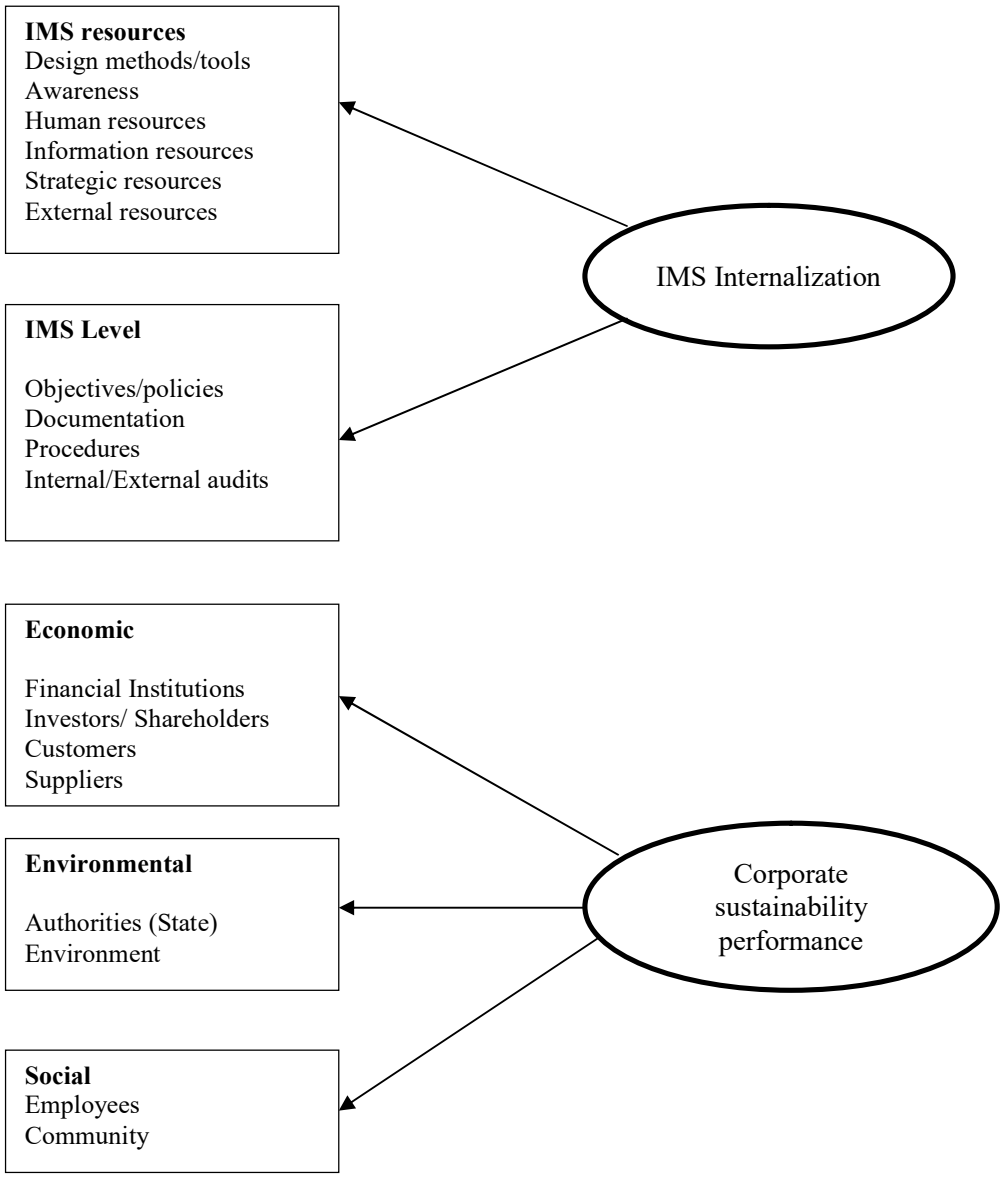


Figure 4.3 Research key constructs and variables

The impact of internalization of individual, discipline-specific management systems on firm performance has been addressed by several researchers. More specifically, it is claimed that the internalization of stand-alone management systems has a positive impact on the operational, environmental and social performance (Heras-Saizarbitoria, 2011; Ketokivi and Schroeder, 2004; Qi et al., 2012). The influence of stakeholders on internalization has been addressed, as well (Heras-Saizarbitoria, 2011; Testa et al., 2015). Not until very recently, has it been investigated the impact of quality management internalization on customers, employees, society and organizational performance (Tarí et al., 2019). However, the impact of the internalization of integrated management systems on firm performance has not yet been addressed (Bernardo et al., 2015). Moreover, the involvement of stakeholders in configuring firm performance within a corporate sustainability framework has not been included in pertinent research, so far. Hence, the following research hypothesis is posited:

Main Research Hypothesis: ***The internalization of integrated management systems has a significant positive impact on corporate sustainability performance.***

The main research hypothesis connects the identified constructs and variables as shown in Figure 4.4.

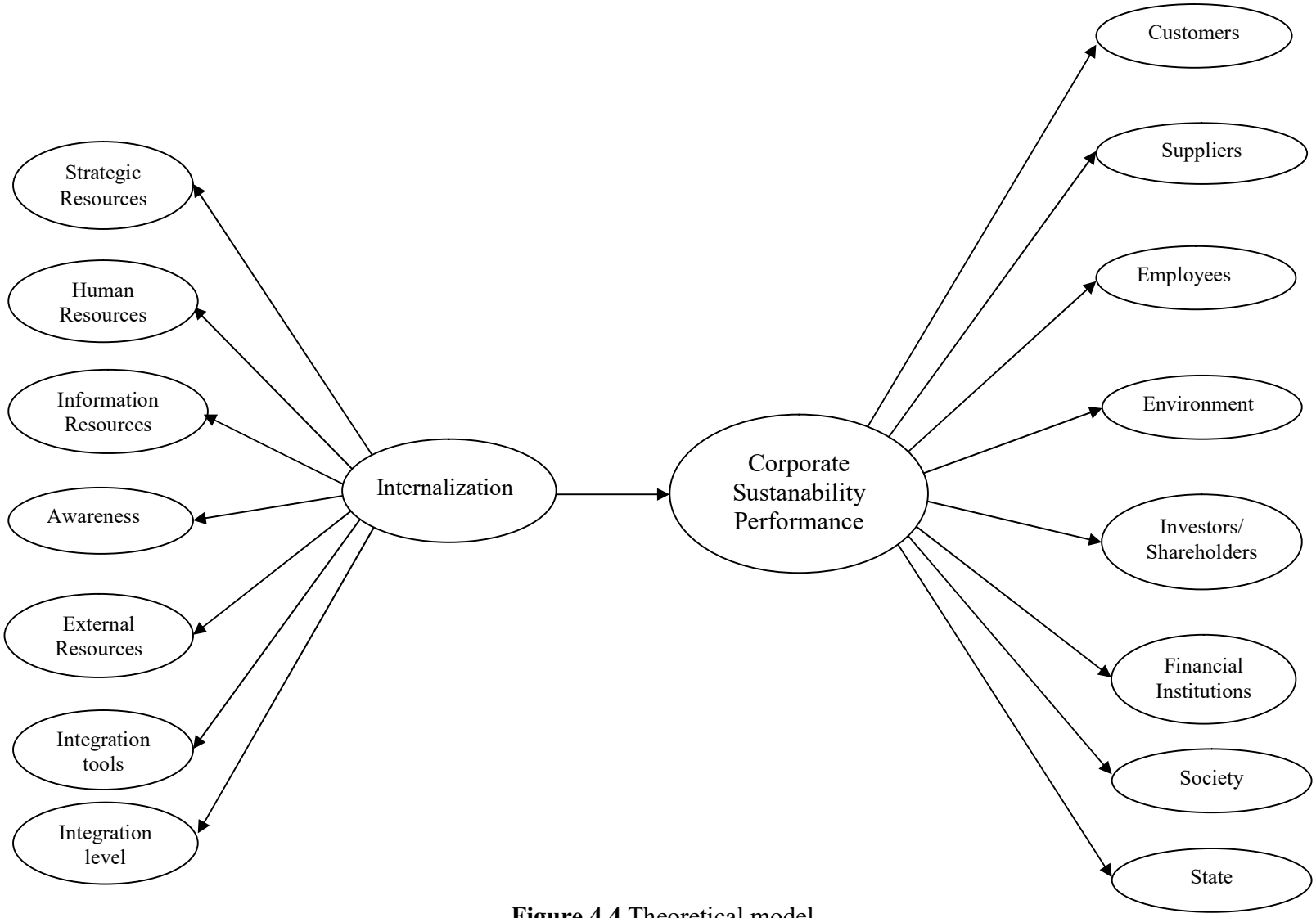


Figure 4.4 Theoretical model

This conceptual study has compiled literature data through three theoretical lenses and has then proposed two main constructs that have been analysed in secondary components. In the next three chapters (5 to 7) the proposed conceptual model is going to be validated through exploratory and confirmatory factor analysis and the main research hypothesis will be empirically tested and confirmed using structural equation modeling.

CHAPTER 5. SURVEY METHODOLOGY

5.1 Operationalization of research constructs

The constructs of the conceptual model are now operationalized using the literature findings presented in the previous chapter (see Table 5.1). A survey instrument is thus designed and validated to collect primary empirical data.

Table 5.1 Operationalization of Research Constructs

	Internalization Items	***Pertinent literature***
	Integration tools	
1.	PDCA (Plan-Do-Check-Act)	Bernardo et al. (2009); Garengo & Biazzo (2013)
2.	Process map	Bernardo et al. (2009)
3.	Standards' common elements	Bernardo et al. (2009)
4.	Tailored framework	Bernardo et al. (2009); Garengo & Biazzo (2013); von Ahsen (2013); Ivanova et al. (2014)
	Human resources	
5.	IMS embeddedness in corporate culture	Savino & Batbaatar (2015)
6.	Managers' awareness of IMS potential benefits	Savino & Batbaatar (2015); Simon & Bernardo (2014)
7.	Employees' awareness of IMS potential benefits	Savino & Batbaatar (2015)
8.	Corporate experience in IMS implementation	Asif et al. (2009); Oliveira (2013); Zeng et al. (2011)
9.	MS operation is the exclusive task of MS managers	Simon et al. (2012a; b); Simon & Bernardo (2014)
10.	Employees are trained in IMS implementation.	Bernardo et al. (2010); Simon et al. (2014); Zeng et al. (2011)
11.	Employees are engaged in IMS implementation	Savino & Batbaatar (2015); Zeng et al. (2011)
	Information resources	
12.	IT tools	Garengo & Biazzo (2013); Savino & Batbaatar (2015)
13.	ERP	Savino & Batbaatar (2015)
14.	Business Intelligence	Gianni et al. (2016); Gianni & Gotzamani (2016); Ivanova et al. (2014); Karapetrovic & Casadesús (2009); Savino & Batbaatar

	Internalization Items	*Pertinent literature*
		(2015)
15.	Decision support systems	Savino & Batbaatar (2015)
	Strategic resources	
16.	Top management MS commitment	Ivanova et al. (2014); Simon & Bernardo (2014)
17.	Top management MS engagement	Gianni & Gotzamani (2015); Savino & Batbaatar (2015); Simon & Bernardo (2014)
18.	Top management MS assessment	Garengo & Biazzo (2013)
	External resources	
19.	MS operation subcontracting	Bourlakis et al. (2014); Gianni et al. (2017b); Gotzamani et al. (2010)
20.	MS internal audits subcontracting	Bourlakis et al. (2014); Gianni et al. (2017b); Gotzamani et al. (2010)
21.	MS documentation subcontracting	Bourlakis et al. (2014); Gianni et al. (2017b); Gotzamani et al. (2010)
	Integration level	
22.	MS policies and objectives	Asif et al. (2010), Simon et al. (2012b)
23.	MS planning based on common standard	Simon and Bernardo (2014), von Ahsen (2014)
24.	MS operation by a single person or department	Simon and Bernardo (2014)
25.	MS performance is evaluated in a unified mode.	Abad et al. (2014)
26.	MS preventive and corrective actions are performed in a unified mode.	Abad et al. (2014), Simon et al. (2012a)
27.	MS non-compliance is monitored in a unified mode.	Abad et al. (2014), Simon et al. (2012a)
28.	MS documents and records control are monitored in a unified mode.	Simon and Bernardo (2014), von Ahsen (2013)
29.	Product design and development are supported by multiple MSs in a unified mode.	Abad et al. (2014), Simon et al. (2012a)
30.	Production is supported by multiple MSs in a unified mode.	Savino & Batbaatar (2015)
31.	Training is supported by multiple MSs in a unified mode.	Tarí & Molina-Azorín (2010)
32.	Purchasing is supported by multiple MSs in a unified mode.	Savino & Batbaatar (2015)
33.	Sales are supported by multiple MSs in a unified mode.	Savino & Batbaatar (2015)

	Internalization Items	*Pertinent literature*
34.	Internal audits are simultaneously conducted in a unified mode.	Abad et al. (2014); von Ahsen (2013); Savino & Batbaatar (2015); Simon et al. (2011)
35.	External audits are simultaneously conducted in a unified mode	Abad et al. (2014);von Ahsen (2013); Simon et al. (2011)
36.	A single, unified report is issued for MSs internal audits.	Simon et al. (2011)
37.	A single, unified report is issued for MSs external audits.	Simon et al. (2011)

	Corporate Sustainability Performance Items	*Pertinent literature*
	Suppliers	
38.	Nonconforming raw materials' rate has decreased.	Tarí & Molina-Azorín (2010); Wagner (2015)
39.	Nonconforming products' rate has decreased.	Tarí & Molina-Azorín (2010)
40.	Relationships with suppliers have improved.	Wagner (2015)
41.	Suppliers' turnover rate has decreased.	Garengo and Biazzo (2013)
42.	Purchasing management has improved.	Wagner (2011)
	Customers	
43.	Customer complaint rate has decreased.	Bou-Llusar et al. (2009); Maletič et al. (2015); Garengo & Biazzo (2013); Simon & Yaya (2012)
44.	Communication with customers has improved.	Garengo & Biazzo (2013); Simon & Yaya (2012); Simon et al. (2012b)
45.	Market share has increased.	Epstein & Roy (2001); Luk et al. (2005), Wagner (2011)
	Investors/Shareholders	
46.	Sales have increased.	Luk et al. (2005); Wagner (2011, 2015);
47.	Earnings have increased.	Luk et al. (2005)
	Financial institutions	
48.	Interest rates have decreased.	Wagner (2011)
49.	Access to loans has improved.	Epstein & Roy (2001); Wagner (2011)
50.	Insurance terms have improved.	Wagner (2011)
	Employees	
51.	Employee turnover rate has decreased.	Bou-Llusar et al. (2009)

	Corporate Sustainability Performance Items	*Pertinent literature*
52.	Absenteeism rate has decreased.	Bou-Llusar et al. (2009); Gianni et al. (2017a)
53.	Employee initiatives have increased.	Bou-Llusar et al. (2009); Simon & Karapetrovic (2012b)
54.	Employee engagement in the management of systems has increased.	Simon et al. (2012b)
55.	Employee participation in decision making has increased.	Simon & Karapetrovic (2012b); Gianni et al. (2017a)
56.	Health and safety measures have improved.	Maletič et al. (2015)
	Environment	
57.	Communication with environmental authorities has improved.	Bozbura et al. (2007); Fresner & Engelhardt (2004); Simon, Karapetrovic andCasadesús (2012b)
58.	Environmental impacts of business activities have decreased.	Maletič et al. (2015); Bou-Llusar et al. (2009)
59.	Water saving has increased.	Maletič et al. (2015); Molina-Azorín et al. (2015)
60.	Energy saving has increased.	Maletič et al. (2015); Molina-Azorín et al. (2015)
61.	Use of recycled materials has increased.	Maletič et al. (2015); Molina-Azorín et al. (2015)
62.	Recycling rate has increased.	Maletič et al. (2015)
	State	
63.	Communication with state authorities has improved.	Bozbura et al. (2007); Fresner & Engelhardt (2004)
64.	Collaboration with public bodies has increased.	Bozbura et al. (2007); Fresner & Engelhardt (2004)
65.	Collaboration with academic and research institutes has increased.	Bozbura et al. (2007)
	Society	
66.	Sponsoring and other measures to support local community have increased.	Ranängen and Zobel (2014)
67.	Rewarding by local authorities, NGOs etc. has increased.	Epstein and Roy (2001)
68.	Corporate image has improved.	Maletič et al. (2015); Rebelo et al. (2016); Savino & Batbaatar (2015); Simon & Karapetrovic (2012b); Wagner (2011)

5.2 Survey methods and tools

A field survey has been designed to collect the empirical data. Questionnaire filling has been standardized by holding constant as many attributes of questionnaire administration as possible, particularly the wording of items. In survey research standardization aims to expose each respondent to the same question experience and to assure the identical recording of the response so, that any differences in the responses may be attributed to differences between respondents rather than differences in the responding process (Fowler and Mangione, 1990).

Two methods were used in order to validate the content of the measuring instrument; firstly, the theoretical foundation and operationalization of the items was established (see Annex) and, secondly, the opinions of domain experts were taken into consideration during the questionnaire pre-testing phase (Malhotra and Grover, 1998). More particularly, a pilot study was conducted in order to pre-test the questionnaire (Oksenberg et al., 1991). The measuring instrument was sent to three companies that were known to have multiple management systems fully or partially integrated. The selected managers were expected to be informants rather than respondents. Their comments and suggestions were taken into account to improve the questions (clarity of expression) and the response process (explanation of terms, items, research purpose and expected outcome) and confirm face validity of the survey instrument. A draft version of the questionnaire was also revised by three researchers/experts (Yan et al., 2012).

The questionnaire includes introductory questions on the demographic profile of a company. A seven-point Likert response scle was used. Certain questions were reversely stated so that "automated" responses would be avoided. Three single-item questions at the end of the questionnaire were posed in order to assure concurrent validity addressing integration resources, integration level and corporate sustainability performance. The questionnaire items are presented in Annex.

The survey questionnaire was addressed to the management systems responsible persons and it was administered by university students. Students took part in a training session dedicated to the purpose of the research, the items included and the interaction with the companies. In the cover letter managers were assured about the confidentiality of the submitted information and they were advised to provide their contact details in case they wished for a summary of the survey results.

5.3 Common method bias

Common method bias may arise when variations in responses are caused by the instrument rather than the actual predispositions of the respondents that the instrument attempts to uncover. In other words, the instrument introduces a bias, hence variances, that might contaminate results by the 'noise' stemming from the biased instrument. Common method bias may arise by a common rater, a common measurement context, a common item context, or from the characteristics of the items themselves. Obviously, in any given study, it is possible for several of these factors to be operative. Therefore, it is important to carefully evaluate the conditions under which data is obtained in order to assess the extent to which method bias may be a problem. Method bias is of higher importance in studies in which data for both the predictor and criterion variable is obtained from the same person in the same measurement context using the same item context and similar item characteristics. These conditions are often present in behavioral research. Most often, Harman's single factor test of bias is applied (Podsakoff and Organ, 1986; Podsakoff et al., 2003). Items are all loaded into one common factor. Unless total variance for a single factor exceeds 50%, common method bias is not an issue.

In this survey the questionnaire was administered to the management system managers. In most of the participating companies the same person is assigned the monitoring of all management systems and, hence, there is a single respondent for each company. In the remaining companies of the sample - where more than one person is responsible for more than one management systems – again the questionnaire is to be filled once since the questions address all management systems concurrently. Thus, since a single questionnaire was completed by each participating company, common method variance is of concern. When testing internalization for common method variance (performing Harman's test), i.e. by loading all items on a single factor, total variance explained is 30.602%, a value quite lower than 50% assuring lack of common method bias. Similarly, when testing corporate sustainability performance for common method variance, i.e. by loading all items on a single factor, total variance explained is 33.067%, which is far less than 50% assuring lack of common method bias.

5.4 Data collection

The questionnaire was administered to Greek companies of all sizes, locations, and types of activity. Sampling was based on data obtained by Hellastat and certification bodies. The only

criterion for participation was for companies to be certified to at least two standards. The field survey took place during the academic year 2017-18. Out of an initial sample of 787 companies, 280 usable responses were collected yielding a response rate of 36.5%, which is quite acceptable in social research (Forza, 2002; Malhotra and Grover, 1998). Sample breakdown by sector, number of employees and revenue is presented in the following Tables 5.2a, 5.2b and 5.2c.

Table 5.2a Sample composition by sector

Sector	Number of companies
Food and beverages	103
Agricultural products	15
Machinery and equipment	9
Metal products	10
Plastic, chemical and associated products	23
Medicines/cosmetics	8
Textiles, clothing, footwear and leather	3
Various industrial products	16
Trade	54
Recycling	3
Maritime	36
Total	280

Table 5.2b Sample composition by size (number of employees)

Employees	Number of companies
1-20	55
21-49	57
50-100	58
101-249	50
250-500	30
More than 501	30
Total	280

Table 5.2c Sample composition by revenue (annual turnover)

Annual Turnover (million €)	Number of companies
0,01-0,99	49
1,00-4,90	85

5,00-49,99	86
50,00-149,99	43
150,00-500,00	10
Over 500,00	7
Total	280

Regarding to the number and the scope of standards, survey results have been processed as follows (Fig. 5.1). According to Figure 5.1, the greatest percentage of companies in the sample apply three management systems simultaneously.

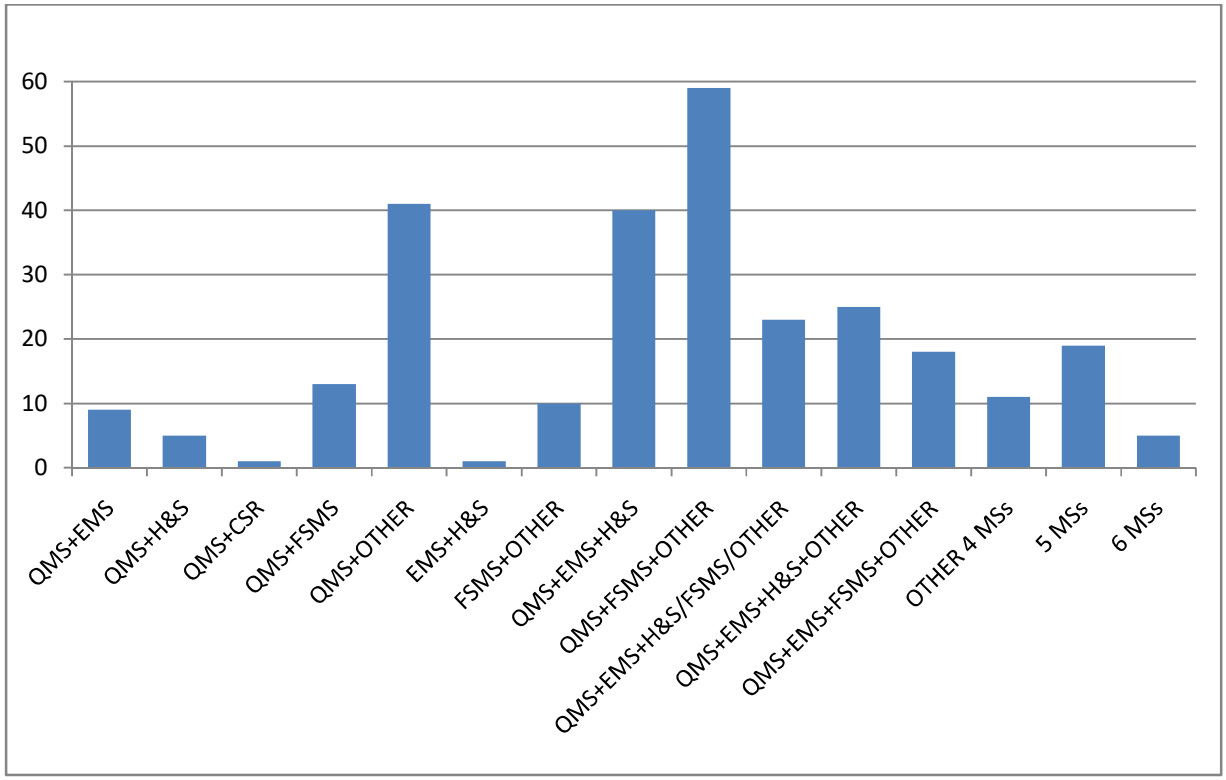


Figure 5.1 Sample breakdown by standards' combination

Statistical processing of data and factor analysis were performed using IBM SPSS Statistics Version 21.0.

5.5 Data testing

Non-response bias refers to failure of estimating a population behavioral feature based on a sample of survey data in which certain types of survey respondents are under-represented. In this case, to test any effects by non-respondents, late vs early responses are Mann-Whitney tested, based on the assumption that the opinions of late respondents are representative of the opinions of the theoretical non-respondents (Armstrong and Overton, 1977) and no significant differences are found. Multicollinearity is not of concern, since all bivariate correlations, i.e. inter-item Pearson coefficients, in the correlation matrices were scanned and found well under the threshold of 0.9 (Pallant, 2011; Tarka, 2018). Moreover, the factor analysis determinants for the two constructs were found equal to $2.268*10^{-12}$ and $8.72*10^{-10}$ respectively far below the critical value of 0.00001 (Field, 2013).

The Bartlett test of sphericity is a statistical test for the presence of correlations among the variables. A statistically significant Bartlett's test of sphericity (sig. < .05) indicates that sufficient correlations exist among the variables to proceed. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy ranges from 0 to 1 reaching 1 when each variable is perfectly predicted without error by the other variables. A KMO value close to zero indicates that the sum of partial correlations is large relative to the sum of correlations indicating diffusion in the pattern of correlations (hence factor analysis is likely to be inappropriate). A value close to one indicates that patterns of correlations are relatively compact allowing factor analysis to yield distinct and reliable factors (Field, 2013). Kaiser-Meyer-Olkin (KMO) values higher than 0.80 are considered 'meritorious', whilst KMO values higher than 0.90 are considered 'marvellous' (Hutcheson and Sofroniou, 1999). KMO value for internalization is 0.894 and for CSP is 0.888 indicating that EFA was suitable for the data. Sphericity (approx. chi-square) values are 7139.539 (666 degrees of freedom) and 5586.791 (df: 465) for internalization and CSP (sig. < 0.001), implying that there are patterned relationships between the items and that the intercorrelation matrix contained enough common variance to apply factor analysis (See Tables 5.3a, 5.3b).

Table 5.3a Internalization: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.890
Bartlett's Test of Sphericity	Approx. Chi-Square	7139.539
	df	666
	Sig.	.000

Table 5.3b CSP: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.888
Bartlett's Test of Sphericity	Approx. Chi-Square	5586.791
	Df	465
	Sig.	.000

5.6 Concurrent validity

Criterion-related validity or concurrent / predictive validity refers to the ability of the scale to predict or at least relate to one or more external variables. Predictive validity is tested by juxtaposing external (criterion) variables that have well documented theoretical relationships to the scale or otherwise by comparing multiple-item with single-item measures of a construct (Bergkvist and Rossiter, 2007). As the field of production and operations management (POM) matures, researchers stress the significance of predictive validity within a theoretical network of constructs (Malhotra and Grover, 1998).

Upon a closer inspection of the notion of criterion validity, it is useful to distinguish between two kinds of it, predictive and concurrent criterion validity (often they are correspondingly referred to, for short, as predictive and concurrent validity). Predictive validity is the extent to which test scores predict criterion measurements to be made in the future, e.g., after a certain period of time. Conversely, concurrent validity reflects the strength of relationship between test scores and criterion measurements made at the time of questionnaire administration or shortly thereafter. We typically speak of concurrent validity for a given test when the criterion scores are available at the same time, at least approximately, as we obtain the test measurements. Both types of criterion validity can be assessed with evidence for a relationship between test and criterion (Raykov and Marcoulides, 2011: pp. 187-188).

In this research concurrent validity is tested via three single-item measures using bootstrapping in order to obtain more robust results (Field, 2013). The three single-items measures (questions A, B, C) can be found at the end of the questionnaire (see Annex). For the first single-item measure (probe_resources) the correlation (Spearman's rho coefficient=0.434) is found significant at the 0.01 level. The confidence interval does not cross zero (0.328 – 0.527) and the significance value is lower than 0.01, meaning that there is a significant positive relationship between the two measures. For the second single-item measure (probe_level) the correlation (Spearman's rho coefficient=0.518) is also found significant at the 0.01 level. The confidence interval does not cross zero (0.419 – 0.612) and the significance value is lower than 0.01, meaning that there is a significant positive relationship between the two measures. For the third second single-item measure (probe_CSP) the correlation (Spearman's rho coefficient=0.483) is found significant at the 0.01 level. The confidence interval (with bootstrapping) does not cross zero (0.383 – 0.574) and the significance value is lower than 0.01, meaning that there is a significant positive relationship between the two measures, as well (Tables 5.4a, 5.4b, 5.4c).

Table 5.4a Criterion validity for resources

Correlations				
			Resource	Probe_Resources
Spearman's rho	Resource	Correlation Coefficient	1.000	.434**
		Sig. (2-tailed)	.	.000
		N	280	280
	Probe_Resources	Correlation Coefficient	.434**	1.000
		Sig. (2-tailed)	.000	.
		N	280	280

Correlations						
					Resource	Probe_ Resources
Spearman's rho	Resource		Correlation Coefficient		1.000	.434**
			Sig. (2-tailed)		.	.000
			N		280	280
		Bootstrap[b]	Bias		.000	-.002
			Std. Error		.000	.051
			95% Confidence Interval	Lower	1.000	.328
				Upper	1.000	.527
	Probe_ Resources		Correlation Coefficient		.434**	1.000
			Sig. (2-tailed)		.000	.

Correlations					
				Resource	Probe_ Resources
	N			280	280
	Bootstrap[b]	Bias		-.002	.000
		Std. Error		.051	.000
		95% Confidence Interval	Lower	.328	1.000
			Upper	.527	1.000

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

b. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Table 5.4b Criterion validity for IMS level

Correlations				
			Probe_Level	Level
Spearman's rho	Probe_Level	Correlation Coefficient	1.000	.518**
		Sig. (2-tailed)	.	.000
		N	280	280
	Level	Correlation Coefficient	.518**	1.000
		Sig. (2-tailed)	.000	.
		N	280	280

Correlations					
				Level	Probe_Level
Spearman's rho	Level	Correlation Coefficient		1.000	.518**
		Sig. (2-tailed)		.	.000
		N		280	280
		Bootstrap[b] Bias		.000	-.001
		Bootstrap[b] Std. Error		.000	.050
		Bootstrap[b] 95% Confidence Interval	Lower	1.000	.419
			Upper	1.000	.612
	Probe_Level	Correlation Coefficient		.518**	1.000
		Sig. (2-tailed)		.000	.
		N		280	280
		Bootstrap[b] Bias		-.001	.000
		Bootstrap[b] Std. Error		.050	.000
		Bootstrap[b] 95% Confidence Interval	Lower	.419	1.000
			Upper	.612	1.000

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

b. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

Table 5.4c Criterion validity for corporate sustainability performance

Correlations				
			CSP	Probe_CSP
Spearman's rho	CSP	Correlation Coefficient	1.000	.483**
		Sig. (2-tailed)	.	.000
		N	280	280
	Probe_CSP	Correlation Coefficient	.483**	1.000
		Sig. (2-tailed)	.000	.
		N	280	280

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

Correlations					
				CSP	Probe_CSP
Spearman's rho	CSP		Correlation Coefficient		1.000	.483**
			Sig. (2-tailed)		.	.000
			N		280	280
		Bootstrap[b]	Bias		.000	.001
			Std. Error		.000	.048
			95% Confidence Interval	Lower	1.000	.383
				Upper	1.000	.574
	Probe_CSP		Correlation Coefficient		.483**	1.000
			Sig. (2-tailed)		.000	.
			N		280	280
		Bootstrap[b]	Bias		.001	.000
			Std. Error		.048	.000
			95% Confidence Interval	Lower	.383	1.000
				Upper	.574	1.000

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

b. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples

In the next chapter, survey results are processed via SPSS and AMOS software. The extracted factors and the best fit structural and measurement models are presented.

CHAPTER 6. SURVEY FINDINGS

6.1 Exploratory factor analysis

Factors are extracted by applying principal component analysis. Final component matrix for internalization (Table 6.1) was rotated using Varimax method with Kaiser normalization and rotation converged in seven iterations (Table 6.2). Seven latent factors are revealed and labeled as internal processes integration level, human resources' awareness, audits integration level, strategy, information systems, outsourcing, integration tools (see Fig. 6.1). Firstly, corporate culture, Department, IntAuditPlan, Experience have been excluded from the parcels due to cross factor loadings. Next, training has been eliminated due to low loading. The IT_tools, Standard and Ex_task have been removed due to low Communality values (lower than 0.55), since removing items with low communality values refines the scale and tends to increase the total variance explained (Hair et al., 2013; Pallant, 2011).

Table 6.1 Initial rotated component matrix for internalization

	Component							
	1	2	3	4	5	6	7	8
Records	.870							
non_Compliance	.867							
Risk	.861							
Production	.857							
Design	.841							
Purchasing	.814							
Assessment	.765							
Sales	.755							
Training	.743							
Policy_goals	.634							
Department	.475							.462
Employee_benefits		.816						
Managers_benefits		.746						
Engagement		.744						
MS_training		.660						
Ext_audit_report			.876					
Ext_audit_plan			.866					

	Component							
	1	2	3	4	5	6	7	8
Int_audit_report			.863					
Int_audit_plan	.487		.578					
TopM_engage				.752				
TopM_commit				.666				
TopM_assess				.629				
IT_tools				.498				
Experience		.406		.476				
Big_Data					.858			
DSS					.748			
ERP					.696			
Ex_task					.614			
IntAudit_outsource						.862		
Doc_outsource						.845		
MS_outsource						.830		
Common_elements							.753	
Common_frame							.715	
Process_map							.558	
PDCA							.427	
Standard								.448

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 13 iterations.

Table 6.2 Internalization – Final Rotated Component Matrix

		Component						
Factors	Items	1	2	3	4	5	6	7
Internal processes integration level	Records	.883						
	non_Compliance	.880						
	Risk	.877						
	Production	.858						
	Design	.847						
	Purchasing	.819						
	Assessment	.775						
	Sales	.755						
	Policy_goals	.650						
Awareness	Employee_benefits		.827					
	Engagement		.741					
	Managers_benefits		.738					
	MS_training		.660					
Audits	Ext_audit_report			.876				

		Component						
Factors	Items	1	2	3	4	5	6	7
integration level	Ext_audit_plan			.868				
	Int_audit_report			.863				
Strategy	TopM_engage				.767			
	TopM_commit				.683			
	TopM_assess				.641			
Outsourcing	IntAudit_outsource					.861		
	Doc_outsource					.844		
	MS_outsource					.829		
Information systems	Big_Data						.849	
	DSS						.738	
	ERP						.705	
Integration tools	Common_elements							.757
	Common_frame							.704
	Process_map							.588

At the beginning of the output a table labelled "Communalities" is presented. A communality value indicates the extent to which an item correlates with all other items. In other words, the higher the communalities, the better the correlation. The researchers may consider deletion of variables that while having significant loadings are poorly accounted for by the factor solution (Hair et al., 2013). Low values (e.g. less than .3) could indicate that the item does not fit well with the other items in its component. For internalization, the item IT tools has the lowest communality value (0.410) for the seven-factor solution, and it also shows the lowest loading (0.498) on the fourth component (see Table 8.3a). In order to improve or refine the scale, this information is used to remove this item from the scale. Removal of items with low communality values tends to increase the total variance explained (Pallant, 2011).

Table 6.3 Communalities for internalization

	Extraction
IT_tools	.410
Standard	.491
Ex_task	.526
Department	.532
Experience	.558
Policy_goals	.577

ERP	.585
Int_audit_plan	.612
MS_training	.613
PDCA	.618
TopM_assess	.626
Common_frame	.659
Engagement	.666
Corp_culture	.668
DSS	.670
Common_elements	.672
TopM_commit	.683
MS_outsource	.697
Employee_benefits	.698
Managers_benefits	.700
Process_map	.727
Training	.745
Doc_outsource	.749
IntAudit_outsource	.762
Big_Data	.785
TopM_engage	.792
Design	.794
Production	.801
Ext_audit_plan	.803
Sales	.806
Assessment	.807
Records	.812
Ext_audit_report	.830
Purchasing	.835
Int_audit_report	.837
non_Compliance	.843
Risk	.848

Extraction Method: Principal Component Analysis.

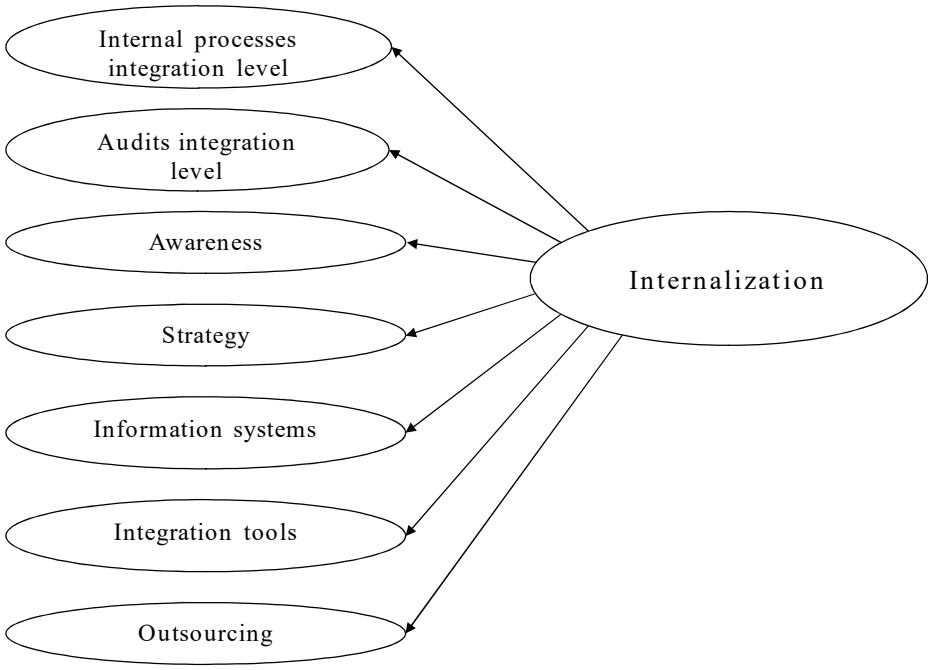


Figure 6.1 Internalization factors

69.314% of total variance is explained, as shown in the following table (Table 6.4).

Table 6.4 Proportion of total Variance explained for internalization factors

Rotation Sums of Squared Loadings		
Total	***% of Variance***	***Cumulative %***
7.009	21.904	21.904
3.158	9.870	31.774
2.617	8.177	39.951
2.529	7.903	47.854
2.413	7.541	55.396
2.386	7.458	62.853
2.068	6.461	69.314

Respectively, for corporate sustainability performance varimax rotation identified seven latent factors that are labeled customer-supplier relationship, employees, environment, financial institutions, investors/shareholders, society and state (see Fig. 6.2). None cross-loading was spotted. Rotated component matrix is shown in Table 6.5.

Table 6.5 Corporate Sustainability Performance - Rotated component matrix

Factors	Items	Component						
		1	2	3	4	5	6	7
Customer-Supplier relationship	Products	.783						
	Raw_materials	.780						
	Supplier_relationship	.735						
	Customer_complaint_rate	.723						
	Customer_comm	.642						
	Purchasing_management	.596						
	Supplier_turnover	.557						
Employees	Absenteism		.750					
	Employee_engagement		.736					
	Employee_decision_making		.722					
	Employee_turnover		.709					
	Employee_initiative		.685					
Environment	Renewables			.709				
	Water			.702				
	Energy			.686				
	Env_impacts			.685				
	Recycling			.539				
Financial institutions	Loans				.865			
	Interest_rate				.773			
	Insurance				.752			
Investors/ Shareholders	Sales_level					.786		
	Earnings					.765		
	Market_share					.697		
Society	Sponsoring						.806	
	Community						.712	
	Image						.604	
State	State_collaboration							.854
	Research							.736
	State_control							.697

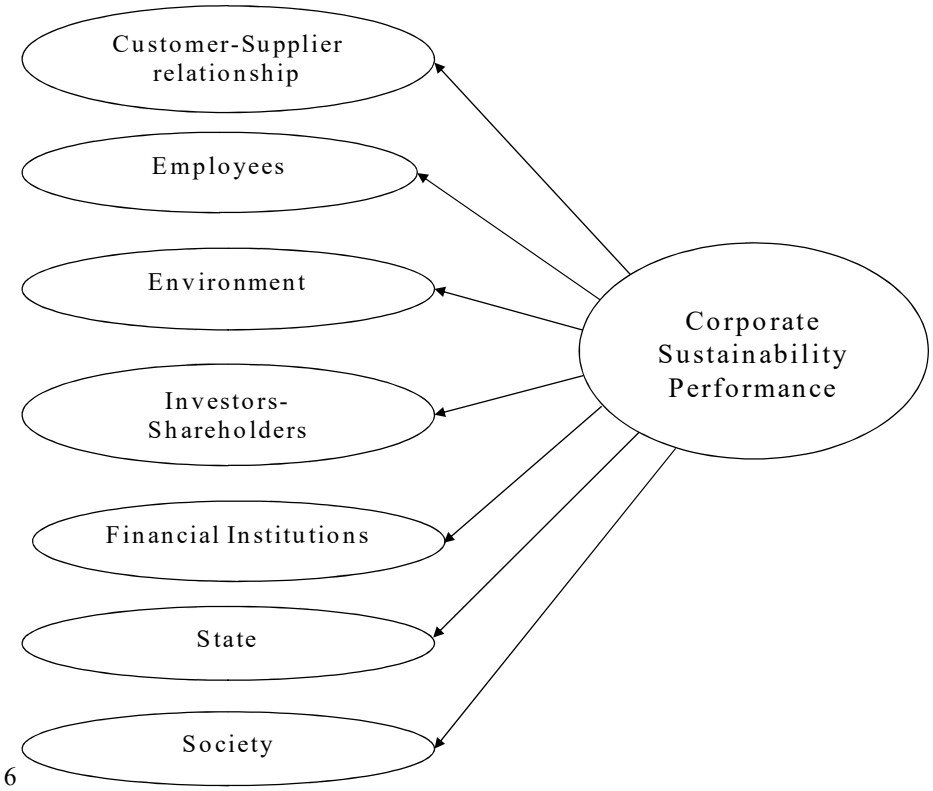
Factors are extracted by applying principal component analysis. Component matrix was rotated using Varimax method with Kaiser normalization and rotation converged in eight iterations. All communalities are found significantly higher than 0.5.

For CSP, the item “Health and Safety has the lowest communality value (0.504) for the seven-factor solution, and it also shows the lowest loading (0.498) on the fourth component (see Table 6.6). In order to improve or refine the scale, this information is used to remove this item from the scale.

Table 6.6 Communalities for CSP

	Initial	Extraction
Raw_materials	1.000	.721
Products	1.000	.734
Supplier_relationship	1.000	.673
Supplier_turnover	1.000	.633
Purchasing_management	1.000	.630
Customer_complaint_rate	1.000	.691
Customer_comm	1.000	.674
Market_share	1.000	.776
Sales_level	1.000	.841
Earnings	1.000	.775
Interest_rate	1.000	.768
Loans	1.000	.859
Insurance	1.000	.732
Employee_turnover	1.000	.698
Absenteism	1.000	.772
Employee_initiative	1.000	.688
Employee_engagement	1.000	.718
Employee_decision_making	1.000	.661
Health_safety	1.000	.504
Env_authorities	1.000	.739
Env_impacts	1.000	.750
Water	1.000	.705
Energy	1.000	.810
Renewables	1.000	.681
Recycling	1.000	.622
State_control	1.000	.827
State_collaboration	1.000	.849
Research	1.000	.695
Sponsoring	1.000	.773
Community	1.000	.763
Image	1.000	.709

Extraction Method: Principal Component Analysis.



6

Figure 6.2 CSP factors

69.155% of total variance is explained, as showin the following table (Table 6.6).

Table 6.6 Proportion of total Variance explained for CSP factors

Rotation Sums of Squared Loadings		
Total	***% of Variance***	***Cumulative %***
4.303	13.881	13.881
3.869	12.479	26.360
3.382	10.909	37.269
2.971	9.585	46.854
2.522	8.135	54.989
2.209	7.127	62.116
2.182	7.039	69.155

6.2 EFA discriminant validity testing

Discriminant validity reflects the extent to which a construct is truly distinct from other constructs both in terms of how much it correlates with other constructs and how distinctly measured variables represent only this single construct. Thus, high discriminant validity provides evidence that a construct is unique and captures some phenomena other measures do not. The results of the exploratory factor analysis do support discriminant validity, since the items of each identified component load strongly on a single factor or - in other words - all individual measured items represent only one latent construct with the absence of cross-loadings (Hair et al., 2014: 624-625). Certain observable variables that were found to cross load were eliminated.

6.3 Model reliability and validity

A reliability analysis is performed to test the internal consistency of the constructs (see Tables 6.7a and 6.7b). Literature suggests 0.6 as the minimum acceptable value for Cronbach's alpha (Cronbach, 1951) reliability coefficient (Hair et al. 2014; Nunnally and Bernstein, 1994). The generally agreed upon lower limit for Cronbach's alpha is 0.7 (Robinson et al., 1991a;b), although it may decrease to 0.6 in exploratory (early stages of) research (Nunnally, 1978;

Robinson et al., 1991a). One issue in assessing Cronbach's alpha is its positive relationship to the number of items in the scale. Because increasing the number of items, even with the same degree of intercorrelation, will increase the reliability value, researchers must place more stringent requirements for scales with large numbers of items (Hair et al., 2014).

Table 6.7a Scale reliability analysis for the internalization factors

Factor	Cronbach's alpha
Internal Processes Integration Level	0.956
Audits Integration Level	0.881
Human Resources	0.830
Strategic Resources	0.830
Information Systems	0.758
Integration tools	0.674
Outsourcing	0.824

Table 6.7b Scale Reliability Analysis for CSP factors

Factor	Cronbach's alpha
Customer-Supplier Relationship	0.871
Employees	0.872
Environment	0.844
Investors/Shareholders	0.889
Financial Institutions	0.891
Society	0.834
State	0.801

In this particular measuring instrument, the value of Cronbach coefficients for the majority of the factors is found higher than 0.8 indicating a significantly high consistency. However, there are certain internalization subscales (information systems and integration tools) with alpha values

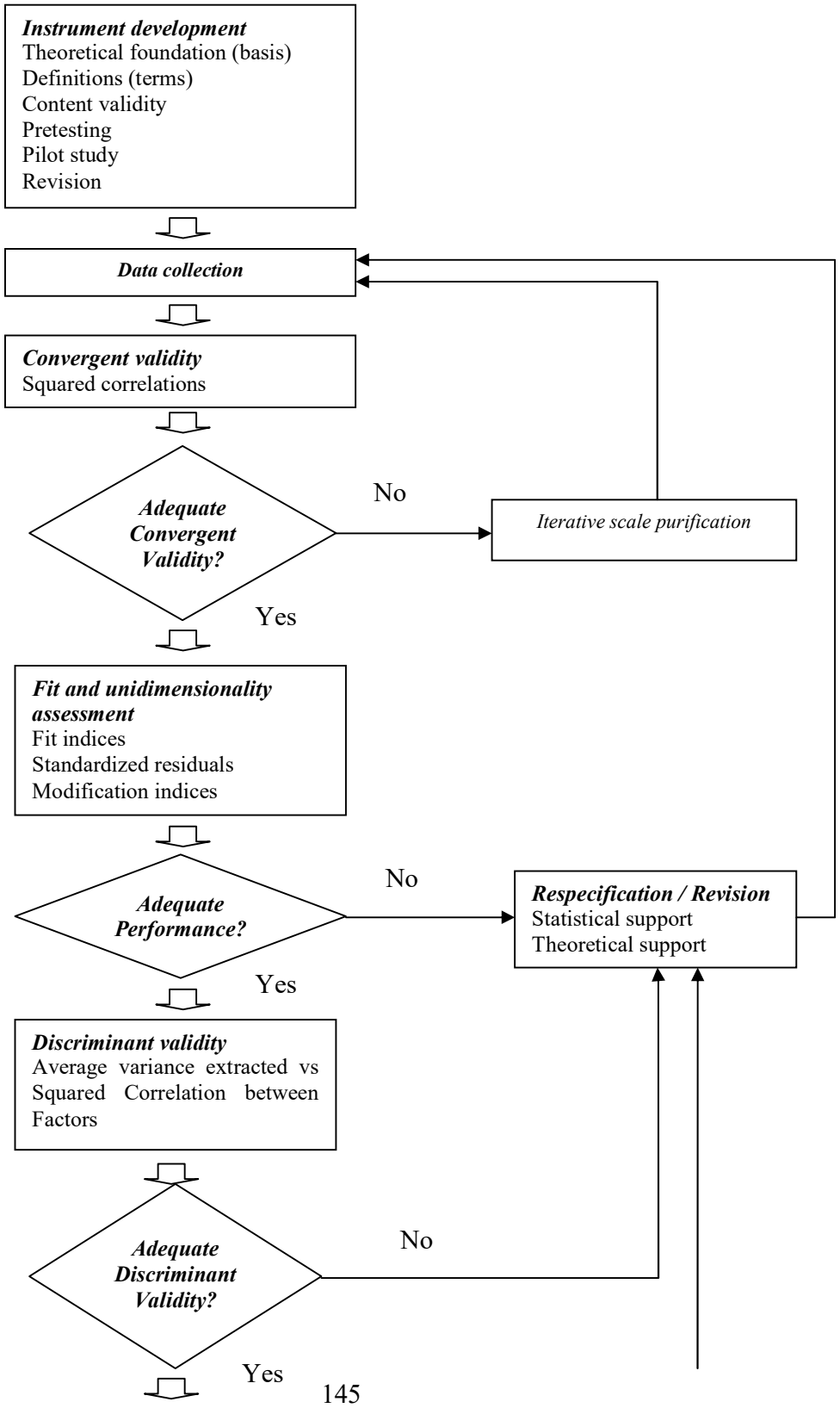
lower than 0.8. So far, research has revealed a high diversification when it comes to integration methods and tools within companies. A more method-focused investigation could reveal what specific tools and information systems are used by companies when integrating their management systems.

Furthermore, there are certain CSP subscales with three items that have high alpha values, i.e. financial institutions, society and state. In general, reliability coefficient is found significantly high for all CSP subscales. This shows that CSP measuring instrument is more reliable/robust.

For the identified composite factor named "Customers-Suppliers relationship", which includes items of both stakeholders (suppliers and customers), a comparison of Cronbach's Alpha coefficients is conducted (prior and post exploratory factor analysis). Prior EFA alpha coefficient was equal to 0.838 for suppliers and 0.775 for customers, whilst post EFA alpha coefficient for Supplier-Customer relationship was found as high as 0.871.

6.4 Confirmatory factor analysis – Structural equation modeling methodology

A step-by-step approach is followed as shown in the following figure (Fig. 6.3).



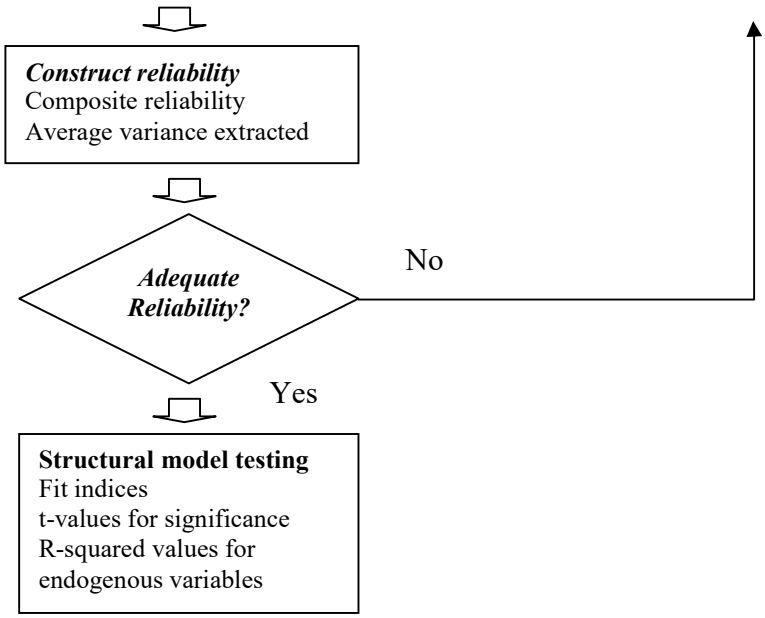


Figure 6.3 Measurement properties: Steps of assessment (adapted by Koufteros, 1999)

6.5 CFA discriminant validity and average variance extracted

Discriminant validity reflects the extent to which a construct is truly distinct from other constructs both in terms of how much it correlates with other constructs and how distinctly measured variables represent only this single construct. Thus, high discriminant validity provides evidence that a construct is unique and captures some phenomena that other measures do not (Hair et al., 2014: 624-625). Discriminant validity is tested by comparing the average variance extracted with the highest squared correlation estimate for each factor assuring that any of the latent constructs explain more of the variance in its item measures than it shares with another construct. As shown in the following tables (Tables 6.8 and 6.9) all max squared correlations are lower than the respective AVE values.

Average variance extracted (AVE) is a summary measure of convergence among a set of items representing a latent construct. It is the average percentage of variation explained (variance extracted) among the items of a construct. AVE values are presented in the following tables (see Tables 6.8 and 6.9).

Table 6.8 Convergent validity testing for internalization

Variable	Construct Reliability	Average Variance Extracted	Max Squared Correlation
Awareness	0.830	0.550	0.350
Tools	0.683	0.422	0.362
Outsourcing	0.825	0.613	0.036
IntLevel	0.954	0.699	0.224
Info Systems	0.776	0.482	0.048
Strategy	0.840	0.639	0.362
Audit Level	0.907	0.764	0.172

AVE value for (Integration) “Tools” and “Information Systems” are found less than 0.50. AVE values should generally be higher than 0.5, yet values between 0.4 and 0.5 are accepted when composite (or construct) reliability is higher than 0.6, since the convergent validity of the construct is considered adequate (Fornell and Larcker, 1981).

Table 6.9 Convergent validity testing for CSP

Variable	Construct Reliability	Average Variance Extracted	Max Squared Correlation
State	0.821	0.613	0.220
CustSupRel	0.871	0.493	0.285
Environment	0.835	0.504	0.438
Employees	0.873	0.579	0.432
FinInst	0.894	0.738	0.294
Society	0.837	0.632	0.438
InvShare	0.891	0.732	0.317

The AVE value for CustSupRel is slightly below 0.50. However, as explained above, values of AVE between 0.4 and 0.5 are accepted when composite (or construct) reliability (CR) is higher than 0.6 (Fornell and Larcker, 1981).

Next, confirmatory factor analysis is performed at first- and second- variable order level.

A graphical representation follows to better explain the regression method (Fig. 6.4).

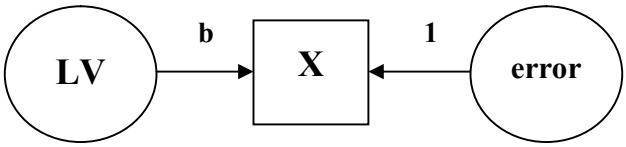


Figure 6.4 CFA with a single latent variable and a single measuring (manifest) item (adapted by van der Schoot et al., 2012)

An underlying mechanism causing the variance in X is assumed, denoted by the latent variable (LV). The regression equation has the following form:

$$X = b_0 + b_1 \text{ x } LV + b_2 \text{ x error}$$

where b_0 is the intercept, b_1 is the regression coefficient (the factor loading in the standardized solution) between the latent variable and the item, and b_2 is the regression coefficient between the residual variance (i.e., error) and the manifest item (observable variable). For model identification purposes the error regression coefficient (b_2) is fixed to equal 1. Moreover, if the means of LV and the error are constrained at zero, the intercept of X is estimated. If the intercept and the error mean are constrained at zero, then the mean of LV is estimated (van der Schoot et al., 2012).

6.6 First-order CFA for internalization

Standardized RMR = 0.0614

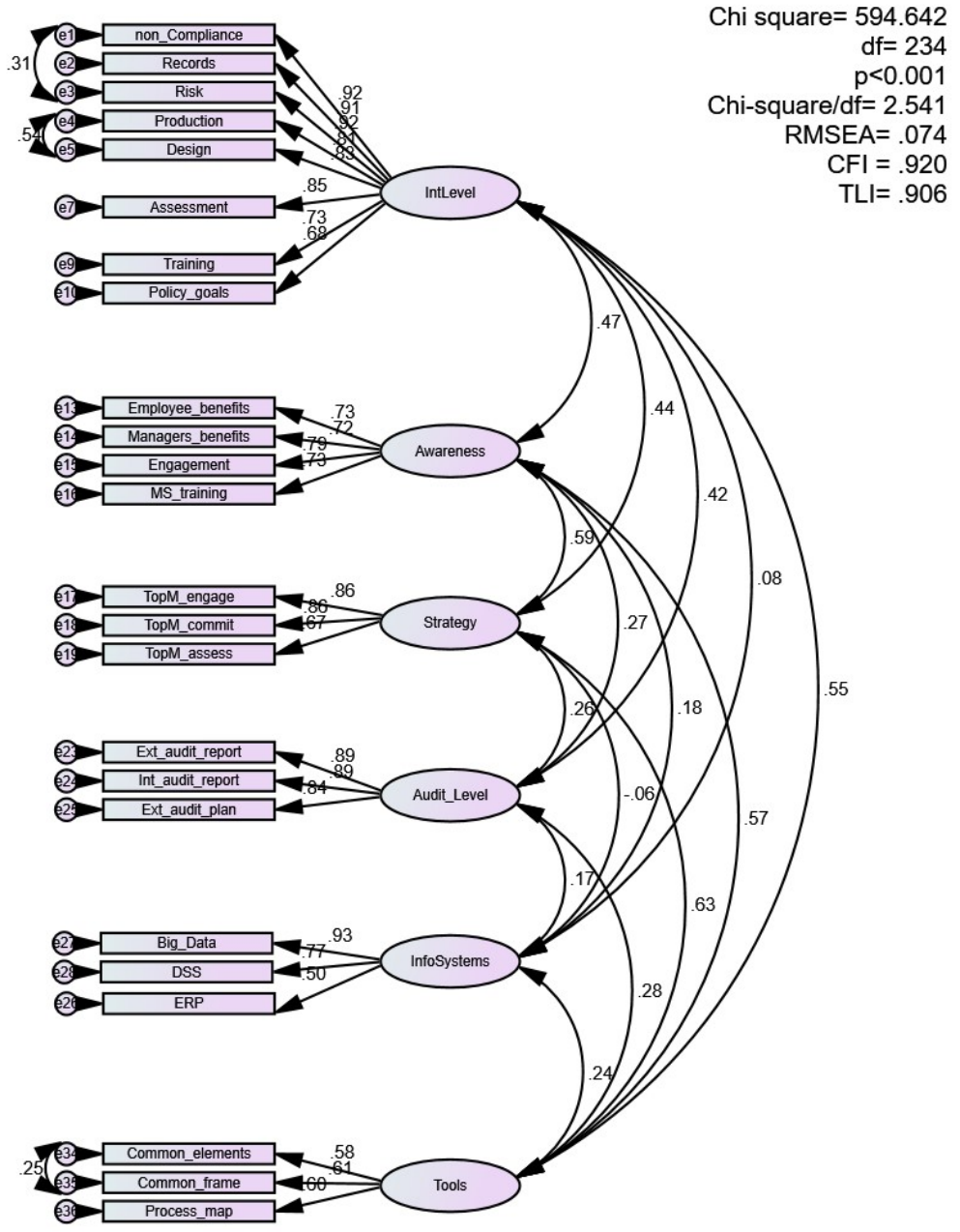


Figure 6.5a First-order CFA for internalization

6.7 Second-order CFA for internalization

Standardized RMR = 0.0747

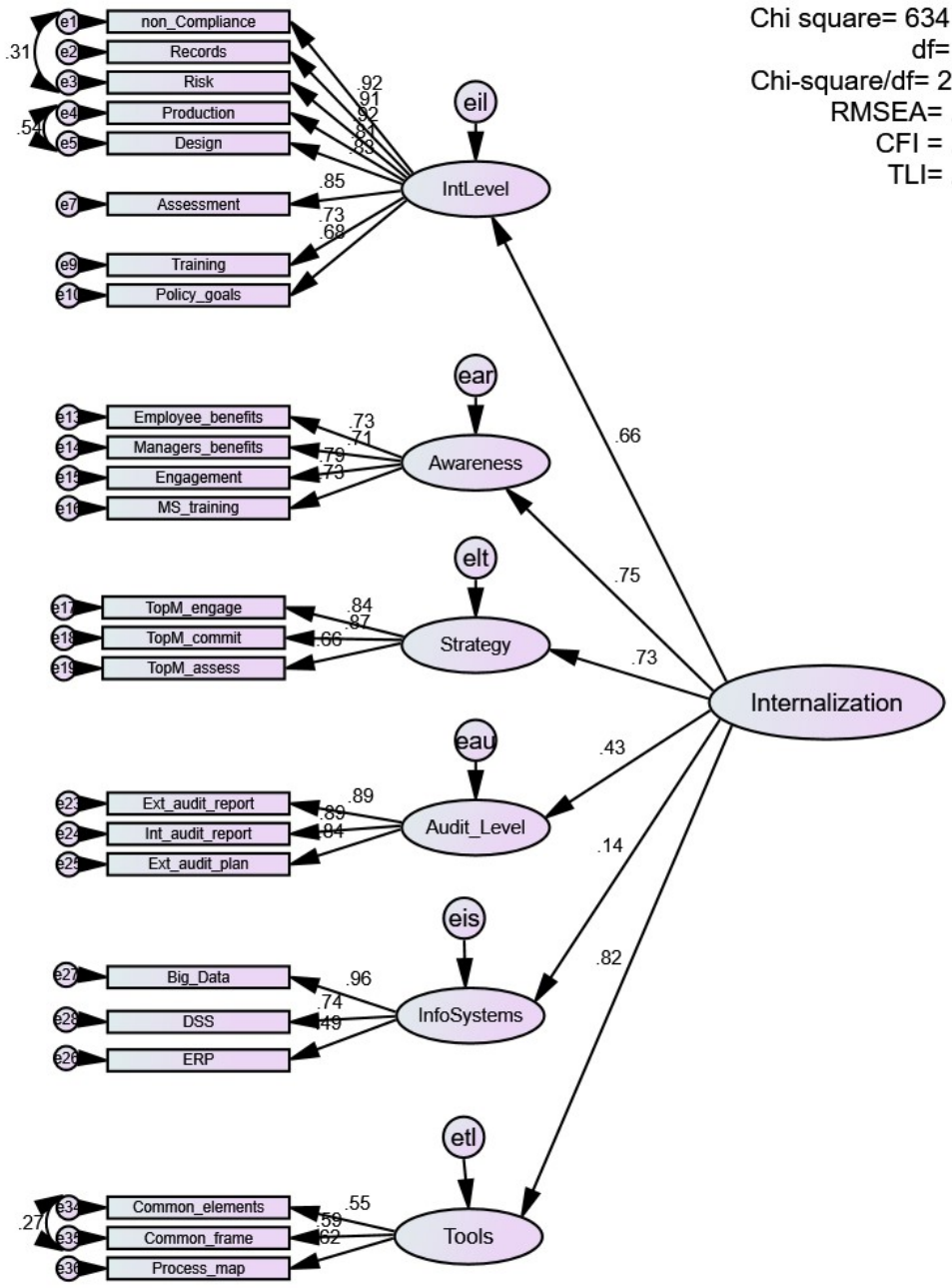


Figure 6.5b Second-order CFA for internalization

6.8 First-order CFA for CSP

Standardized RMR = 0.0578

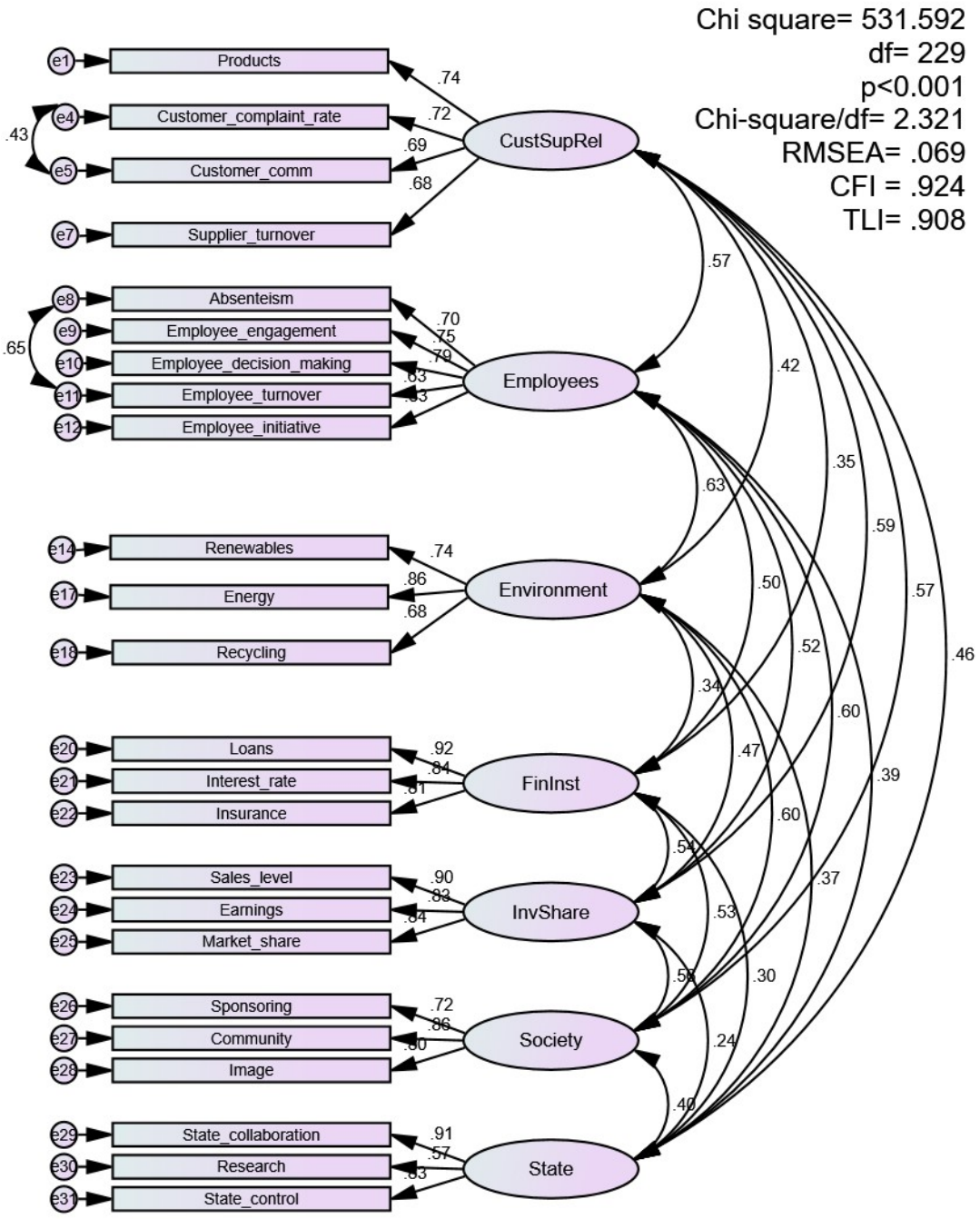


Figure 6.6a First-order CFA for CSP

6.9 Second-order CFA for CSP

Standardized RMR = 0.0658

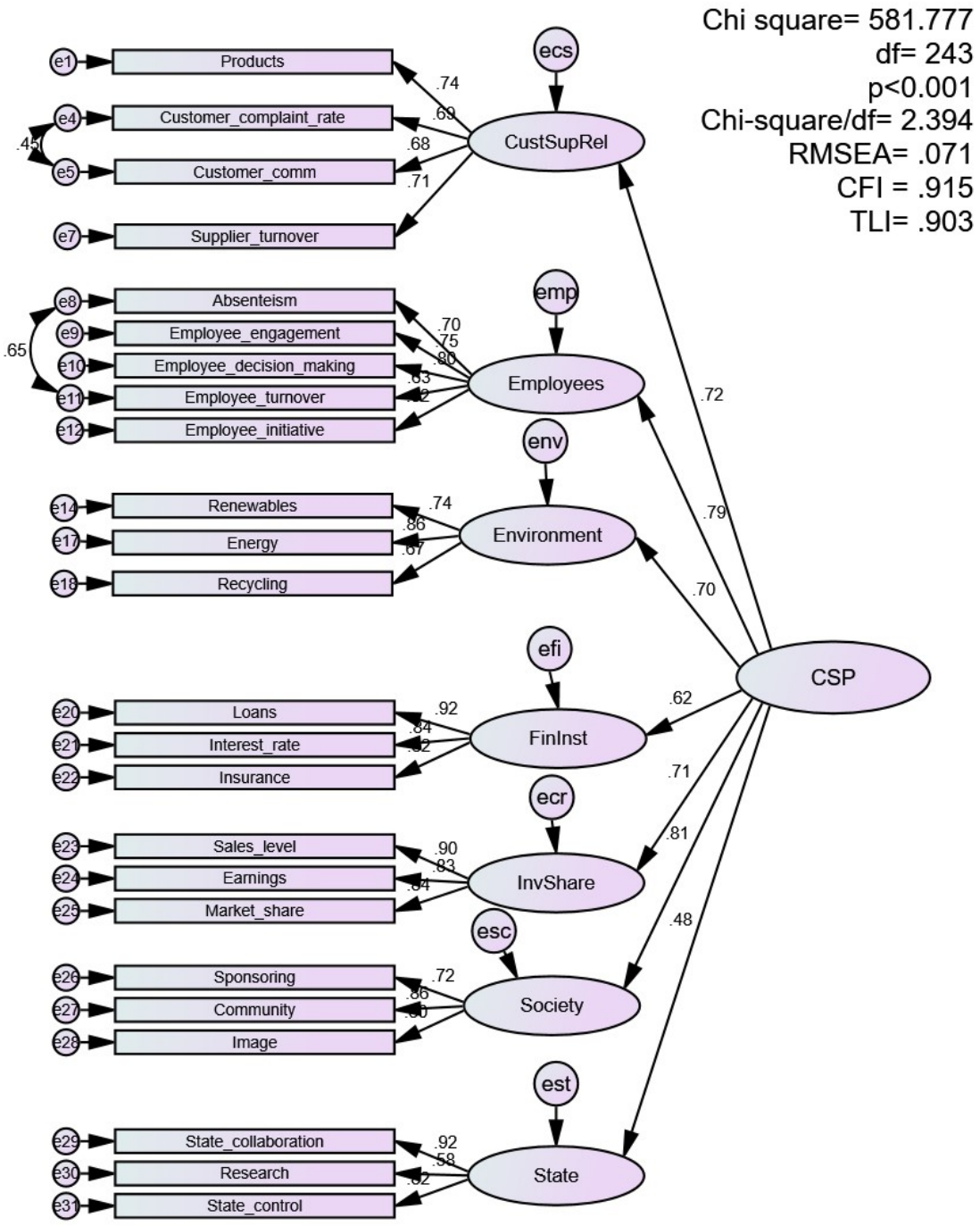


Figure 6.6b Second-order CFA for CSP

Confirmatory factor analysis has established face (content) validity of the constructs. The goodness of fit indices support a second-order measuring scale for both constructs. Moreover, target coefficient values are well in the high acceptance range:

Target coefficient=X^2 of the first-order CFA / X^2 of the second-order CFA

Target coefficient for internalization = 594.642/634.541=0.937121

Target coefficient for CSP = 531.592/581.777=0.913738

According to Runge et al. (2004) and Doll et al. (1995) values of target coefficient ranging from 0.8 to 1.0 imply that a higher order latent factor can explain the covariance among the first order latent factors.

In this research framework the hypothesis (H1) to be tested is:

The internalization of integrated management systems has a significant positive impact on corporate sustainability performance (CSP), see Fig. 6.7 (see Chapter 4 for theoretical grounding).

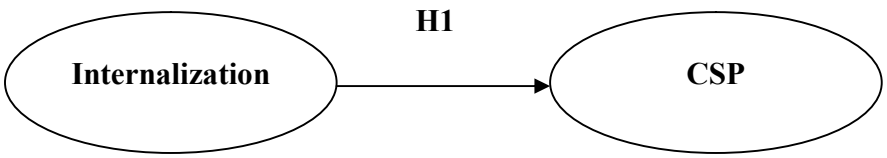


Figure 6.7 Main research hypothesis

In the following paragraphs the main research hypothesis is tested through structural equation modeling.

6.10 Structural equation modeling

Structural equation modeling is used in order to investigate multiple relationships of dependent and independent variables (Hair et al., 2014: 11). The structural model contains paths between latent variables. The initial structural model is depicted as follows (Fig. 6.8).

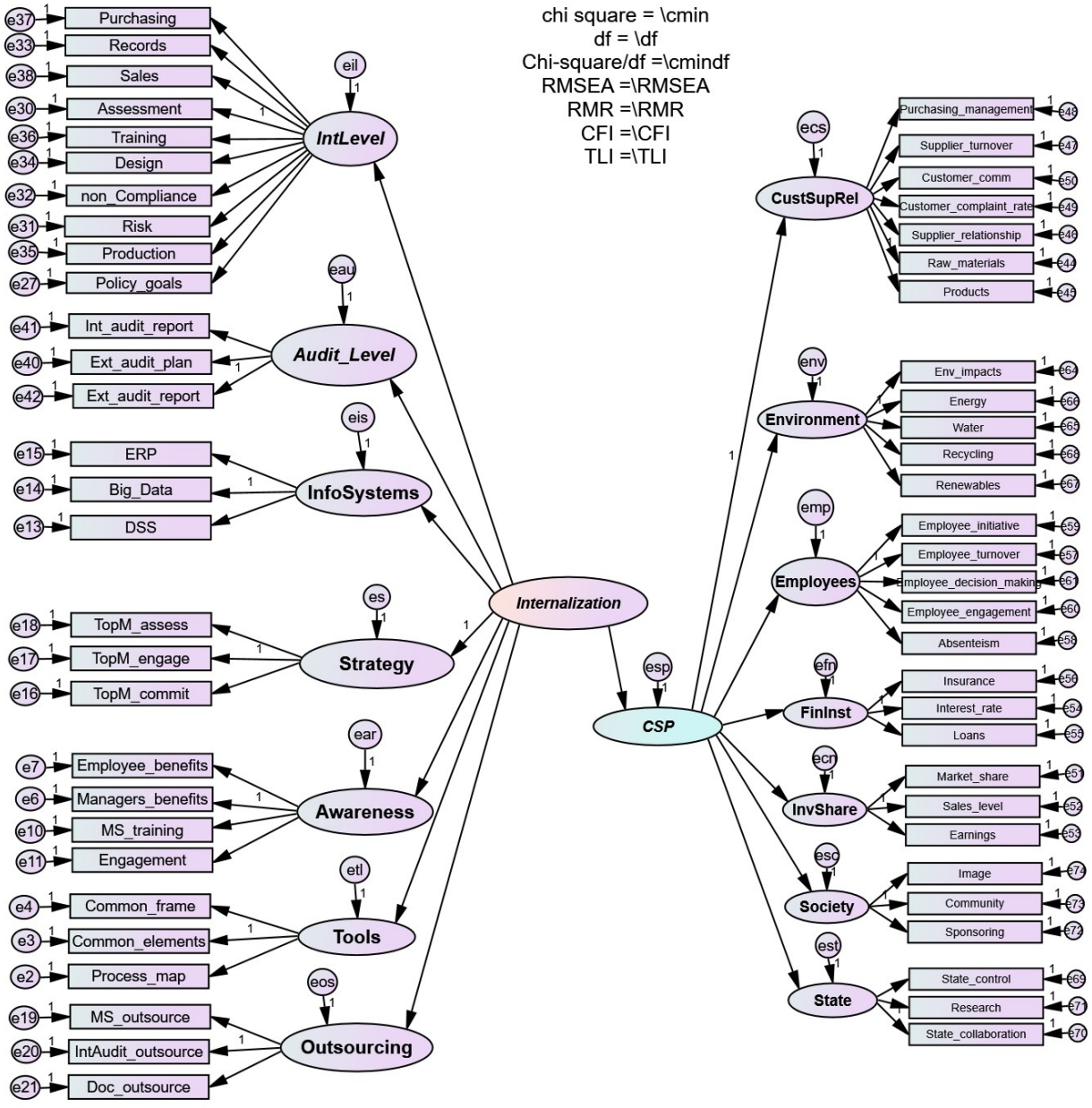


Figure 6.8 Structural model

For the initial structural model (Fig 6.9a) the Standardized RMR was found equal to 0.0926. Further improvements followed to achieve best fit according to Hair et al. (2014).

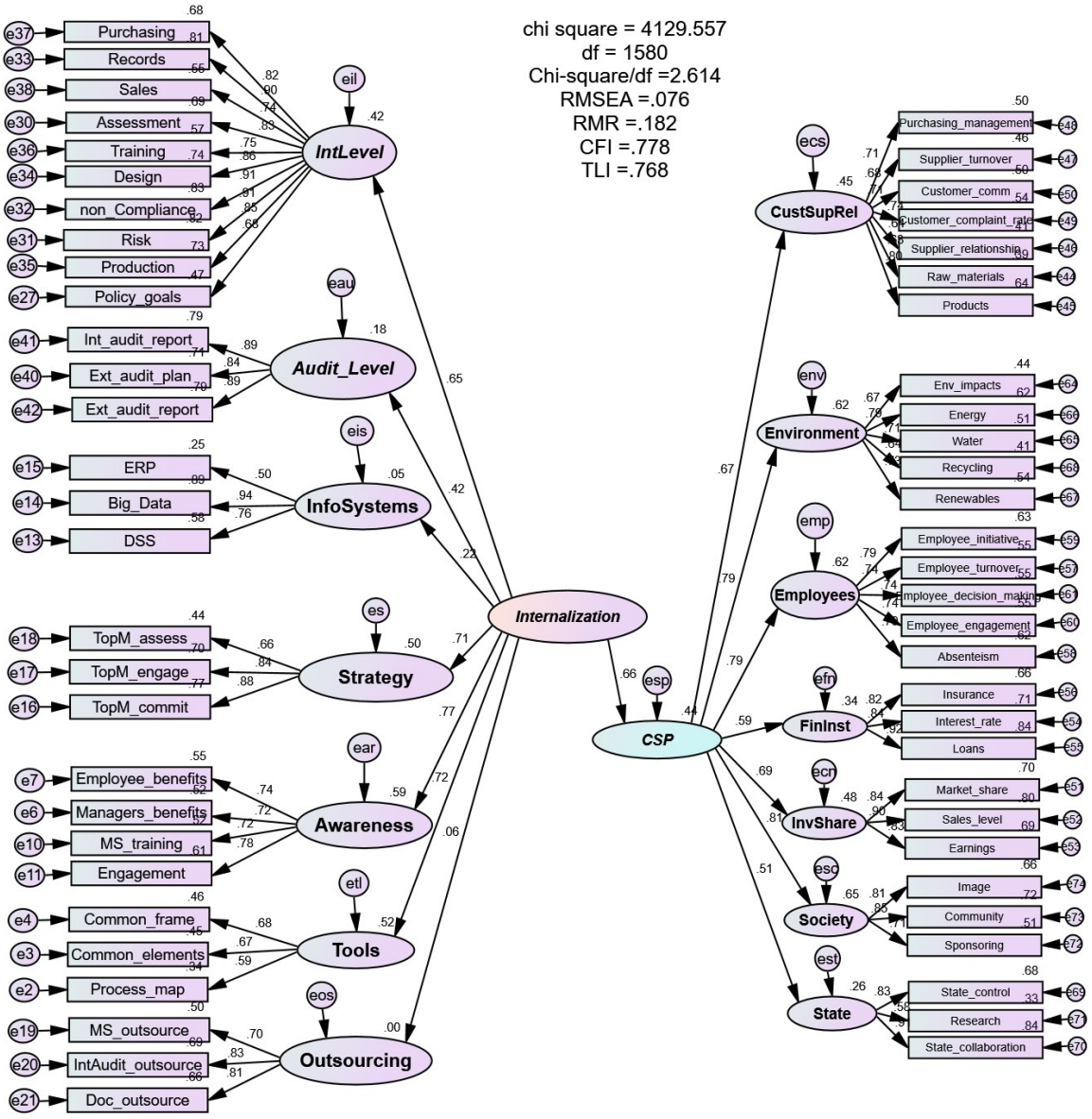


Figure 6.9a The initial structural model with unstandardized loading estimates

After removing training and environmental authorities indicators the Standardized RMR is reduced to 0.0873 (see fig. 6.9b).

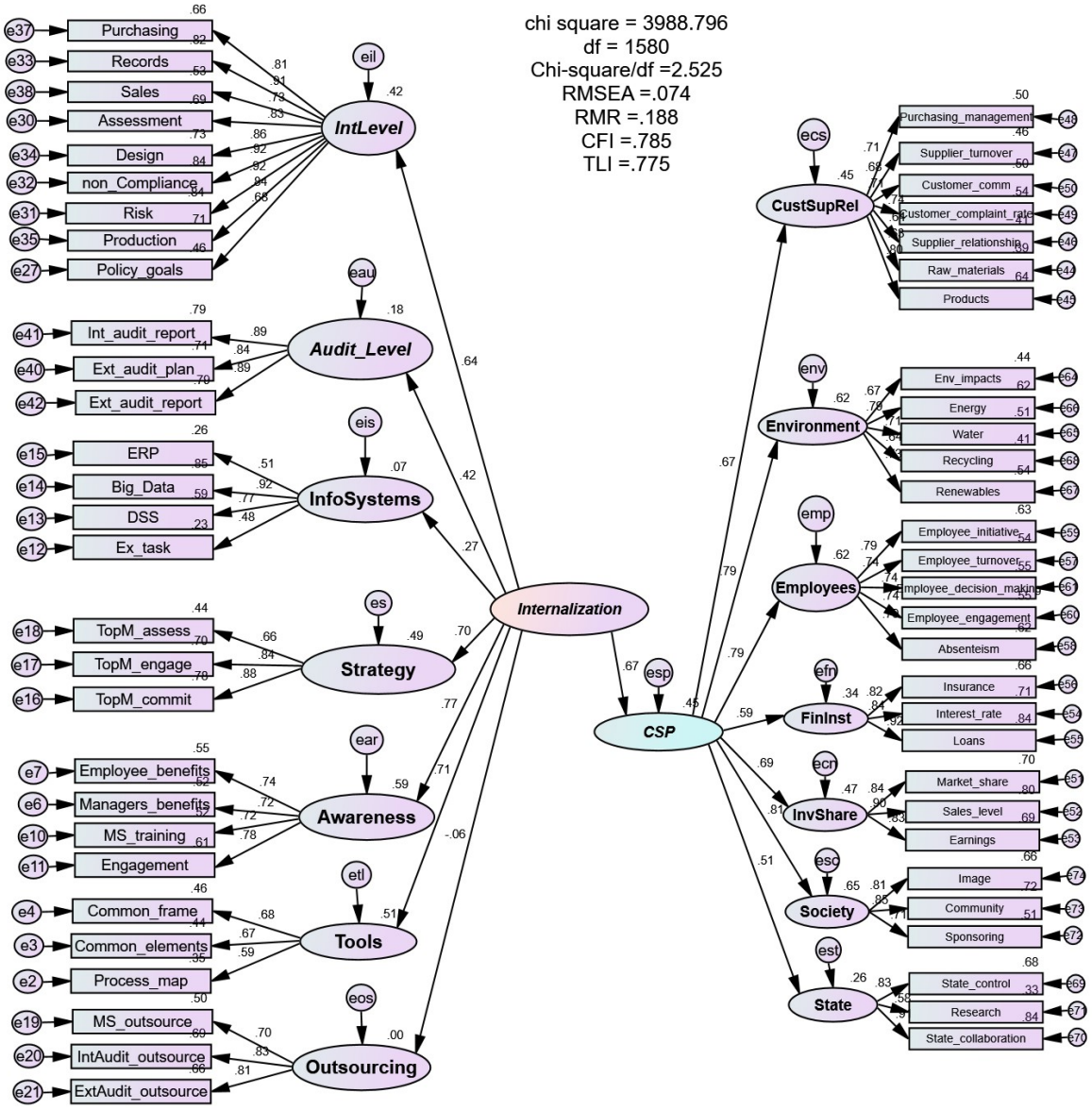


Figure 6.9b Improved structural model

There is a negative and quite low unstandardized estimate (Outsourcing loading) in the improved model (fig. 6.9b) as was expected, since internalization as a concept reflects internal resources. It supports the argument that as internalization increases organizations tend to rely on their own

resources to coordinate and integrate multiple management systems. The respective path is found non-significant at 0.05 level (p=0.416). Hence, Outsourcing is removed from the model.

Further improvements (removal of certain items and error covariances) lead to the best fit solution (Figure 6.9c). According to Hair et al. (2014: p. 584) for sample sizes greater than 250 and observed variables more than 30, chi-square significant values are expected, the normed chi-square (χ^2/df) should be less than the threshold value of 3, Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) should be higher than 0.90, standardized RMR (SRMR) is expected to be less than 0.08 and Root Mean Square Error of Approximation (RMSEA) less than 0.07.

Next, the goodness of fit indices for the best-fit model (Fig. 6.8) are provided. The chi-square value equals 1312.811 with 685 degrees of freedom and a p-value lower than 0.001. The normed chi-square (χ^2/df) equals 1.917, a value far less than the threshold value of 3. RMSEA is found equal to 0.057 (well under the threshold value of 0.07). The Standardized Root Mean Square Residual (SRMR) has a value of 0.069, which is well under the required threshold value of 0.08. CFI value is 0.912 and TLI value is 0.905. Hence fit criteria are met.

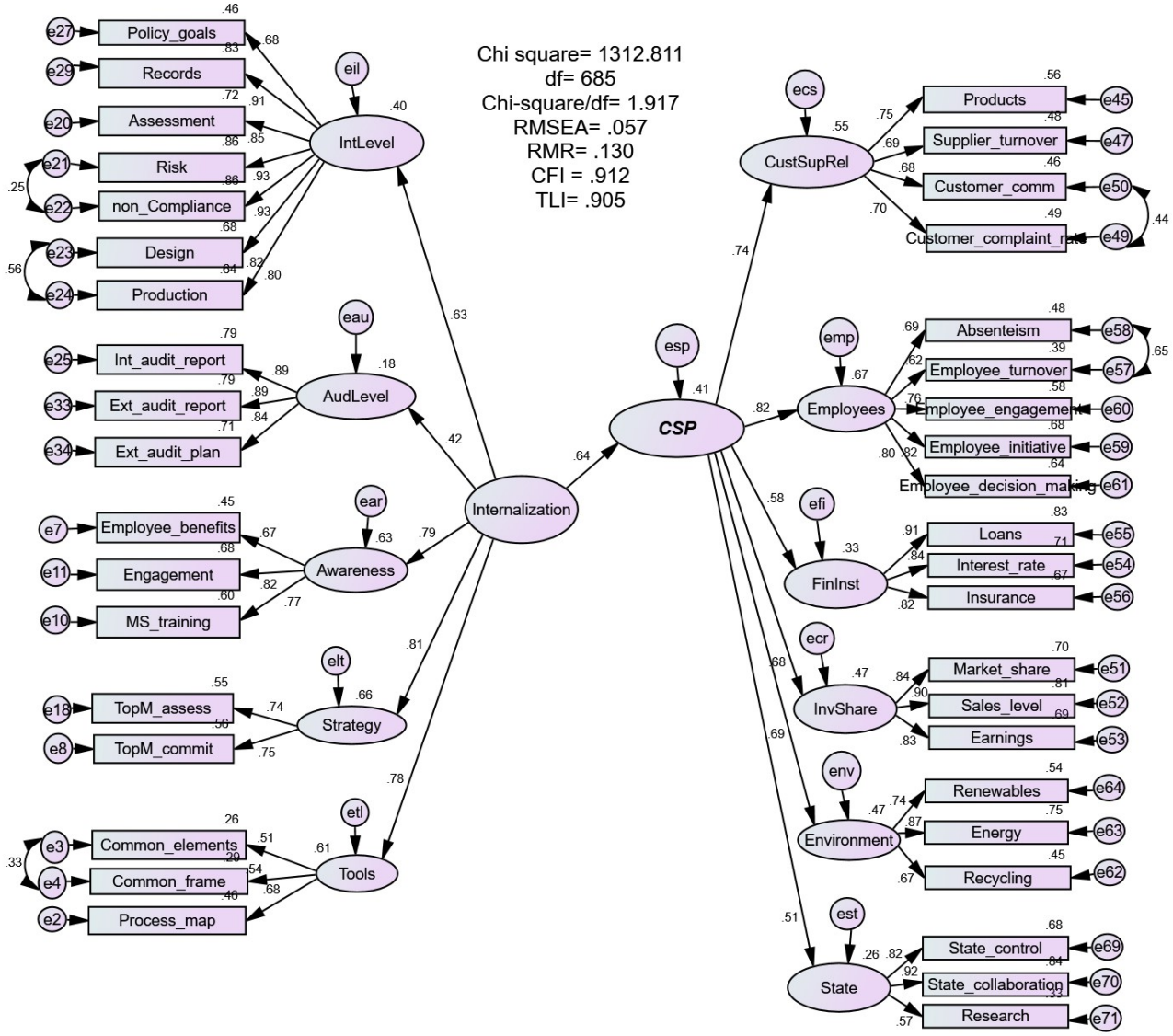


Figure 6.9c Best fit solution

To provide the explanation of the numbers on the graphical representations, a part of the model is analyzed in detail in the following figure (fig. 6.10).

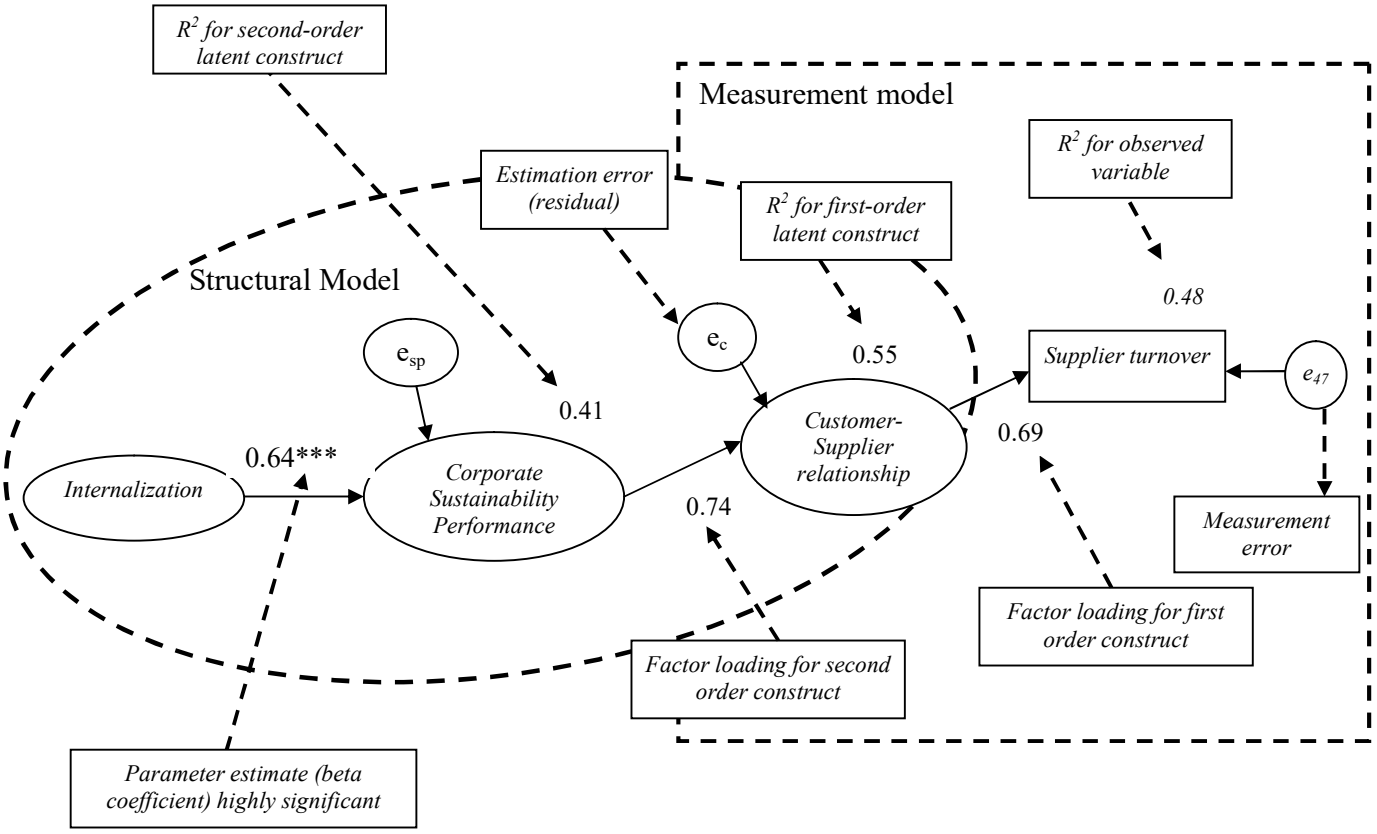


Figure 6.10 The general structural equation model is demarcated into measurement and structural components (Byrne, 2010)

First of all, it is observed that all fit indices have achieved the required level. Thus, any further item deletions or modifications are not required. Internalization is finally composed of five first-order latent constructs, since outsourcing was eliminated first - as expected – and factor loading for information tools was low (0.25) with extremely small percentage (7%) of variance explained. The factor loadings of internalization on Integration Level, Audit Level, Awareness,

Tools and Strategy were found equal to 0.63, 0.42, 0.79, 0.81 and 0.78 with percentage of variance explained 40%, 18%, 63%, 66% and 61% respectively.

The results showed that CSP loads well on its six sub-constructs. The factor loadings (standardized regression weights estimates) of CSP on Customer-Supplier Relationship, Employees, Financial Institutions, Investors-Shareholders, the Environment and the State are 0.74, 0.82, 0.58, 0.68, 0.69 and 0.51 respectively. Furthermore, the R square value for Customer-Supplier Relationship, Employee, Investors-Shareholders and the Environment are relatively high (0.55, 0.67, 0.47, and 0.47 respectively), which reflect the contribution of Corporate Sustainability Performance on its four sub-constructs is quite good. The coefficient R-square values for Financial Institutions and the State are found lower (0.33 and 0.26 respectively), yet significant). In other words, the initial assumption that Corporate Sustainability Performance consists of six sub-constructs is well supported.

The criterion for the factor loadings is the threshold of 0.3 (Raykov and Marcoulides, 2011: 78). The rationale behind this threshold is based on the fact that, when a factor loading is lower than 0.3, the part of observed variance explained by that factor in the pertinent measure will be under 10% (indeed, $0.3^2 = 0.09$) and therefore would not contribute to factor interpretation. Taking this 'rule of thumb' under consideration, all factor loadings are well above 0.3 with respective proportion of variance explained greater than 10%.

The measurement portion of the model, i.e. the portion of the model that specifies how the observed variables depend on the unobserved or latent variables, is also quite good – the lowest R^2 value is 0.26 (Common Elements), which is a reasonable value to obtain in behavioral sciences research, and the other R^2 values are higher, with highest that of Internal Audit Report (0.88) and average value as high as 0.62, indicating that the model is accounting for a large proportion of the variance in the measured items.

R-square of the endogenous variable (CSP) equals 0.41. That means that the exogenous variable (internalization), which is CSP's predictor, explains 41% of its variance.

In order to examine the significance of the main constructs on every sub-construct in the model the results (unstandardized regression weights) from the Amos Text-Output are given in the following Table (Table 6.10).

Table 6.10 Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
CSP	<---	Internalization	.479	.081	5.909	***	
Employees	<---	CSP	1.618	.222	7.281	***	
Environment	<---	CSP	1.525	.225	6.781	***	
CustSupRel	<---	CSP	1.000				
FinInst	<---	CSP	1.620	.240	6.739	***	
IntLevel	<---	Internalization	.947	.138	6.841	***	
Strategy	<---	Internalization	1.000				
Awareness	<---	Internalization	.851	.118	7.230	***	
Tools	<---	Internalization	.648	.112	5.792	***	
AudLevel	<---	Internalization	1.007	.186	5.414	***	
InvShare	<---	CSP	1.299	.179	7.267	***	
State	<---	CSP	1.192	.201	5.945	***	
Common_elements	<---	Tools	1.433	.204	7.008	***	
Absenteism	<---	Employees	1.000				
Employee_turnover	<---	Employees	.906	.057	15.836	***	
Employee_engagement	<---	Employees	.847	.075	11.332	***	
Employee_initiative	<---	Employees	1.064	.088	12.062	***	
Employee_decision_making	<---	Employees	.979	.083	11.771	***	
Common_frame	<---	Tools	1.000				
TopM_assess	<---	Strategy	1.000				
Renewables	<---	Environment	1.000				
Energy	<---	Environment	.993	.084	11.880	***	
Policy_goals	<---	IntLevel	1.000				
Engagement	<---	Awareness	1.110	.103	10.806	***	
Customer_comm	<---	CustSupRel	1.000				
Customer_complaint_rate	<---	CustSupRel	1.198	.092	13.041	***	
Employee_benefits	<---	Awareness	1.000				
Process_map	<---	Tools	1.424	.232	6.134	***	
TopM_commit	<---	Strategy	.751	.081	9.293	***	
Products	<---	CustSupRel	1.143	.118	9.661	***	
Supplier_turnover	<---	CustSupRel	1.151	.125	9.202	***	
Loans	<---	FinInst	1.000				
Interest_rate	<---	FinInst	.881	.049	18.067	***	
Insurance	<---	FinInst	.845	.049	17.271	***	
MS_training	<---	Awareness	.989	.094	10.513	***	
Assessment	<---	IntLevel	1.113	.086	13.007	***	
Risk	<---	IntLevel	1.148	.082	13.969	***	
non_Compliance	<---	IntLevel	1.115	.080	13.942	***	
Design	<---	IntLevel	1.059	.084	12.651	***	

			Estimate	S.E.	C.R.	P	Label
Production	<---	IntLevel	.980	.080	12.292	***	
Int_audit_report	<---	AudLevel	1.000				
Ext_audit_report	<---	AudLevel	1.125	.058	19.550	***	
Ext_audit_plan	<---	AudLevel	.926	.051	18.227	***	
Recycling	<---	Environment	.675	.066	10.267	***	
Market_share	<---	InvShare	1.000				
Sales_level	<---	InvShare	1.123	.064	17.569	***	
Earnings	<---	InvShare	1.072	.066	16.197	***	
State_control	<---	State	1.000				
State_collaboration	<---	State	1.101	.081	13.584	***	
Research	<---	State	.606	.062	9.768	***	
Records	<---	IntLevel	1.114	.081	13.796	***	

6.11 Confirmation of the main research hypothesis

The standardized regression coefficient estimate is 0.639 for the path: CSP ← Internalization.

The unstandardized regression coefficient is 0.479 with standard error equal to 0.081 (Critical Ratio, CR=5.909) and $p<0.001$. When the critical ratio (CR) is > 1.96 for a regression weight, that path is significant at the .05 level or better (that is, its estimated path parameter is significant). In the p-value column, three asterisks (***) indicate significance smaller than .001, as applies in this case. Therefore, the research hypothesis is supported.

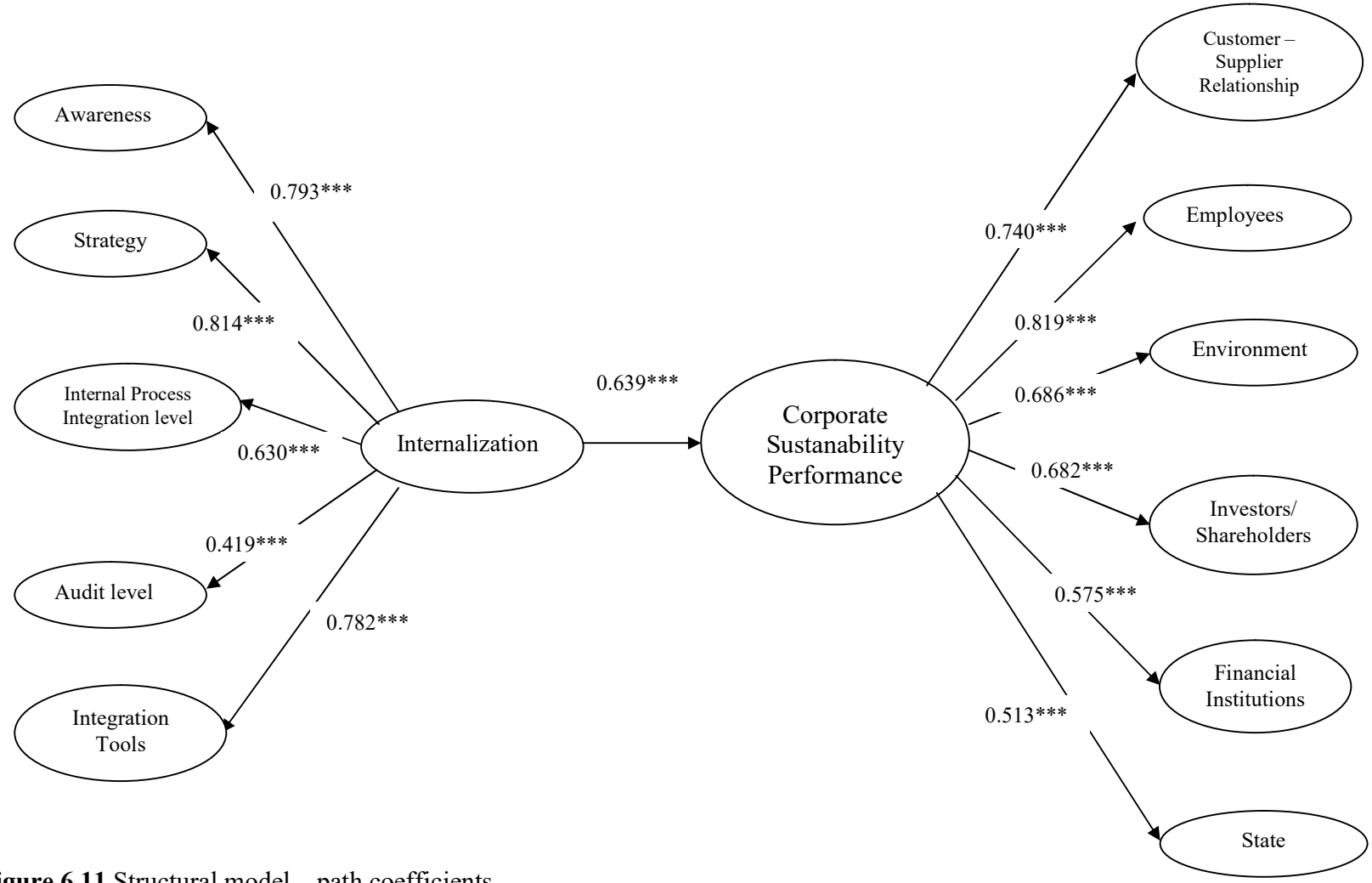


Figure 6.11 Structural model – path coefficients

Table 6.11 Manifest item loadings

			Estimate
CSP	<---	Internalization	.639
Employees	<---	CSP	.819
Environment	<---	CSP	.686
CustSupRel	<---	CSP	.740
FinInst	<---	CSP	.575
IntLevel	<---	Internalization	.630
Strategy	<---	Internalization	.814
Awareness	<---	Internalization	.793
Tools	<---	Internalization	.782
AudLevel	<---	Internalization	.419
InvShare	<---	CSP	.682
State	<---	CSP	.513
Common_elements	<---	Tools	.507
Absenteism	<---	Employees	.691
Employee_turnover	<---	Employees	.622
Employee_engagement	<---	Employees	.763
Employee_initiative	<---	Employees	.824
Employee_decision_making	<---	Employees	.799
Common_frame	<---	Tools	.537
TopM_assess	<---	Strategy	.744
Renewables	<---	Environment	.735
Energy	<---	Environment	.865
Policy_goals	<---	IntLevel	.678
Engagement	<---	Awareness	.822
Customer_comm	<---	CustSupRel	.681
Customer_complaint_rate	<---	CustSupRel	.700
Employee_benefits	<---	Awareness	.670
Process_map	<---	Tools	.676
TopM_commit	<---	Strategy	.749
Products	<---	CustSupRel	.750
Supplier_turnover	<---	CustSupRel	.689
Loans	<---	FinInst	.913
Interest_rate	<---	FinInst	.844
Insurance	<---	FinInst	.818
MS_training	<---	Awareness	.775
Assessment	<---	IntLevel	.849
Risk	<---	IntLevel	.927
non_Compliance	<---	IntLevel	.925
Design	<---	IntLevel	.823

			Estimate
Production	<---	IntLevel	.797
Int_audit_report	<---	AudLevel	.890
Ext_audit_report	<---	AudLevel	.889
Ext_audit_plan	<---	AudLevel	.843
Recycling	<---	Environment	.671
Market_share	<---	InvShare	.836
Sales_level	<---	InvShare	.899
Earnings	<---	InvShare	.831
State_control	<---	State	.823
State_collaboration	<---	State	.918
Research	<---	State	.575
Records	<---	IntLevel	.909

In the next chapter the findings of this survey are discussed.

CHAPTER 7. DISCUSSION OF SURVEY FINDINGS

Collected data has been subjected to the exploratory-confirmatory continuum due to the complexity of the model (more than sixty indicators) adopting a two-step approach (Anderson & Gerbing, 1988). The first-order factors that are derived from the exploratory factor analysis are used as "facets" corresponding to the content domains that lead to the operationalization of the more 'generic' constructs (internalization and corporate sustainability performance) in the form of second-order factors. A second-order structural model is generally considered more robust and susceptible to theoretical grounding and further interpretation (Gerbing et al., 1994). Moreover, a second-order model enables the separation of each first-order variance from measurement error variance. Thus, first-order factors variance can be examined against common variance which is associated with the second-order factor (Chen et al., 2005) leading to a parsimonious account of the first-order correlated model (Avolio et al., 2018).

Seven first-order factors reflect the internalization of multiple management systems and seven factors 'measure' corporate sustainability performance. Two of the internalization factors reflect the integration level of the internal processes and the audits, indicating the depth of the integration i.e. the degree of merging and penetration of multiple management systems within the organizational fabric. The remaining five factors represent resources that contribute to the integrated implementation of multiple management systems. These resources are mostly tacit and refer to gained experience and awareness based on information and knowledge. All of the identified resources refer to the very core of internalization as a concept addressing its key features, i.e. the development of firms' human, organizational and social capital (Ataseven et al., 2014).

Regarding corporate sustainability performance eight factors were originally conceived based on relevant literature findings addressing firms' relationships with customer, suppliers, employees, the environment, the investors/shareholders, the financial institutions, state and society. EFA identified a more parsimonious seven factor model where the Customer and Supplier dimensions collapsed to a single factor named 'Customer-Supplier Relationship' (abbreviated term: "CustSupRel"). Interestingly, a similar high correlation between supplier and customer relationships was previously identified by Ketokivi and Schroeder (2004). CFA corroborated that those indicators, which reflect the closest external stakeholders, i.e. the customers and the

suppliers, are strongly correlated yielding better model fit. From a practical perspective, this observation may be attributed to the former, less extrovert perspective of the quality management standard (QMS) that included only the supplier and the customer within its scope. Firms with multiple management systems usually implement a quality management system (QMS) first and, since the stakeholder approach was introduced only a few years before (ISO, 2015), it did not come as a surprise that those two QMS stakeholders have been prioritized by the majority of the respondents.

EFA identified six more factors contributing in corporate sustainability performance, that represent firms' interactions with the employees, the environment, the investors/shareholders, the financial institutions, the state and society. These findings support the conceptual capturing of the CSP construct, with both primary and secondary stakeholders being engaged. What is worth highlighting at this point is the duality of stakeholder influence over organizations, in that they provide MS inputs (requirements) and receive MS outputs (Rocha et al., 2007). This seems more relevant now that the new versions of the ISO standards apply the stakeholder perspective. Moreover, the pressure of primary and secondary stakeholders on internalization has already been emphasized (Castka and Prajogo, 2013). This duality justifies further the conceptual framework of this thesis that is based on the common ground between IMS and CSP and provides additional support to the validity of this thesis' model, linking in a stronger mode IMS with CSP. A replication of this study in the near future, when companies will have adopted the new standards for some time, could confirm this claim.

Further in the factor analysis, it is noticed that the health and safety item has been removed from the employees' factor. This may be related to the fact that the ISO 45001 standard for occupational health and safety was not until recently released by the ISO organization. In the years that preceeded, OHSAS 18001 has been the non-ISO standard commonly adopted by organizations that aimed to manage their health and safety issues in a normalized manner. This standard, however, did not follow the high-level (homogenized) structure of the ISO standards, probably impeding the integration of the health and safety management system in companies - this study's participants included.

The final best-fit solution includes, on the one side, the key components of the independent variable, i.e. integration strategy and awareness, integration tools, internal process integration

level and audit integration level as first-order latent variables reflecting internalization and, on the other side, the key components of the dependent variable, i.e. customer-supplier relationship, employees, investors/shareholders, financial institutions, the environment and the state as first-order latent variables reflecting corporate sustainability performance.

It is worthwhile noticing that society is not included in the CSP construct in the best fit model. Examining the data, it is found that only a small proportion (9%) of the integrated management systems of the participating organizations included social-oriented management systems within their scope. This is probably due to the lack of an internationally recognized, certifiable standard. It can also be emphasized at this point, that companies are hardly motivated to comply with standards or guidelines that do not add marketing value. Supply chain actors have launched several social accountability initiatives (Michalski et al., 2018), but they are either costly or sector-specific and have not yet exercised any significant "isomorphic power" on companies. Hence, it can be safely assumed that there is still a long way to go for Greek organizations to attain social awareness and realize their place in the social responsibility canvas.

During the fitting process, the outsourcing factor was first eliminated from the model, since - as expected – the reliance on any external resources is contradictory to the very meaning of internalization that reflects the substantial integration of multiple management systems by the use of internal means. Sales and purchasing are not included in the internal process integration level factor. This implies a lack of communication and information sharing between the marketing and management system departments which is often observed in companies (Ittner & Larcker, 2003).

It is also noticed that the information systems are not included in the best-fit model. Taking into account that internalization requires the transformation of data into organizational knowledge this finding emphasizes the claim that information technology alone cannot leverage knowledge (McDermott, 1999). Deeper investigation of this finding is needed to identify the reasons. What could be assumed at this point is that Greek companies use information systems only for accounting purposes. Moreover even at bigger companies the available ERP platforms are not used for the monitoring of management systems. Furthermore, among the sample companies none was certified to the ISO 20000 or ISO 27001 standards.

Regretfully, the training item is not included in the IMS resources that are found to contribute to MS internalization. This finding accords with prior research arguing that workers rely heavily on their rich practical experience yet lack 'theoretical training' (Simon et al., 2014). Nevertheless, it should be noted that training is a useful tool for the dissemination of knowledge among the employees. By leaving training 'out of the equation' the process of internalization lacks a significant resource. This finding may be attributed to the cutting of less necessary costs by companies in their attempt to survive. In other words, in the current challenging context of Greek economy, the investment in IMS training is probably considered as a "luxury". This challenging economic context has probably affected the allocation of IMS human resources. The 'excluding task' item was removed from the initial measuring model, indicating that the MS monitoring is not assigned to a dedicated employee or team. Greek companies rely strongly on the 'multi-tasking' of employees in their agonizing attempt to exploit their resources to the fullest possible extent before even having to consider recruiting.

Empirical results sum up the human resource-related items to a factor reflecting the awareness or otherwise the knowledge and the human resource focus of IMS. This interpretation of human resource dimension accords with the resource theorists' intellectual capital approach (Bozbura et al., 2007). In this framework firms 'capitalize' on the individual-level knowledge that each employee possesses. Researchers highlight the absorption of tacit knowledge by the employees as a key enabler of internalization (Linderman et al., 2004). In Chapters 2 and 6 of this thesis there is an extensive discussion on the relationships between information and knowledge and MS integration and internalization. Scanning again the particular manifest variables of the model, it is observed that managers' awareness is not included in the final solution. This implies that, while the employees are well aware of the benefits of integration, the managers are either less aware or skeptical about the IMS potential benefits. This finding leads to the assumption that the symbolic integration of management systems has its origin in higher ranks of organizational hierarchy.

A rather frustrating finding is that management systems are not embedded in corporate culture. Moreover, the respondents did not consider the experience in integrating management systems nor the assignment of IMS monitoring to a single responsible person or department to be significant. However, these findings should not readily be interpreted negatively. The majority of Greek organizations are small and medium enterprises that encourage multi-tasking to reduce

costs. Most importantly, these findings suggest that the integration of management systems has not matured enough to become a discrete component of organizational culture. This finding accords with similar claims regarding the potential impact of employees in undermining MS integration (Chountalas and Tepaskoualos, 2019).

Another observation is the exclusion of the plan-do-check-act (PDCA) approach from the IMS resources in the model. The rationale behind this outcome lies in that the ISO 9001 standard was based on the process approach whereas the ISO 14001 standard (and other standards, e.g. OHSAS 18001) was based on the PDCA cycle (Bernardo et al., 2009; Karapetrovic and Jonker, 2003; Tessitore et al., 2019). Current versions of the flagship standards converge at this point among others requiring PDCA as a common approach. In fact, there are three core concepts in the latest version (2015) of the ISO 9001 standard: the process approach, risk-based thinking, and management of the processes using "PDCA" (Hinsch, 2019). Another key approach now introduced in all management standards is the risk-based thinking, which overarches other similar ways of managing functions, such as the corrective and preventive actions (CAPA) of quality assurance and the hazard analysis of critical control points (HACCP) of food safety management (El-Khalili, 2019). Future IMS studies would make use of these developments and address risk-based and PDCA approaches in the adoption of the updated standards from the integrated management perspective.

The exploratory factor analysis results identified two latent factors that included certain integration level items. These factors are labeled: integration level of internal processes and integration level of audits. This distinction corroborates prior research that has acknowledged the audits as thee most 'dissimilar aspect' of integration (Bernardo et al., 2018). The results also indicate that the internal audit planning is not considered as important a resource compared to the external audit planning for multiple management systems, which entails costly human hours and other costs related to the assignment of external auditors that are not included in the payroll of organizations. Another reason for this exclusion might be the cost for the internal auditors' training that several organizations are not inclined to bear.

Further to the above, this study – like any other empirical one - is not exempt from limitations. Common method bias (Guide and Ketokivi, 2015; Ketokivi, 2019; Podsakoff et al., 2003) can be present, since a single informant was used for the collection of data from each participating

company. However, particularly in the case of integrated management systems, usually a single person is assigned the monitoring of all management systems. This is common practice in small and medium enterprises (SMEs), where human resources are quite limited. What should also be noted at this point is that SMEs represent the majority of Greek companies. In addition, even when two or more persons are responsible for multiple management systems – again the questionnaire needed to be filled once, since the questions refer to all management systems concurrently. Another limitation refers to the generalizability of results, since data represent the specific business context in Greece. Future research could test the model in other countries. Furthermore, the repetition of this survey after a certain time period (longitudinal method) would test the replicability of results.

In the next chapter, firstly, concluding remarks are presented. Secondly, the implications for academics and practitioners are highlighted, certain limitations are presented and, finally, future research directions are offered.

CHAPTER 8. CONCLUSION

This chapter concludes the thesis. Concluding remarks are presented in section 8.1, while section 8.2 contains implications and section 8.3 discusses limitations and provides directions for future research.

8.1 Concluding remarks

This thesis addressed the integration of management systems from multiple theoretical and empirical perspectives drawing on operations management theories and using case research and empirical survey methods. The literature review (Chapter 2) was launched from the basic IMS issues – motives, difficulties, and benefits – and spread on issues, such as performance and information management. Information that derives from raw data 'yearns' to be transformed into knowledge. Thus, relevant literature has been reviewed to investigate the links between information management systems, integration and organizational knowledge. The generic information – knowledge discussion has been viewed by the management system perspective and implicated the internalization of management systems as a potential IMS key enabler. Information and knowledge are linked with performance evaluation and improvement. Furthermore, the difference between superficial, symbolic and internalized, substantive implementation has been discussed.

The first case study (Chapter 3) focused on the critical factors of IMS failure. It has been evidenced that the imbalanced performance of the two discipline-specific management systems and the non-integrated audits led to the withdrawal of top management commitment and, finally, to the disintegration. The second case study (Chapter 3) unveiled the dependence of IMS performance on several supply chain actors and other stakeholders, including but not limited to the employees, the consultants, the auditors, and the regulatory authorities. Both cases indicated the significance of the integration approach, the integration level and IMS resources. The integration process in the abandoned IMS case was based on the common elements - a rather 'techno-centric' approach - whilst in the successful IMS case the process approach was used. In the first case the integration level of the majority of processes was found low and the audits were non-integrated whilst in the second case the integration level was far higher at all parts of the systems. In the success case, traceability has been identified as a key motivator for integration both within and across organizations, intensely dependent on information sharing.

Contemplating on the first steps of this thesis the need for a conceptual framework has arisen to address the IMS challenges that have been unveiled. To this end, a thorough literature review has been conducted and certain theories of the firm (resource, institutional and stakeholder theories) have been invoked to outline and substantiate the main research concepts, i.e. IMS resources, integration level, internalization and corporate sustainability performance. The IMS resources are analysed into human, methods and tools, strategic, information and external resources. The integration level is measured in terms of the objectives, the policies, the documentation, the processes and the audits of management systems. Corporate sustainability performance (CSP) has been conceptualized using triple bottom line approach on stakeholder relationships. Thus, CSP economic dimension is operationalized via items measuring relationships with customers, suppliers, investors, shareholders, financial institutions; CSP environmental dimension is operationalized via items measuring relationships with the environment and the environmental authorities; CSP social dimension is operationalized via items measuring relationships with employees, state authorities, and society at large. The adoption of the internalization concept enhanced the understanding of substantial integration and its relationship with corporate sustainability performance. Thus, a conceptual framework has been composed (Chapter 4).

Resource, stakeholder and institutional theories have been used to delve into the IMS and CS concepts and their relationships. Despite its wide acceptance, resource-based view limits itself within a single organisation. To address this limitation, resource dependence theory (RDT) expands the internal perspective to an open system susceptive and vulnerable to the external environment (Pfeffer and Salancik, 2003). Moreover, RDT intersects with stakeholder theory in that both theories recognize the firm's dependence on external and internal stakeholders (Hillman et al., 2009). In terms of its "usability" in operations management, resource-based view undergoes criticism due to its focusing on the valuable, rare, non-substitutable, and inimitable resources (Priem and Butler, 2001; Hitt et al., 2016; Kenworthy and Balakrishnan, 2016). However, when reviewing pertinent literature for the development of the conceptual framework, it has been evidenced that management scholars address resources, at large, forwarding a broader view of firm performance and growth (Bromiley and Rau, 2016; Hitt et al., 2016). In this wider context, corporate sustainability performance has been operationalized considering all stakeholders that are affected, either directly or indirectly, by multiple management systems

implementation. Suppliers, employees, customers, investors, the environment, regulatory authorities, and the community are included in the composed framework.

The proposed performance evaluation scheme offers new insights to the added value of management systems. It has long been criticized that organisations often adopt management standards to merely undergo certification audits successfully. Hence, certified firms aim at conformance to the standards requirements shifting focus from the actual operational and strategic objectives. From this point of view, the lack of an IMS certification standard may leverage performance, since firms distance from the certification objective and focus on the improvement goal, which ultimately refers to optimizing measurable results against business objectives. Moreover, it can be induced that, firms that integrate multiple management systems - while abiding by corporate sustainability principles - ensure that business objectives cover a wide variety of needs and expectations of diverse stakeholders.

So far, there has been contradictory evidence on whether individual management systems improve firm performance (Siva et al., 2016). Integration is highlighted as a potential gateway to manage the conflicting areas of the different management disciplines and a "spillover effect" is recognized (Wiengarten et al., 2017). Nevertheless, the scarcity of theoretical and empirical research to that direction is emphasized (Wiengarten et al., 2017). This thesis addressed the gap in the extant research by studying the combined effect of multiple management systems on performance. IMS effectiveness is measured in terms of the different stakeholders and their relationships with the organization. Furthermore, an effort has been made to understand IMS internalization drawing upon the institutional and the resource theories. IMS resource and level factors are used to identify the IMS relationship with the sustainabilily of companies making the very existence of an IMS less perceivable yet more tangible, visible, and quantifiable to the academics and practitioners.

Another identified gap in research refers to the missing link between the measurement of sustainability outcomes and sustainability management within organisations. There seems to be a "decoupling" between what is measured and what is managed. Thus, whilst on the one side IMS manage the implementation yet fail to measure the output, on the other side CS measure its performance yet fails to manage its implementation. In light of these deficiencies, potential synergies have been investigated to promote research on management systems integration and

corporate sustainability performance. On the one side, integrated management systems have provided the necessary holistic framework for the management of corporate sustainability. On the other side, triple bottom line sustainability accounting and reporting has offered the metrics for IMS effectiveness. Bearing in mind what Searcy et al. (2005) emphasise, that in fact "indicators are a complement to, not a replacement for, existing management systems", this research combined the experience gained from the integration of management systems with the know-how of sustainability accounting and reporting. Under this common thinking, certain key constructs have been identified suggested to be related: IMS resources, IMS level, IMS internalization and corporate sustainability performance.

At the final part of this PhD thesis (Chapters 5 to 7) the conceptual framework has been tested empirically. Exploratory and confirmatory factor analyses have been applied to process the survey data. A second-order latent factor configuration explained the relationships between the two main constructs. The internalized corporate resources and practices in the form of integration strategy and awareness, integration tools, internal process integration level and audit integration level are found to positively influence the performance of organizations on its stakeholder interactions in terms of customer-supplier relationships, employees, investors/shareholders, financial institutions, the environment, and the state.

8.2 Implications

This study investigated empirically the integration of management systems and its effect on corporate sustainability performance. There are strong implications for scholars in the management field. The internalization concept, which is broadly discoursed in relation with individual management systems, is now brought into the foreground of the IMS research to interpret this effect. On the other hand, corporate sustainability performance is conceptualized using triple bottom line approach on stakeholder relationships. Thus, the economic, the environmental and the social dimensions of sustainable development in business organizations are correlated with suppliers, customers, employees, investors, shareholders, financial institutions, state authorities, the environment and society, at large.

Research on the integration of management standards and systems has gone a long way since the first theoretical and empirical underpinnings to more mature discussions on the relationships of

IMS with stakeholders and sustainable development drawing on management theories. To date, standardization is not simply about files, procedures and tools, leading organizations to internalize process management turning it into a form of knowledge. The internalized multiple management systems become part of the organizational knowledge enhancing business performance.

The acquired model widens IMS research canvas introducing the internalization of integrated - or jointly implemented - management systems. IMS internalization is found to strongly influence corporate sustainability performance. A second-order structural modeling configuration explains more accurately the relationships that are identified between the two constructs. Corporate resources and practices in the form of integration strategy and awareness, integration tools, internal process integration level and audit integration level are found to reflect internalization whilst outcomes on customer-supplier relationship, employees, investors/shareholders, financial institutions, the environment and the state are found to reflect corporate sustainability performance.

The implications for practitioners are equally important, since a great emphasis is given both on the internal conditions, the resources and the needs of each single organization, and on the relationships with stakeholders at the same time. Furthermore, management system standards are continually evolving while affecting all interested parties whether inside or outside the organization's boundaries, upstream and downstream the supply chain. The three-dimensional interpretation of corporate sustainability offered useful insights to the creation of the CSP construct. It has become evident, that profit does not singlehandedly suffice for companies' survival and prosperity. There are strong relationships between a company's stakeholders, that need to be taken into account when managing business operations and expect positive corporate results. According to the outcome of this particular study, practitioners may rely on this interpretation and use integrated management systems as leverage for all individual management systems to improve corporate sustainability performance.

8.3 Limitations – Future research directions

Viewed from a contingency perspective, the validated model should be tested in different sectors. There are several sector-specific management standards that may serve as motives for

the adoption of multiple standards, thus raising the need for integration. For instance, food companies in Greece have embraced the ISO 22000 standard (ISO, 2018), which sets the requirements for food safety. What has been implied in relevant IMS case study research (Bernardo et al., 2018; Gianni et al., 2017b) is that Greek companies that have adopted the food safety standard tend to adopt the quality management standard, as well. Moreover, a novel stream of IMS research contemplates on the effect of contextual factors (Nadae et al., 2019; Poltronieri et al., 2019). A wider empirical sector-specific survey would offer valuable insights in this direction.

Discussion of the findings has identified an additional stakeholder group, the external auditors that - although not generally acknowledged – may partly reflect CS performance. Therefore, the registrars, the second- and third-party auditors (Bernardo et al., 2010; 2011) could be included in a similar research framework in the future.

Several stakeholders of an organization can be supply chain actors, at the same time. Future research may apply the supply chain perspective on IMS. Drawing on management theories, it has been made clear that resource dependence theory by overcoming the "narrow" resource-based view can provide new insights on resources and their dependence along the supply chain, including quasi integration, new product development, and buyer–supplier relationship focusing on the joint dependence of resources between the focal firm and its external environments (Hitt et al., 2016). So far, several scholars have studied isolated management systems and stressed the importance of quality and environmental management system integration across supply chain tiers (Wiengartenet al., 2013; Wong et al., 2015; Zu and Kaynak, 2012). Through this lens, the IMS inter-organizational scope may be widened by engaging upstream and downstream supply chain actors - stakeholders.

Concluding, this thesis served to emphasize that integrated management systems are not a mere addition of management systems or a simple alignment of paragraphs of different standards. Integrated management systems are not generally certifiable, after all. Certifying compliance to several standards by yearly third-party audits is not what the standards' are made for. For instance, there are certain guidelines that are non-certifiable, yet provide firms with useful management principles and practices. Even for those management systems (quality, environmental, health and safety etc.) that abide by certifiable standards, certification is not

obligatory. Moreover, in the case of certifiable management system standards, the audits are usually 'paragraph oriented', meaning that they focus on the detailed, formal adoption of specific requirements of the standards not taking into account the essential meaning, the principles and the objectives of the standards, as originally perceived by their creators. Thus, irrespective of whether certification is an option or not, the debate between ceremonial and real implementation remains an issue, since there is always the underlying risk of 'bragging' or rather manifesting for a quality management system or a CSR management system or an IMS without actually benefiting from one. Anchoring on internalization puts an end to this interplay between the façade and the backstage and focuses on the IMS essentials bringing together the necessary means for the exploitation of management systems to the benefit of the firm and its stakeholders.

As far as the internalization of management systems is concerned, this thesis offers a novel insight responding to the need for its indirect measurement. The internalization of management systems is 'loaded' with positive meaning that is expected to 'attract' socially desirable positive responses. In this context, this thesis has provided an instrument that measures several aspects of the actual notion of internalization, 'going round' any social desirability effects.

Furthermore, prior relevant literature on IMS in Greece has revealed certain critical IMS aspects, yet using qualitative data (Bernardo et al., 2018). This PhD research addresses this gap and enhances the contingency discourse by providing country-specific wide survey findings. These findings can be compared with similar findings in other countries and further the research on context-specific factors that may affect the integration of management systems and their impact on corporate sustainability performance, in turn.

Prior research on the impact of quality and environmental management systems on quality and environmental performance, respectively - when implemented in an isolated mode - is inconclusive (Castka and Prajogo, 2013; Siva et al., 2016; Tarí et al., 2019). The proposed and tested model of this thesis includes the internalized resources and practices of integrated management systems, on the one side, and their combined results, on the other. In this context, the survey findings identified a clear positive impact of integrated management systems on CS performance. It has thus become evident that different standards, when jointly adopted and internalized, contribute in a rather composed, counter-balanced manner to the increase of efficiency and effectiveness of business operations.

REFERENCES

Abad, J., Dalmau, I. and Vilajosana, J. (2014), "Taxonomic proposal for integration levels of management systems based on empirical evidence and derived corporate benefits", *Journal of Cleaner Production*, Vol. 78, pp. 164-173.

Abad, J., Lafuente, E. and Vilajosana, J. (2013), "An assessment of the OHSAS 18001 certification process: objective drivers and consequences on safety performance and labour productivity", *Safety Science*, Vol. 60, pp. 47-56.

AccountAbility (2015). AA1000 Stakeholder Engagement Standard - Revision for Public Comment.

Adams, C. A. and Frost, G. R. (2008), "Integrating sustainability reporting into management practices", *Accounting Forum*, Vol. 32, pp. 288–302.

Aggelogiannopoulos, D., Drossinos, H. and Athanasopoulos, P. (2007), "Implementation of a quality management system according to the ISO 9000 family in a Greek small-sized winery: a case study", *Food Control*, Vol. 18 No. 9, pp. 1077-1085.

von Ahsen A. and Funck D. (2001), "Integrated Management Systems – Opportunities and Risks for Corporate Environmental Protection", *Corporate Environmental Strategy*, Vol. 8 No. 2, pp. 165-176.

von Ahsen, A. (2014), "The Integration of quality, environmental and health and safety management by car Manufacturers – a long-term empirical study", Business Strategy and the Environment, Vol. 23 No. 6, pp.395-416.

Aiello, G., Enea, M. and Muriana, C. (2015), "The expected value of the traceability information", *European Journal of Operational Research*, Vol. 244, pp. 176-186.

Akdere, M. (2009). The role of knowledge management in quality management practices: Achieving performance excellence in organizations. *Advances in Developing Human Resource*, Vol. 11 No. 3, pp. 349-361.

Alavi, M. and Leidner, D.E. (2001). Review: knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly*, Vol. 25 No. 1, pp. 107-136.

Alidrisi, H. and Mohamed, S. (2012), "Resource allocation for strategic quality management: a goal programming approach", *International Journal of Quality & Reliability Management*, Vol. 29 No. 3, pp. 265-283.

Almeida, J., Domingues, P. and Sampaio, P. (2014),"Different perspectiveson management systems integration", *Total Quality Management & Business Excellence*, Vol. 25 No. 3-4, pp. 338-351.

Alonso-Almeida, M.M., Llach, J. and Marimon, F. (2014),"A closer look at the 'Global Reporting Initiative' sustainability reporting as a tool to implement environmental and social policies: A worldwide sector analysis", *Corporate Social Responsibility and Environmental Management*, Vol. 21 No. 6, pp. 318-335.

Alshitri, K.I., & Abanumy, A.N. (2014). Exploring the reasons behind the low ISO 27001 adoption in public organizations in Saudi Arabia. In *Information Science and Applications (ICISA), 2014 International Conference on*. Seoul, Korea.

Alsmadi, M., Almani A. and Jerisat, R. (2012), "A comparative analysis of Lean practices and performance in the UK manufacturing and service sector firms", *Total Quality Management & Business Excellence*, Vol. 23 No. 3-4, pp. 381-396.

Amundsen, A. (2000), "Joint management of energy and environment", *Journal of Cleaner Production*, Vol. 8 No. 6, pp. 483-494.

Anderson, J.C. and Gerbing, D.W. (1988), "Structural equation modeling in practice: A review and recommended two-step approach", *Psychological Bulletin*, Vol. 103, pp. 411-423.

Aras G. and Crowther, D. (2009), "Making sustainable development sustainable", *Management Decision*, Vol. 47 No. 6, pp. 975-988.

Arda, O.A., Bayraktar, E. and Tatoglu, E. (2019), "How do integrated quality and environmental management practices affect firm performance? Mediating roles of quality performance and environmental proactivity", *Business strategy and the environment*, Vol. 28, No. 1, pp. 64-78.

Arifin, K., Aiyub, K., Awang, A., Jahi, J. M. and Iten, R. (2009), "Implementation of integrated management system in Malaysia: The level of organization's understanding and awareness", *European Journal of Scientific Research*, Vol. 31 No. 2, pp.188-195.

Armstrong J.S., Overton T.S. (1977). "Estimating nonresponse bias in mail surveys". *Journal of Marketing Research*, 14, 396-402.

Artiach, T., Lee, D., Nelson, D. and Walker, J. (2010), "The determinants of corporate sustainability performance", Accounting & Finance, Vol. 50, pp. 31–51.

Asif, M. and de Vries, H.J. (2015), "Creating ambidexterity through quality management", *Total Quality Management & Business Excellence*, Vol. 26 No. 11-12, pp. 1226-1241.

Asif, M. and Searcy, C. (2014), "Towards a standardized management system for corporate sustainable development", *The TQM Journal*, Vol. 26 No. 5, pp. 411-430.

Asif, M., de Bruijn, E.J., Fisscher, O.A.M., Searcy, C. and Steenhuis, H.-J. (2009), "Process embedded design of integrated management systems", *International Journal of Quality & Reliability Management*, Vol. 26 No. 3, pp. 261-282.

Asif, M., Fisscher, O.A.M., de Bruijn, E.J. and Pagell, M. (2010a), "An examination of strategies employed for the integration of management systems", *The TQM Journal*, Vol. 22 No. 6, pp. 648-669.

Asif, M., Fisscher, O.A.M., de Bruijn, E.J. and Pagell, M. (2010b), "Integration of management systems: A methodology for operational excellence and strategic flexibility", *Operations Management Research*, Vol. 3 No. 3-4, pp. 146-160.

Asif, M., Fisscher, O.A.M., de Bruijn, E.J. and Pagell, M. (2010c), "Meta-management of integration of management systems", *The TQM Journal*, Vol. 22 No. 6, pp. 570-582.

Asif, M., Searcy, C., Zutshi, A. and Ahmad, N. (2011a), "An integrated management systems approach to corporate sustainability", *European Business Review*, Vol. 23 No. 4, pp. 353-367.

Asif, M., Searcy, C., Garvare, R. and Ahmad, N. (2011b), "Including sustainability in business excellence models", *Total Quality Management & Business Excellence*, Vol. 22 No.7, pp. 773-786.

Asif, M., Searcy, C., Zutshi, A. and Fisscher, O.A.M. (2013), "An integrated management systems approach to corporate social responsibility", *Journal of Cleaner Production*, Vol. 56, pp. 7-17.

Ataseven C., Prajogo D.I. and Nair A. (2014), "ISO 9000 Internalization and organizational commitment- Implications for process improvement and operational performance". *IEEE Transactions on Engineering Management*, Vol. 61 No. 1, pp. 5-17.

Augustin, M.A., Udabage, P., Juliano, P. and Clarke, P.T. (2013), "Towards a more sustainable dairy industry: Integration across the farm–factory interface and the dairy factory of the future", *International Dairy Journal*, Vol. 31 No. 1, pp. 2-11.

Aung, M.M. and Chang, Y.S. (2014), "Traceability in a food supply chain: Safety and quality perspectives", *Food Control*, Vol. 39, pp. 172-184.

Avolio, B. J., Wernsing, T. and Gardner, W. L. (2018), "Revisiting the Development and Validation of the Authentic Leadership Questionnaire: Analytical Clarifications", *Journal of Management*, Vol. 44 No. 2, pp. 399–411.

Azadeh, A., Fam, I. M. and Azadeh, M.A. (2009), "Integrated HSEE management systems for industry: A case study in gas refinery", *Journal of the Chinese Institute of Engineers*, Vol. 32 No. 2, pp. 235-241.

Azapagic, A. (2003), "Systems Approach to Corporate Sustainability: A General Management Framework", *Process Safety and Environmental Protection*, Vol. 81 No. 5, pp. 303-316.

Badia-Melis, R., Mishra, P., & Ruiz-García, L. (2015). Food traceability: New trends and recent advances. *Food Control, 57*, 393-401.

Badreddine, A., Ben Romdhane, T., Ben Amor, N. (2010), A Multi-Objective Approach to Generate an Optimal Management Plan in an IMS-QSE, Chapter 29 in: Electronic Engineering and Computing Technology, Lecture Notes in Electrical Engineering, Ao, S.-I. and Gelman, L. (eds.), Springer Science + Business Media B.V., (60), 335-347.

Bamber, C.J., Sharp, J.M., Hides, M.T. (2000), Developing management systems towards integrated manufacturing: a case study perspective, Integrated Manufacturing Systems, 11 (7), 454-461.

Barata, J., & da Cunha, P.R. (2014). ISO2: A new breath for the joint development of IS and ISO 9001 management systems. In M. José Escalona et al. (eds.), *Information System Development: Improving Enterprise Communication* (pp. 499-510), PA: Springer International Publishing Switzerland.

Barge, P., Gay, P., Merlino, V. and Tortia, C. (2014), "Item-level Radio-Frequency IDentification for the traceability of food products: Application on a dairy product", *Journal of Food Engineering*, Vol. 125, pp. 119-130.

Barlette, Y. and Fomin, V.V. (2010), "The adoption of information security management standards: A literature review", In IGI Global (Eds.), *Information Resources Management: Concepts, Methodologies, Tools and Applications* (pp. 69-90). USA.

Barling, D. (2008), "Governing and governance in the agri-food sector and traceability", In C. Coff, D. Barling, M. Korthals, & T. Nielsen (Eds.), *Ethical traceability and communicating food* (pp. 167-191). Netherlands, PA: Springer.

Barnett, J., Begen, F., Howes, S., Regan, A., McConnon, A., Marcu, A., Rowntree, S. and Verbeke, W. (2016), "Consumers' confidence, reflections and response strategies following the horsemeat incident", *Food Control*, Vol. 59, pp. 721-730.

Barney, J. B. (1991), "The resource-based theory of the firm", *Journal of Management,* Vol. 17 No. 1, pp. 99-120.

Barratt, M., Choi, T. Y. and Li, M. (2011), "Qualitative case studies in operations management: Trends, research outcomes, and future research implications", Journal of Operations Management, Vol. 29 No.4, pp. 329-342.

Beckert, J. (2010), "Institutional Isomorphism Revisited: Convergence and Divergence in Institutional Change", *Sociological Theory*, Vol. 28 No. 2, pp. 150-166.

Beckmerhagen, I.A., Berg, H.P., Karapetrovic, S.V. and Willborn, W.O. (2003a), "Auditing in support of the integration of management systems: a case from the nuclear industry", *Managerial Auditing Journal*, Vol. 18 No. 6/7, pp. 560-568.

Beckmerhagen, I.A., Berg, H.P., Karapetrovic, S.V. and Willborn, W.O. (2003b), "Integration of management systems: focus on safety in the nuclear industry", *International Journal of Quality & Reliability Management*, Vol. 20 No.2, pp. 210-228.

Beekman, V. (2008), “Consumer rights to food ethical traceability”, In C. Coff, D. Barling, M. Korthals and T. Nielsen (Eds.), *Ethical traceability and communicating food* (pp. 235-249). Netherlands, PA: Springer.

Benn, S., Dunphy, D. and Griffiths, A. (2014), *Organizational change for corporate sustainability*, 3rd Ed., Routledge, Taylor & Francis Group, London and New York.

Bergkvist, L. and Rossiter, J. R. (2007), “The Predictive Validity of Multiple-Item versus Single-Item Measures of the Same Constructs”, *Journal of Marketing Research*, Vol. *44* No. 2, pp. 175-184.

Berker, Y. (2018), “Golden-ratio as a substitute to geometric and harmonic counting to determine multi-author publication credit”, *Scientometrics*, Vol. 114, pp. 839-857.

Bernardo, M. (2014), “Integration of management systems as an innovation: a proposal for a new model”, *Journal of Cleaner Production*, Vol. 82, pp. 132-142.

Bernardo, M., Casadesus, M. Karapetrovic, S. and Heras, I. (2011a), “Relationships between the integration of audits and management systems - An empirical study”, *The TQM Journal*, Vol. 23 No. 6, pp. 659-672.

Bernardo, M., Gotzamani, K., Vouzas, F. and Casadesús, M. (2011b), “A qualitative study on management systems integration”, 14th QMOD Conference on Quality and Service Sciences, San Sebastian, Spain, Book of Full Papers, pp. 251-263.

Bernardo, M., Casadesus, M. and Karapetrovic, S. (2011c), “Are methods used to integrate standardized management systems a conditioning factor of the level of integration? - An empirical study”, *International Journal for Quality research*, Vol. 5 No. 3, pp. 213-222.

Bernardo, M., Casadesús, M. and Karapetrovic, S. (2011d), “Are methods used to integrate standardized management systems a conditioning factor of the level of integration? - An empirical study”, *International Journal for Quality research*, Vol. 5 No. 3, pp. 213-222.

Bernardo, M., Casadesús, M., Karapetrovic, S. and Heras, I. (2009), “How integrated are environmental, quality and other standardized management systems? An empirical study”, *Journal of Cleaner Production*, Vol. 17 No. 8, pp. 742-750.

Bernardo, M., Casadesús, M., Karapetrovic, S. and Heras, I. (2010), "An empirical study on the integration of management system audits", *Journal of Cleaner Production*, Vol. 18 No. 5, pp. 486-495.

Bernardo, M., Casadesus, M., Karapetrovic, S. and Heras, I. (2012), "Do integration difficulties influence management system integration levels?", *Journal of Cleaner Production*, Vol. 21 No. 1, pp. 23-33.

Bernardo, M., Gianni, M., Gotzamani, K. and Simon, A. (2017), "Is there a common pattern to integrate multiple management systems? A comparative analysis between organizations in Greece and Spain", *Journal of Cleaner Production*, Vol. 151, pp. 121-133.

Bernardo, M., Gotzamani, K., Gianni, M. (2013), Certification maturity as a diffusion factor for management systems integration, 20th EurOMA Conference – Operations Management at the Heart of the Recovery, 7th-12th June, Dublin, Ireland.

Bernardo, M., Gotzamani, K., Vouzas, F. and Casadesus, M. (2018), "A qualitative study on integrated management systems in a non-leading country in certifications", *Total Quality Management & Business Excellence*, Vol. 29 No. 3-4, pp. 453-480.

Bernardo, M., Simon, A., Tarí, J.J. and Molina-Azorín, J.F. (2015), "Benefits of management systems integration: a literature review", Journal of Cleaner Production, Vol. 94, pp. 260-267.

Beske, P. (2012), "Dynamic capabilities and sustainable supply chain management", *International Journal of Physical Distribution & Logistics Management*, Vol. 42 No. 4, pp. 372-387.

Bevilacqua, M., Ciarapica F.E. and Giacchetta G. (2009), "Business process reengineering of a supply chain and a traceability system: case study", *Journal of Food Engineering*, Vol. 93, pp. 13-22.

Blecken, A., Zobel, A. and Maurantzas, E. (2010), "Development of a Lean Quality Management System: An Integrated Management System", *Advanced Manufacturing and Sustainable Logistics-Lecture Notes in Business Information Processing*, Vol. 46, pp. 141-151.

Bonk-Kassner, C., Ehmann, J., Gallhoff, G., Moore, D.S., Moos, B. and Siegemund, B. (1997), "Integration of parallel-operating quality systems", *Accreditation and Quality Assurance*, Vol. 2 No. 6, pp. 285–293.

Bos-Brouwers, H. E. J. (2010), “Corporate sustainability and innovation in SMEs: Evidence of themes and activities in practice”, *Business Strategy and the Environment*, Vol. 19, pp. 417–435.

Bosona, T. and Gebresenbet, G. (2013), “Food traceability as an integral part of logistics management in food and agricultural supply chain”, *Food Control*, Vol. 33 No. 1, pp. 32-48.

Botta, S., Comoglio, C. and Petrosillo, I. (2013), “Implementing the environmental and social policies of a municipality through an integrated management system: theoretical framework and case study”, *Journal of Environmental Planning and Management*, Vol. 56 No. 7, pp. 1073-1095.

Boudouropoulos, I.D. and Arvanitoyannis, I.S. (1999), “Current state and advances in the implementation of ISO 14000 by the food industry. Comparison of ISO 14000 to ISO 9000 to other environmental programs”, *Trend in Food Science & Technology*, Vol. 9 No. 11-12, pp. 395-408.

Bou-Llusar, J.C., Escrig-Tena, A.B., Roca-Puig, V. and Beltrán Martín, I. (2009), “An empirical assessment of the EFQM excellence model: Evaluation as a TQM framework relative to the MBNQA model”, *Journal of Operations Management*, Vol. 27 No. 1, pp. 1-22.

Bouranta, N. and Psomas, E. (2017), “A comparative analysis of competitive priorities and business performance between manufacturing and service firms”, *International Journal of Productivity and Performance Management*, Vol. 66 No. 7, pp. 914-931.

Bourlakis M., Maglaras G., Aktas E., Gallear D. and Fotopoulos, C. (2014), “Firm size and sustainable performance in food supply chains: insights from Greek SMEs”, *International Journal of Production Economics*, Vol. 152, pp. 112-130.

Bourlakis, M. and Bourlakis, C. (2006), “Integrating logistics and information technology strategies for sustainable competitive advantage”, *Journal of Enterprise Information Management*, Vol. 19 No. 4, pp. 389-402.

Bourlakis, M., Maglaras, G., Aktas, E., Gallear, D. and Fotopoulos, C. (2014), “Firm size and sustainable performance in food supply chains: Insights from Greek SMEs”, *International Journal of Production Economics*, Vol. 152, pp. 112-130.

Bourlakis, M., Maglaras, G., Gallear, D. and Fotopoulos, C. (2014), "Examining sustainability performance in the supply chain: the case of the Greek dairy sector", *Industrial Marketing Management*, Vol. 43, pp. 56-66.

Bozbura, F.T., Beskese, A. and Kahraman, C. (2007), "Prioritization of human capital measurement indicators using fuzzy AHP", *Expert Systems with Applications*, Vol. 32 No. 4, pp. 1100-1112.

Britos, P., Dieste, O. and Garcia-Martinez, R. (2008), "Requirement elicitation in data mining for business intelligence projects", *Advances in Information Systems Research, Education and Practice*. IFIP – The International Federation for Information Processing, Vol. 274, Springer, Boston, MA, pp. 139-150.

Bromiley, P. and Rau, D. (2016), "Operations management and the resource based view: Another view", *Journal of Operations Management*, Vol. 41, pp. 95-106.

Bryman, A., Bell, E. (2007), Business research methods, 2nd ed., Oxford University Press, Oxford, UK.

BSI (2012). PAS 99:2012: Specification of common management system requirements as a framework for integration. *British Standards Institution*, London.

Burnay C., Jureta, I., Linden, I. and Faulkner S. (2016), "A framework for the operationalization of monitoring in business intelligence requirements engineering", *Software and System Modeling*, Vol. 15 No. 2, pp. 531-552.

Byrne, B.M. (2010), Structural Equation Modeling with Amos, 2nd Ed. Routledge, Taylor & Francis Group, New York.

Cabecinhas M., Domingues, P., Sampaio, P., Bernandes, M., Franceschini, F., Galetto, M., Gianni, M., Gotzamani, K., Mastrogiacomo, L. and Hernandez-Vivanco, A. (2018). "Integrated management systems diffusion models in South European countries", *International Journal of Quality and Reliability Management*, Vol. 35 No. 10, pp. 2289-2303.

Cambra-Fierro, J. and Ruiz-Benítez, R. (2011), "Sustainable business practices in Spain: a two-case study", *European Business Review*, Vol. 23 No. 4, pp. 401-412.

Campos, C.A.O. and Medeiros, D.D. (2009), A model for integration of management systems, Produção, Vol. 9 No. 1, pp. 70-86. doi: 10.1590/S0103-65132009000100006

Cândido, C.J.F., Coelho, L.M.S. and Peixinho, R.M.T. (2016), "The financial impact of a withdrawn ISO 9001 certificate", *International Journal of Operations & Production Management*, Vol. 36 No. 1, pp. 23-41.

Casadesús, M., Karapetrovic, S. and Heras I. (2011), "Synergies in standardized management systems: Some empirical evidence", *The TQM Journal*, Vol. 23 No.1, pp. 73-86.

Casadesús, M., Marimon, F. and Heras, I. (2008), "ISO 14001 diffusion after the success of the ISO 9001 model", *Journal of Cleaner Production*, Vol. 16 No. 16, pp. 1741-1754.

Castillo-Rojas, S.M., Casadesús, M., Karapetrovic, S., Coromina, L., Heras, I., and Martín, I. (2012), "Is implementing multiple management system standards a hindrance to innovation?", *Total Quality Management & Business Excellence*, Vol. 23 No. 9-10, pp. 1075-1088.

Castka P. and Prajogo, D. (2013), "The effect of pressure from secondary stakeholders on the internalization of ISO 14001", *Journal of Cleaner Production*, Vol. 47, pp. 245-252.

Castka, P. and Balzarova, M.A. (2008), "ISO 26000 and supply chains - On the diffusion of the social responsibility standard", *International Journal of Production Economics*, Vol. 111 No. 2, pp. 274-286.

Chan, Y.K., Gaffney, P., Neailey and Ip, W.H. (1998), "The establishment of an integrated management system – a paradigm for railway engineering management", *The TQM Magazine*, Vol. 10 No. 6, pp. 420-424.

Chandler, D. and Hwang, H. (2015), "Learning from learning theory: A model of organizational adoption strategies at the micro foundations of institutional theory", *Journal of Management*, Vol. 41 No. 5, pp. 1446-1476.

Chappin, M.M.H., Cambré, B., Vermeulen, P.A.M. and Lozano, R. (2015), "Internalizing sustainable practices: a configurational approach on sustainable forest management of the Dutch wood trade and timber industry", *Journal of Cleaner Production*, Vol. 107, pp. 760-774.

Chau, K.W. (2007), "Integrated water quality management in Tolo Harbour, Hong Kong: a case study", *Journal of Cleaner Production*, Vol. 15 No. 16, pp. 1568-1572.

Chaudhuri, S., Dayal, U. and Narasayya, V. (2011), "An overview of business intelligence technology", *Communication of the ACM, Vol. 54* No. 8, pp. 88-98.

Chen, F. F., Sousa, K. H. and West, S. G. (2005), "Teacher's corner: Testing measurement invariance of second-order factor models", *Structural Equation Modeling Journal*, Vol. 12, pp. 471-492.

Chen, C., Zhang, J. and Delaurentis, T. (2014), "Quality control in food supply chain management: An analytical model and case study of the adulterated milk incident in China", *International Journal of Production Economics*, Vol. 152, pp. 188-199.

Cheng, C., Fet, A. and Holment, E. (2010), "Using a hexagonal balanced scorecard approach to integrate corporate sustainability into strategy", *16th Annual International Sustainable Development Research Conference***,** Hong Kong.

Chountalas, P. and Tepaskoualos, F. (2019), "Selective integration of management systems: a case study in the construction industry", *The TQM Journal*, Vol. 31 No. 1, pp. 12-27.

Christaki, T. and Tzia, C. (2002), "Quality and safety assurance in winemaking", *Food Control*, Vol. 13, pp. 503-517.

Christmann, P. and Taylor, G. (2006), "Firm self-regulation through international certifiable standards: Determinants of symbolic versus substantive implementation", *Journal of International Business Studies*, Vol. 37 No. 6, pp. 863–878.

Chrysochou, P., Chryssochoidis, G. and Kehagia, O. (2009), "Traceability information carriers. The technology backgrounds and consumers' perceptions of the technological solutions", *Appetite*, Vol. 53, pp. 322-331.

Claver, E., López, M.D., Molina, J.F. andTarí, J.J. (2007), "Environmental management and firm performance: A case study", *Journal of Environmental Management*, Vol. 84 No. 4, pp. 606-619.

Coelho, J.F.G.M. and Moy, D. (2003), "The new performance evaluation methodology and its integration with management systems", *The TQM Magazine*, Vol. 15 No. 1, pp. 25-29.

Cots, S. and Casadesús, M. (2014), "Exploring the Service Management Standard ISO 22000", *Total Quality Management & Business Excellence*, Vol. 26 No. 5-6, pp. 515-533.

Cronbach, L.J. (1951), "Coefficient alpha and the internal structure of a test", *Psychometrika*, Vol. 16 No. 3, pp. 297-334.

Crowder, M. (2013), "Quality standards: integration within a bereavement environment", *The TQM Journal*, Vol. 25 No. 1, pp. 18-28.

Dabbene, F. and Gay, P. (2011), "Food traceability systems: Performance evaluation and optimization", *Computers and Electronics in Agriculture*, Vol. 75 No. 1, pp. 139-146.

Daly, M. and Adam, F. (2011), "Understanding organisational decision support maturity: Case studies of Irish organisations", *International Journal of Decision Support System Technology*, Vol. 3 No. 2, pp. 57-77.

Damanpour, F. and Aravind, D. (2012), "Managerial Innovation: Conceptions, Processes, and Antecedents", *Management and Organization Review*, Vol. 8 No. 2, pp. 423–454.

de Oliveira Matias, J.C., Janela Fonseca, J.M., Gomes Barata, I. and Ribeiro ProençaBrojo, F.M. (2013), "HACCP and OHS: Can each one help improve the other in the catering sector?", *Food Control*, Vol. 30 No. 1, pp. 240-250.

de Oliveira, O.J. (2013), "Guidelines for the integration of certifiable management systems in industrial companies", *Journal of Cleaner Production*, Vol. 57, pp. 124-133.

DiMaggio, P.J. and Powell, W.W. (1983), "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, Vol. 48 No. 2, pp. 147–160.

Disterer, G. (2012), "Why firms seek ISO 20000 certification – A study for ISO 20000 adoption", In *Proceedings of the 20th European Conference on Information Systems*. Barchelona, Spain.

Djekic, I., Miocinovic, J., Tomasevic, I., Smigic, N. and Tomic, N. (2014), "Environmental life-cycle assessment of various dairy products", *Journal of Cleaner Production*, Vol. 68, pp. 64-72.

Domingues P., Sampaio P. and Arezes P.M. (2016), "Integrated management systems assessment: a maturity model proposal", *Journal of Cleaner Production*, Vol. 124, pp. 164-174.

Domingues, J.P.T., Sampaio, P. and Arezes, P. M. (2014), "A model for assessing maturity of integrated management systems", in P. Arezes, J. S. Baptista, M. Barroso, P. Carneiro, P.

Cordeiro, N. Costa, R. Melo, A. S. Miguel, & G. Perestrelo (Eds.), Occupational Safety and Hygiene II. London: CRC Press, Taylor & Francis, pp.341-346.

Doll, W.J., Raghunathan, T.S., Lim, J.S. and Gupta, Y.P. (1995), "A confirmatory factor analysis of the user information satisfaction instrument", *Information Systems Research*, Vol. 6 No. 2, pp. 177-188.

Domingues, J.P.T., Sampaio, P., Arezes, P.M. (2011), "Beyond 'audit' definition: A framework proposal for integrated management systems", Proceedings of 61st IEEE Annual Conference and Expo, Reno, Nevada, USA.

Donaldson, T. and Preston, L.E. (1995), "The Stakeholder Theory of the Corporation: Concepts, Evidence and Implications", *Academy of Management Review*, Vol. 20 No. 1, pp. 65-91.

Dunleavy P. (2003), "*Authoring a PhD: How to Plan, Draft, Write and Finish a Doctoral Thesis or Dissertation*", Palgrave Study Guides, Palgrave Macmillan.

Duriau, V.J., Reger, R.K. and Pfarrer, M.D. (2007), "A content analysis of the content analysis literature in organization studies: Research themes, data sources and methodological refinements", *Organizational Research Methods*, Vol. 10 No. 1, pp. 5-34.

Dyllick, T. and Muff, K. (2016), "Clarifying the meaning of sustainable business: Introducing a typology from business-as-usual to true business sustainability", *Organization & Environment*, Vol. 29 No. 2, pp. 156-174.

Dyllick, T. and Hockerts, K. (2002). Beyond the Business Case for Corporate Sustainability. *Business Strategy and the Environment*, Vol. 11 No. 2, pp. 130- 141.

Efstratiadis, M. M. and Arvanitoyannis, I. S. (2000), "Implementation of HACCP to large scale production line of Greek ouzo and brandy: a case study", *Food Control*, Vol. 11, pp. 19-30.

Eisenhardt, K.M. and Graebner, M.E. (2007), "Theory building from cases: Opportunities and challenges", *Academy of Management Journal*, Vol. 50 No. 1, pp. 25-32.

Eisenhardt, K.M. and Martin, J.A. (2000), "Dynamic capabilities: What are they?", *Strategic Management Journal*, Vol. 21 No. 10/11, pp. 1105-1121.

Ejdys, J. and Matuszak-Flejszman, A. (2010), “New management systems as an instrument of implementation sustainable development concept at organizational level”, *Technological and Economic Development of Economy*, Vol. 16 No. 2, pp. 202-218.

Elkington, J. (1997). “Cannibals with forks: the triple bottom line of 21st century business”. Capstone Publishing Limited, UK.

Elliot, S. (2011), “Transdisciplinary perspectives on environmental sustainability: a resource base and framework for IT-enabled business transformation”, *MIS Quarterly*, Vol. 35 No. 1, pp. 197-236.

Engert, S., Rauter, R. and Baumgartner, R.J. (2016), “Exploring the integration of corporate sustainability into strategic management: a literature review”, *Journal of Cleaner Production*, Vol. 112 Part 4, pp. 2833-2850.

Epstein, M.J. and Roy, M.J. (2001), “Sustainability in action: Identifying and measuring the key performance drivers”, *Long Range Planning*, Vol. 34 No. 5, pp. 585-604.

Erlantz, A., Heras-Saizarbitoria, I. and Casadesús, M. (2014), "Internalization of ISO 9001: a longitudinal survey", *Industrial Management & Data Systems*, Vol. 114 No. 6, pp. 872-885

Escanciano, C. and Santos-Vijande, M.L. (2014), “Reasons and constraints to implementing an ISO 22000 food safety management system: Evidence from Spain”, *Food Control*, Vol. 40, pp. 50-57.

Escrig-Tena A.B., Garcia-Juan B. and Segarra-Ciprés M. (2019), “Drivers and internalisation of the EFQM excellence model”, *International Journal of Quality & Reliability Management*, Vol. 36 No. 3, pp. 398-419.

Fagerberg, J. and Verspagen, B. (2009), “Innovation studies - The emerging structure of a new scientific field”, *Research Policy*, Vol. 38 No. 2, pp. 218-233.

Ferragut, V. and Trujillo, T. (2008), “Semi-hard cheese – Cheese making technology”, in M.M.C. Vieira, P. Ho (eds.), *Experiments in Unit Operations and Processing of Foods*, Springer Science+Business Media, LLC, pp. 155-160.

Ferreira, A.L., Machado, R.J. and Paulk, M.C. (2011), “Supporting Audits and Assessments in Multi-model Environments”, Product-Focused Software Process Improvement. in Caivano, D.,

Oivo, M., Baldassarre, M.T., Visaggio, G. (Eds.), *Proceedings of the 12th International Conference, 2011 (LNCS)*, Vol. 6759, pp. 73-87, Berlin, Germany: Springer.

Ferrón Vílchez, V. and Darnall, N. (2016), "Two are Better than One: The Link Between Management Systems and Business Performance", *Business Strategy and the Environment*, Vol. 25 No. 4, pp. 221–240.

Field, A. (2013), "Discovering statistics using IBM SPSS statistics", 4th Ed., Sage Publications.

Figge, F., Hahn, T., Schaltegger, S. and Wagner, M. (2002), "The sustainability balanced Scorecard – Linking sustainability management to business strategy", *Business Strategy and the Environment*, Vol. 11 No. 5, pp. 269-284.

Fomin, V.V., de Vries, H.J. and Barlette, Y. (2008), "ISO/IEC 27001 information systems security management standard: Exploring the reasons of low adoption". In *Proceedings of the third European Conference on Management of Technology (EuroMOT)*, Nice, France.

Fornell C. and Larcker, D. (1981), "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error". *Journal of Marketing Research*, Vol. 18 No. 1, pp. 39-50.

Forza, C. (2002), "Survey research in operations management: a process-based perspective", *International Journal of Operations & Production Management*, Vol. 22 No. 2, pp. 152-194

Fotopoulos, C.V., Psomas, E.L. and Vouzas, F.K. (2010), "ISO 9001:2000 implementation in the Greek food sector", *The TQM Journal*, Vol. 22 No. 2, pp. 129-142.

Fowler F.J. and Mangione T.W. (1990), *Standardized Survey Interviewing Minimizing Interviewer-Related Error*, Thousand Oaks, CA: Sage.

Franceschini, F., Galetto, M. and Cecconi, P. (2006), "A worldwide analysis of ISO 9000 standard diffusion: Considerations and future development", *Benchmarking: An International Journal*, Vol. 13 No. 4, pp. 523-541.

Franceschini, F., Galetto, M., Maisano, D. and Mastrogiacomo, L. (2010), "Clustering of European countries based on ISO 9000 certification diffusion", *International Journal of Quality & Reliability Management*, Vol. 27 No. 5, pp. 558-575.

Franceschini, F., Galetto, M., Mastrogiacomo, L. and Viticchie, L. (2008), "Diffusion of ISO 9000 and ISO 14000 certification in Italian commodity sectors", *International Journal of Quality & Reliability Management*, Vol. 25 No. 5, pp. 452-465.

Freeman, R. E., Harrison, J.S. and Wicks, A.C. (2007), *Managing for Stakeholders: Survival, Reputation, and Success*, Yale University Press.

Fresner J. (1998), "Starting continuous improvement with a cleaner production assessment in an Austrian textile mill", Journal of Cleaner Production, Vol. 6 No. 2, pp. 85-91.

Fresner, J. and Engelhardt, G. (2004), "Experiences with integrated management systems for two small companies in Austria", Journal of Cleaner Production, Vol. 12 No. 6, pp. 623-631.

Galbreath, J. (2009), "Building corporate social responsibility into strategy", *European Business Review*, Vol. 21 No. 2, pp. 109-127.

Garengo, P. and Biazzo, S. (2013), "From ISO quality standards to an integrated management system: an implementation process in SME", *Total Quality Management & Business Excellence*, Vol. 24 No. 3-4, pp. 310-335.

Genaro, A.F.S. and Loureiro, G. (2015), "Stakeholder management as an approach to integrated management systems (IMS_{STK})", In R. Curran, N. Wognum, M. Borsato, J. Stjepandić and W.J.C. Verhagen (Eds.), *Transdisciplinary Lifecycle Analysis of Systems*, IOS Press BV, Amsterdam, pp. 31-39.

Gerbing, D.W., Hamilton, J.G. and Freeman, E.B. (1994), "A large-scale second-order structural equation model of the influence of management participation on organizational planning benefits", *Journal of Management*, Vol. 20, No. 4, pp. 859-885.

Gianni M. and Gotzamani K. (2015), "Management systems integration: lessons from an abandonment case", *Journal of Cleaner Production*, Vol. 86, pp. 265-276.

Gianni M. and Gotzamani K. (2016). "Integrated Management Systems and Information Management Systems: Common Threads". In P. Papajorgji, F. Pinet, A. Guimarães, & J. Papathanasiou (Eds.) *Automated Enterprise Systems for Maximizing Business Performance,* IGI Global, pp. 195-214.

Gianni M., Gotzamani K. and Linden, I. (2016). "How a BI-wise responsible integrated management system may support food traceability". *International Journal of Decision Support System Technology*, Vol. 8 No. 2, pp. 1-17.

Gianni M., Gotzamani K. and Tsiotras G. *(*2017a), "Multiple perspectives on integrated management systems and corporate sustainability performance", *Journal of Cleaner Production*, Vol. 168, pp. 1297-1311.

Gianni M., Gotzamani K., Vouzas F. (2017b), "Food integrated management systems: dairy industry insights", *International Journal of Quality & Reliability Management*, Vol. 34 No. 2, 194-215.

Gianni, M. and Gotzamani, K. (2014), "Exploring the Integration of Management Systems in Services", 8th *AMA ServSig - International Service Research Conference: Services Marketing in the New Economic and Social Landscape*, June 13-15, Thessaloniki, Greece, *Conference Proceedings*, section 'Service Operations Management-Supply Chains', pp. 7-14, paper no. 174.

Gianni, M. and Gotzamani, K. (2016), "Integrated management systems and information management systems: Common threads", In Papajorgji, P., Pinet, F., Guimarães, A. M., & Papathanasiou, J. (Eds.), *Automated Enterprise Systems for maximizing Business Performance*, IGI Global, USA, pp. 195-214.

Gianni, M., Gotzamani, K. and Vouzas, F. (2014), "Integrated management systems in the food sector: Insights from a dairy plant", In *1st International Conference on Quality Engineering and Management*, September 14-16, Guimarãez, Portugal, Conference Proceedings, pp. 303-314.

Gibbert, M. and Ruigrok, W. (2010), "The "what" and "how" of case study rigor: Three strategies based on published research", *Organizational Research Methods*, Vol. 13 No. 4, pp. 710-737.

Gillies, A. (2011), "Improving the quality of information security management systems with ISO27000", *The TQM Journal*, Vol. 23 No. 4, pp. 367–376.

González-García, S., Castanheira, É.G., Dias, A.C. and Arroja, L. (2013), "Environmental performance of a Portuguese mature cheese-making dairy mill", *Journal of Cleaner Production*, Vol. 41, pp. 65-73.

Gotzamani, K., Longinidis, P. and Vouzas, F. (2010), "The logistics services outsourcing dilemma: quality management and financial performance perspectives", *Supply Chain Management: An International Journal*, Vol. 15 No.6, pp. 438–453.

Gotzamani K.D. and Tsiotras G.D. (2002), "The true motives behind ISO 9000 certification: Their effect on the overall certification benefits and long term contribution towards TQM". *International Journal of Quality & Reliability Management*, Vol. 19 No. 2, pp. 151-169.

Goyal, P., Rahman, Z. and Kazmi, A.A. (2013), "Corporate sustainability performance and firm performance research: Literature review and future research agenda", *Management Decision*, Vol. 51 No. 2, pp.361-379.

Gray, R. (2010), "Is accounting for sustainability actually accounting for sustainability… and how would we know? An exploration of narratives of organisations and the planet", *Accounting, Organizations and Society*, Vol. 35, pp. 47–62.

Grekova, K., Bremmers, H.J., Trienekens, J.H., Kemp, R.G.M. and Omta, S.W.F. (2014), "Extending environmental management beyond the firm boundaries: An empirical study of Dutch food and beverage firms", *International Journal of Production Economics*, Vol. 152, pp. 174-187.

GRI (2010), "GRI and ISO 26000: How to use the GRI Guidelines in combination with ISO 26000", *GRI Research and Development Series*.

Griffith, A. and Bhutto, K. (2008), "Improving environmental performance through integrated management systems (IMS) in the UK", *Management of Environmental Quality: An International Journal*, Vol. 19 No. 5, pp. 565-578.

Griffith, A. and Bhutto, K. (2009), "Better environmental performance: A framework for integrated management systems (IMS)", *Management of Environmental Quality: An International Journal*, Vol. 20 No. 5, pp. 566-580.

Grimm, J.H., Hofstetter, J.S. and Sarkis, J. (2014), "Critical factors for sub-supplier management: A sustainable food supply chains perspective", *International Journal of Production Economics*, Vol. 152, pp. 159-173.

Guide, V.D.R. and Ketokivi, M. (2015), "Notes from the Editors: Redefining some methodological criteria for the journal", *Journal of Operations Management*, Vol. 37, pp. v-viii.

Hacham, H., Tetro, N., Kochari-Azolai, S., Stern, N., Mizrahi, D., Lisenker, A. and Gazit, E. (2007), "Unification of the quality assurance systems of public health laboratories conformed to ISO 17025, ISO 15189, and ISO 9000: a major organizational change", *Accreditation and Quality Assurance*, Vol. 12 No. 8, pp. 409-413.

Hagen, N. (2010), "Deconstructing doctoral dissertations: how many papers does it take to make a PhD?", *Scientometrics*, Vol. 85, pp. 567-579.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2014), *Multivariate Data Analysis*. 7th Ed. - Pearson New International Edition, Pearson Education Limited, Harlow, Essex, England.

Halkier, B. and Holm, L. (2006), "Shifting responsibilities for food safety in Europe: An introduction", *Appetite,* Vol. 47 No. 2, pp. 127-133.

Hamprecht, J., Corsten, D., Noll, M. and Meier, E. (2005), "Controlling the sustainability of food supply chains", *Supply Chain Management: An International Journal*, Vol. 10 No. 1, pp. 7-10.

Handfield, R., Sroufe, R. and Walton, S. (2005), "Integrating environmental management and supply chain strategies", *Business Strategy and the Environment*, Vol. 14 No. 1, pp. 1-19.

Heck, R.H. and Marcoulides, G.A. (1989), "Examining the Generalizability of Administrative Personnel Allocation Decisions", *The Urban Review*, Vol. 21, No. 1, pp. 51-62.

Heras-Saizarbitoria, I. (2011), "Internalization of ISO 9000: an exploratory study". *Industrial Management & Data Systems*, Vol. 111 No. 8, pp. 1214-1237.

Heras-Saizarbitoria, I. and Boiral, O. (2013), "ISO 9001 and ISO 14001: Towards a research agenda on management system standards*", *International Journal of Management Reviews*, Vol. 15 No. 1, pp. 47-65.

Heras-Saizarbitoria, I. and Boiral, O. (2015). Symbolic adoption of ISO 9000 in small and medium-sized enterprises: The role of internal contingencies. *International Small Business Journal*, Vol. *33* No. 3, pp. 299–320.

Hernandez-Vivanco, A., Bernardo, M. and Cruz-Cázares, C. (2016), "Relating open innovation, innovation and management systems integration", *Industrial Management & Data Systems*, Vol. 116, No. 8, pp.1540-1556.

Hillman, A.J., Withers, M.C. and Collins, B.J. (2009), "Resource dependence theory: A review", *Journal of Management*, Vol. 35 No. 6, pp. 1404-1427.

Hitt, M.A., Xu, K. and Matz Carnes, C. (2016), "Resource based theory in operations management research", *Journal of Operations Management*, Vol. 41, pp. 77-94.

Ho, S.K.M. (2010), "Integrated lean TQM model for sustainable development", *The TQM Journal*, Vol. 22 No. 6, pp. 583-593.

Hoorfar, J., Wagner, M., Jordan K. and Barker, G.C. (2011), "17 - Biotracing: a novel concept in food safety integrating microbiology knowledge, complex systems approaches and probabilistic modeling". In S. Brul, P.M. Fratamico & T.A. McMeekin (Eds.), *Tracing Pathogens in the Food Chain* (pp. 377-390). Woodhead Publishing Series in Food Science, Technology and Nutrition.

Hörisch, J., Freeman, R.E. and Schaltegger, S. (2014), "Applying stakeholder theory in sustainability management: Links, similarities, dissimilarities, and a conceptual framework", *Organization & Environment*, Vol. 27 No. 4, pp. 328-346.

Howson, C. (2008), "Successful business intelligence: Secrets to making BI a killer app", McGraw-Hill.

Hoy, Z. and Foley, A. (2015), "A structured approach to integrating audits to create organisational efficiencies: ISO 9001 and ISO 27001 audits", *Total Quality Management & Business Excellence*, Vol. 26 No. 5-6, pp. 690-702.

Hutcheson, G. and Sofroniou, N. (1999). *The multivariate social scientist*. London: Sage.

Hudson, J. and Orviska, M. (2013). "Firms' adoption of international standards: One size fits all?", *Journal of Policy Modeling*, Vol. 35, pp 289-306.

Hughes, S. and Karapetrovic, S. (2006), "ISO 10002 Complaints Handling System: a study", *International Journal of Quality & Reliability Management*, Vol. 23 No. 9, pp. 1158-1175.

Iatridis, K., Kuznetsov, A. and Whyman, P. (2016), "SMEs and Certified Management Standards: The Effect of Motives and Timing on Implementation and Commitment", *Business Ethics Quarterly*, Vol. 26 No. 1, pp. 67-94.

Inmon, W.H. (1992). Building the Data Warehouse, (1st ed.), Wiley.

Ionescu-Somers, A. and Steger, U. (2008), Business Logic for Sustainability – A Food and Beverage Industry Perspective, Palgrave Macmillan, Hampshire, UK.

ISO (2008), "The integrated use of management system standards", International Organization for Standardization, Geneva.

ISO (2010). ISO 26000 – Guidance on social responsibility. *International Organization for Standardization*, Geneva.

ISO (2014), "The ISO survey of management system standard certifications", International Organization for Standardization, Geneva.

ISO (2015). The ISO Survey of Management System Standard Certifications-2014. *International Organization for Standardization*, Geneva.

ISO (2018). The Integrated Use of Management System Standards (IUMSS) ISO HANDBOOK. 2nd ed., Switzerland.

ISO 14001 (1996), Environmental Management Systems – Specification with Guidance for Use, International Organization for Standardization, Geneva.

ISO 14001 (2004), Environmental Management Systems – Requirements with Guidance for Use, International Organization for Standardization, Geneva.

Ittner, C.D. and Larcker, D.F. (2003), "Coming up short on nonfinancial performance measurement", *Harvard Business Review*, Vol. 81 No. 11, pp. 88-95.

Ivanova, A., Gray, J. and Sinha, K. (2014), "Towards a unifying theory of management standard implementation: The case of ISO 9001/ISO 14001", *International Journal of Operations & Production Management*, Vol. 34, No. 10, pp. 1269-1306.

Jain, P., Vyas, V. and Chalasani, D. P. S. (2016), "Corporate Social Responsibility and Financial Performance in SMEs: A Structural Equation Modelling Approach", *Global Business Review*, Vol. 17 No. 3, pp. 630–653.

Jankovic, M., Zaraté, P., Bocquet, J.-C. and Le Cardinal, J. (2009), "Collaborative decision making: Complementary developments of a model and an architecture as a tool support", *International Journal of Decision Support System Technology*, Vol. 1 No. 1, pp. 35-45.

Jin, S. and Zhou, L. (2014), "Consumer interest in information provided by food traceability systems in Japan", *Food Quality and Preference*, Vol. 36, pp. 144-152.

Johnson, M.P. (2015), "Sustainability management and small and medium-sized enterprises: Managers' awareness and implementation of innovative tools", *Corporate Social Responsibility and Environmental Management*, Vol. 22, pp. 271-285.

Jonker, J. and Karapetrovic, S. (2004), "Systems thinking for the integration of management systems", *Business Process Management Journal*, Vol. 10 No. 6, pp. 608-615.

Jørgensen, T.H. (2008), "Towards more sustainable management systems: through life-cycle management and integration", *Journal of Cleaner Production*, Vol. 16 No. 10, pp. 1071-1080.

Jørgensen, T.H., Remmen, A. and Mellado, M.D. (2006), "Integrated management systems – three different levels of integration", *Journal of Cleaner Production*, Vol. 14 No. 8, pp. 713-722.

Jupp, V. (Ed.) (2006). The SAGE Dictionary of Social Research Methods. SAGE Publications, London.

Kafel, P. and Sikora, T. (2014), "The level of management maturity in the Polish food sector and its relation to financial performance", *Total Quality Management & Business Excellence*, Vol. 25 No. 5-6, pp. 650-663.

Kafetzopoulos, D., Gotzamani, K. and Psomas, E. (2013), "Quality systems and competitive performance of food companies", *Benchmarking: An International Journal*, Vol. 20 No. 4, pp. 463-483.

Kafetzopoulos, D.P. and Gotzamani, K.D. (2014), "Critical factors, food quality management and organizational performance", *Food Control*, Vol. 40, pp. 1-11.

Kafetzopoulos, D.P., Gotzamani, K.D. and Psomas, E.L. (2014), "The impact of employees' attributes on the quality of food products", International *Journal of Quality & Reliability Management*, Vol. 31 No. 5, pp. 500 – 521.

Karaman, A.D., Cobanoglu, F., Tunalioglu, R. and Ova, G. (2012), "Barriers and benefits of the implementation of food safety management systems among the Turkish dairy industry: A case study", *Food Control*, Vol. 25 No. 2, pp. 732-739.

Karapetrovic, S. (2002), “Strategies for the integration of management systems and standards”, *The TQM Magazine*, Vol. 14 No. 1, pp. 61-67.

Karapetrovic, S. (2003), “Musings on integrated management systems”, *Measuring Business Excellence*, Vol. 7 No. 1, pp. 4-13.

Karapetrovic, S. and Jonker, J. (2003), “Integration of standardized management systems: searching for a recipe and ingredients”, *Total Quality Management & Business Excellence*, Vol.14 No. 4, pp. 451-459.

Karapetrovic, S. and Casadesús, M. (2009), “Implementing environmental with other standardized management systems: Scope, sequence, time and integration”, *Journal of Cleaner Production*, Vol. 17 No. 5, pp. 533-540.

Karapetrovic, S., Casadesús-Fa, M. and Heras-Saizarbitoria, I. (2010), “What happened to the ISO 9000 lustre? An eight-year study”, *Total Quality Management & Business Excellence*, Vol. 21 No. 3, pp. 245-267.

Karapetrovic, S. and Willborn, W. (1998a), “Integration of quality and environmental management systems”, *The TQM Magazine*, Vol. 10 No. 3, pp. 204-213.

Karapetrovic, S., Willborn, W. (1998b), Connecting internal management systems in service organizations, Managing Service Quality, Vol. 8, No. 4, pp. 256-271.

Karapetrovic, S. and Willborn, W. (1998c), “The system’s view for clarification of quality vocabulary”, *International Journal of Quality & Reliability Management*, Vol. 15 No. 1 pp. 99-120.

Karapetrovic, S. and Willborn, W. (2000), “Generic audit of management systems: fundamentals”, *Managerial Auditing Journal*, Vol. 15 No. 6, pp. 279-294.

Karapetrovic, S. and Willborn, W. (2001), “Audit system: Concepts and practices”, Total Quality Management, Vol. 12 No. 1, pp. 13-28.

Karipidis, P., Athanassiadis, K., Aggelopoulos, S. and Giompliakis, E. (2009), “Factors affecting the adoption of quality assurance systems in small food enterprises”, *Food Control*, Vol. 20, pp. 93-98.

Karlsen, K.M., Dreyer, B., Olsen, P. and Elvevoll, E.O. (2013), "Literature review: Does a common theoretical framework to implement food traceability exist?", *Food Control*, Vol. 32 No. 2, pp. 409-417.

Kaziliũnas, A. (2008), "Problems of auditing using quality management systems for sustainable development of organizations", *Technological and Economic Development of Economy*, Vol. 14 No. 1, pp. 64-75.

Kenworthy, T. and Balakrishnan, J. (2016), "Theory usage in empirical operations management research: a review and discussion", *Management Decision*, Vol. 54 No. 10, pp. 2413-2432.

Ketokivi, M. (2019), "Avoiding bias and fallacy in survey research: A behavioral multilevel approach", *Journal of Operations Management*, Vol. 65, pp. 380-402.

Ketokivi, M. and Choi, T. (2014), "Renaissance of Case Research as a Scientific Method", *Journal of Operations Management*, Vol. 32 No. 5, pp. 232-240.

Ketokivi M.A. and Schroeder R.G. (2004), "Strategic, structural contingency and institutional explanations in the adoption of innovative manufacturing practices", *Journal of Operations Management*, Vol. 22 No. 1, pp. 63-89.

Khanna, H.K., Laroiya, S.C. and Sharma, D.D. (2010), "Integrated management systems in Indian manufacturing organizations: Some key findings from an empirical study", *The TQM Journal*, Vol. 22 No. 6, pp. 670-686.

Kheradia, A. and Warriner, K. (2013), "Food Safety Modernization Act and the role of quality practitioners in the management of food safety and quality systems", *The TQM Journal*, Vol. 25 No. 4, pp. 347-370.

Kimball, R. (1996), *The data warehouse toolkit* (1st ed.), Wiley

Kline, P. (1999), *The handbook of psychological testing* (2nd ed.). London: Routledge.

Klute-Wenig, S. and Refflinghaus, R. (2015), "Integrating sustainability aspects into an integrated management system", *The TQM Journal*, Vol. 27 No. 3, pp. 303-315.

Kostevšek, A., Petek, J., Čuček, L. and Pivec, A. (2013), "Conceptual design of a municipal energy and environmental system as an efficient basis for advanced energy planning", *Energy*, Vol. 60, pp. 148-158.

Kostova, T. and Roth, K. (2002), “Adoption of an organizational practice by subsidiaries of multinational corporations: institutional and relational effects”, *The Adademy of Management Journal*, Vol. 45, No. 1, pp. 215-233.

Koufteros, X.A. (1999), “Testing a model of pull production: a paradigm for manufacturing research using structural equation modeling”, *Journal of Operations Management*, Vol. 17, pp. 467-488.

Koufteros, X. and Marcoulides, G.A. (2006), “Product development practices and performance: A structural equation modeling-based multi-group analysis”, *International Journal of Production Economics*, Vol. 103 No. 1, pp. 286-307.

Kraus, J. and Grosskopf, J. (2008), “Auditing integrated management systems: Considerations and practice tips”, *Environmental Quality Management*, Vol. 18 No. 2, pp. 7-16.

Kuei, C.-H. and Lu, M.H. (2013), “Integrating quality management principles into sustainability management”, *Total Quality Management & Business Excellence*, Vol. 24, No. 1-2, pp. 62-78.

Kumbakara, N. (2008), “Managed IT services: The role of IT standards”, *Information Management & Computer Security*, Vol. 16 No. 4, pp. 336-359.

Labodová, A. (2004), “Implementing integrated management systems using a risk analysis based approach”, *Journal of Cleaner Production*, Vol. 12 No.6, pp. 571-580.

Lagodimos, A.G., Chountalas, P.T. and Chatzi, K. (2007), “The state of ISO 14001 certification in Greece”, *Journal of Cleaner Production*, Vol. 15 No. 18, pp. 1743-1754.

Länsiluoto, A. and Järvenpää, M. (2012), “Integrating greenness into a balanced scorecard in a food processing company”, *The TQM Journal*, Vol. 24 No. 5, pp. 388-398.

Leopoulos, V., Voulgaridou, D., Bellos, E., Kirytopoulos, K. (2010), “Integrated management systems: moving from function to organisation/decision view”, The TQM Journal, Vol. 22 No. 6, pp. 594-628.

Lezcano, J.-M., Adachihara, H. and Prunier, M. (2010). Experimenting design and implementation of an educati//onal services management system based on ISO/IEC 20000 standard. In M. Lytras, P. Ordonez De Pablos, D. Avison, J. Sipior, Q. Jin, W. Leal, L. Uden, M.

Thomas, S. Cervai, & D. Horner (Eds.), *Technology enhanced learning. Quality of teaching and educational reform (CCIS 73*) (pp. 55–60). Berlin: Springer.

Lieberman, M.B. and Asaba, S. (2006), "Why Do Firms Imitate Each Other?", *The Academy of Management Review*, Vol. 31 No. 2, pp. 366-385.

Linderman, K., Schroeder, R.G., Zaheer, S., Liedtke, C. and Choo, A.S. (2004), "Integrating quality management practices with knowledge creation processes", *Journal of Operations Management*, Vol. 22, No. 6, pp. 589-607.

Liu, S., Moizer, J., Subramaniam, P., Leat, M., & Linden, I. (2010). Decision support for ERP-based production management: a business intelligence perspective. *Proceedings of the 15th IFIP WG8.3 International Conference on Decision Support Systems*.

Llach, J., Marimon, F. and Alonso-Almeida, M.M. (2015), "Social Accountability 8000 standard certification: analysis of worldwide diffusion", *Journal of Cleaner Production*, Vol. 93, pp. 288-298.

Llach, J., Marimon, F. and Bernardo, M. (2011), "ISO 9001 diffusion analysis according to activity sectors", *Industrial Management & Data Systems*, Vol. 111 No. 2, pp. 298-316.

López-Fresno, P. (2010), Implementation of an integrated management system in an airline: a case study, *The TQM Journal*, Vol. 22 No. 6, pp. 629-647.

López-Mielgo, N., Montes-Peón, J.M. and Vázquez-Ordás, C.J. (2009), "Are quality and innovation management conflicting activities?", *Technovation*, Vol. 29 No. 8, pp. 537-545.

Lourenço, I.C., Branco, M.C., Curto, J.D. and Eugénio, T. (2012), "How Does the Market Value Corporate Sustainability Performance?", *Journal of Business Ethics*, Vol. 108 No. 4, pp. 417-428.

Lozano, R. (2008), "Envisioning sustainability three-dimensionally", *Journal of Cleaner Production*, Vol. 16, pp. 1838-1846.

Lozano, R. (2013), "Sustainability inter-linkages in reporting vindicated: a study of European companies", *Journal of Cleaner Production*, Vol. 51, pp. 57-65.

Lozano, R. (2015), "A Holistic Perspective on Corporate Sustainability Drivers", *Corporate Social Responsibility and Environmental Management*, Vol. 22, pp. 32-44.

Lozano, R., Carpenter, A. and Huisingh, D. (2015), "A review of 'theories of the firm' and their contributions to corporate sustainability", *Journal of Cleaner Production*, Vol. 106, pp. 430-442.

Lubin, D.A. and Esty, D.C. (2010), "The sustainability imperative", *Harvard Business Review*, Vol. 88 No. 5, pp. 42-50.

Luk, C.-L., Yau, O.H.M., Chow, R.P.M., Tse, A.C.B. and Sin, L.Y.M. (2005), "Stakeholder orientation and business performance: The case of service companies in China", *Journal of International Marketing*, Vol. 13 No. 1, pp. 89-110.

Maas, S. and Reniers, G. (2014), "Development of a CSR model for practice: connecting five inherent areas of sustainable business", *Journal of Cleaner Production*, Vol. 64, pp. 104-114.

Mackau, D. (2003), "SME integrated management system: a proposed experiences model", *The TQM Magazine*, Vol. 15 No. 1, pp. 43-51.

Maletič M., Maletič D. and Gomišček, B. (2016), "The impact of sustainability exploration and sustainability exploitation practices on the organisational performance: a cross-country comparison". *Journal of Cleaner Production*, Vol. 138, Part 2, pp. 158-169.

Maletič, M., Maletič D., Dahlgaard, J., Dahlgaard-Park, S.M. and Gomišcek, B. (2015), "Do corporate sustainability practices enhance organizational economic performance?", *International Journal of Quality and Service Sciences*, Vol. 7 No. 2/3, pp. 184-200.

Maletič, M., Maletič, D. and Gomišček, B. (2018), "The role of contingency factors on the relationship between sustainability practices and organizational performance", *Journal of Cleaner Production*, Vol. 171, pp. 423-433.

Maletič, M., Maletič, D., Dahlgaard, J.J., Dahlgaard-Park, S.M. and Gomišček, B. (2015), "Effect of sustainability-oriented innovation practices on the overall organisational performance: an empirical examination", *Total Quality Management & Business Excellence*, Vol. 27 No. 10, pp. 1171-1190.

Maletič, M., Maletič, D., Dahlgaard, J.J., Dahlgaard-Park, S.M. and Gomišček, B. (2014), "Sustainability exploration and sustainability exploitation: from a literature review towards a conceptual framework", *Journal of Cleaner Production*, Vol. 79, pp. 182-194.

Maletič, M., Podpečan, M. and Maletič, D. (2015), "ISO 14001 in a corporate sustainability context: a multiple case study approach", *Management of Environmental Quality: An International Journal*, Vol. 26 No. 6, pp.872-890.

Malhotra M.K. and Grover V. (1998), "An assessment of survey research in POM: From constructs to theory", *Journal of Operations Management*, Vol. 16 No. 4, pp. 407-425.

Manos B. and Manikas I. (2010), "Traceability in the Greek fresh produce sector: drivers and constraints", *British Food Journal*, Vol. 112 No. 6, pp. 640-652.

Manzanera, R., Jardí, J., Gomila, X., Pastor, J.R., Ibáñez, D., Gálvez, G., Albertí, C., Navarro, A., Uris, J., Pomares, A., López, L., Zuazu, C., Sabaté, P., Aguado, I., Domingo, L., Infante, C., Gomis, J., Jover, A., Iglesias, J. and Mestres, A. (2014), "Design of an integrated management system (IMS) in a government-run medical evaluation organization", *The TQM Journal*, Vol. 26 No. 6, pp. 550-565.

Marimon, F., Heras, I. and Casadesús, M. (2009), "ISO 9000 and ISO 14000 standards: A projection model for the decline phase", *Total Quality Management & Business Excellence*, Vol. 20 No. 1, pp. 1-21.

Marsden, G., Kelly, C. and Snell, C. (2006), "Selecting indicators for strategic performance management", *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 1956, pp. 21-29.

Marsh, H, W., Balla, J. R. and McDonald, R. P. (1988), "Goodness-of-fit indexes in confirmatory factor analysis: the effects of sample size", *Psychological Bulletin*, Vol. 103 No. 3, pp. 391-410.

Martí-Ballester, C.P. and Simon, A. (2017), "Union is strength. The integration of ISO 9001 and ISO 14001 contributes to improve the firms' financial performance", *Management Decision*, Vol. 55 No.1, pp. 81-102.

Martins, C., Bulkan, A. and Klempt, P. (2011), "Security excellence from a total quality management approach", *Total Quality Management & Business Excellence*, Vol. 22 No. 3, pp. 345-371.

Mason, S. and Merga, M.K. (2018), “A Current View of the Thesis by Publication in the Humanities and Social Sciences”, *International Journal of Doctoral Studies*, Vol. 13, pp. 139-154.

Massoud, M.A., Fayad, R., El-Fadel, M. and Kamleh, R. (2010), “Drivers, barriers and incentives to implementing environmental management systems in the food industry: A case of Lebanon”, *Journal of Cleaner Production*, Vol. 18 No. 3, pp. 200-209.

Matias J.C.D.O. and Coelho D.A. (2002). “The integration of the standards systems of quality management, environmental management and occupational health and safety management”, International Journal of Production Research, Vol. 40 No. 15, pp. 3857-3866.

Maxwell, J. A. (2005), “Qualitative research design”, 2nd ed., Thousand Oaks, CA: Sage Publications.

McDermott, R. (1999), “Why information systems inspired but cannot deliver knowledge management”, *California Management Review*, Vol. 41 No. 4, pp. 103-117.

McMeekin, T.A., Baranyi, J., Bowman, J., Dalgaard, P., Kirk, M., Ross, T., Schmid, S. and Zwietering, M.H. (2006), “Information systems in food safety management”, *International Journal of Food Microbiology*, Vol. 112, pp. 181–194.

Melnyk, S.A., Sroufe, R.P. and Calantone, R. (2003), “Assessing the impact of environmental management systems on corporate and environmental performance”, *Journal of Operations Management*, Vol. 21 No. 3, pp. 329-351.

Mensah, L.D. and Julien, D. (2011), “Implementation of food safety management systems in the UK”, *Food Control*, Vol. 22 No. 8, pp. 1216-1225.

Meredith, J. (1998), “Building operations management theory through case and field research”, *Journal of Operations Management*, Vol. 16 No. 4, pp. 441-454.

Mesquida, A.-L. and Mas, A. (2015), “Integrating IT service management requirements into the organizational management system”, *Computers Standards & Interfaces*, Vol. 37, pp. 80-91.

Michalski, M., Montes Botella, J.L. and Figiel, A. (2018), “Corporate social responsibility in supply chain management: a new model approach”, *International Journal of Logistics Systems and Management*, Vol. 30 No. 4, pp. 477-502.

Miles, M.B. and Huberman, A.M. (1994), "Qualitative Data Analysis.An Expanded Sourcebook", 2nd ed., Sage Publications Inc., Thousand Oaks.

Milliman, J. and Grosskopf, J. (2011), "Lessons in leadership: Operationalizing sustainability through an integrated management system", *Environmental Quality Management*, Vol. 20 No. 4, pp. 15-28.

Milliman, J., Grosskopf, J., Paez, O. and Ayen, W. (2005), "Pilot project results of an integrated security management system", Disaster Prevention and Management Journal, Vol. 14 No. 1, pp. 20-31.

Mitchell, R., Agle, B. and Wood, D. (1997), "Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts", *Academy of Management Review*, Vol. 22 No. 4, pp.853-886.

Mithas, S., Ramasubbu, N. and Sambamurthy, V. (2011), "How information management capability influences firm performance", *MIS Quarterly*, Vol. 35, pp. 237-256.

Molina-Azorín, J.F., Tarí, J.J., Pereira-Moliner, J., López-Gamero, M.D. and Pertusa-Ortega, E.M. (2015), "The effects of quality and environmental management on competitive advantage: A mixed methods study in the hotel industry", *Tourism management*, Vol. 50, pp. 41-54.

Moneva, J.M., Archel, P. and Correa, C. (2006), "GRI and the camouflaging of corporate unsustainability", *Accounting Forum*, Vol. 30, pp. 121-137.

Moore, D.R.J. (2013), Sustainability, institutionalization and the duality of structure: Contradiction and unintended consequences in the political context of an Australian water business, *Management Accounting Research*, Vol. 24 No. 4, pp. 366-386.

Morioka, S.N. and de Carvalho, M.M. (2016), "A systematic literature review towards a conceptual framework for integrating sustainability performance into business", *Journal of Cleaner Production*, Vol. 136, Part A, pp. 134-146.

Mungree, D., Rudra, A. and Morien, D. (2013). A framework for understanding the critical success factors of enterprise business intelligence implementation. *Proceedings of the Nineteenth Americas Conference on Information Systems, Chicago, Illinois, August 15-17, 2013.*

Myers, M. D. (2008), "Qualitative research in business & management", Sage Publications Limited.

Nadae, J., Carvalho, M. and Vieira, D. (2019), "Exploring the influence of environmental and social standards in integrated management systems on economic performance of firms", *Journal of Manufacturing Technology Management*, Vol. 30 No. 5, pp. 840-861.

Nair A. and Prajogo, D. (2009), "Internalisation of ISO 9000 standards: the antecedent role of functionalist and institutionalist drivers and performance implications", *International Journal of Production Research*, Vol. 47 No. 16, pp. 4545-4568.

Niemann, M., Miede, A., Johannsen, W., Repp, N. and Steinmet, R. (2010), "Structuring SOA Governance", *International Journal on IT/Business Alignment and Governance*, Vol. 1 No. 1, pp. 58-75.

Nowicki, P., Kafel, P. and Sikora, T. (2013), "Selected requirements of integrated management systems based on PAS 99 Specification", *International Journal for Quality Research*, Vol. 7 No. 1, pp. 97-106.

Nunhes T.V., Bernardo M. and Oliveira, O.J. (2019), "Guiding principles of integrated management systems: Towards unifying a starting point for researchers and practitioners", *Journal of Cleaner Production*, 210, 977-993.

Nunhes, T. V., Ferreira Motta, L.C. and de Oliveira, O.J. (2016), "Evolution of integrated management systems research on the Journal of Cleaner Production: Identification of contributions and gaps in the literature", *Journal of Cleaner Production*, Vol. 139, pp. 1234-1244.

Nunhes T.V., Oliveira, O.J. (2018). "Analysis of Integrated Management Systems research: identifying core themes and trends for future studies", *Total Quality Management & Business Excellence*, doi: 10.1080/14783363.2018.1471981

Nunnally J.C. and Bernstein, I.H. (1994), "The Assessment of Reliability", *Psychometric Theory*, Vol. 3 No. 1, pp. 248–292.

Nunnally, J. C. (1978), *Psychometric theory (*2nd ed.), New York: McGraw-Hill.

Nunnally, J. C. and Bernstein, I. H. (1994), *Psychometric theory* (3rd ed.), New York: McGraw-Hill.

Oksenberg L., Cannell C. and Kalton, G. (1991), "New Strategies for Pretesting Survey Questions", *Journal of Official Statistics*, Vol. 7 No. 3, pp. 349-365.

Olajire, A.A. (2012), "The brewing industry and environmental challenges", *Journal of Cleaner Production*, doi: 10.1016/j.jclepro.2012.03.003.

Ooi, K.-B. (2015), "TQM practices and knowledge management: a multi-group analysis of constructs and structural invariance between the manufacturing and service sectors", *Total Quality Management & Business Excellence*, Vol. 26 No. 11-12, pp. 1131-1145.

Oskarsson, K. and von Malmborg, F. (2005), "Integrated management systems as a corporate response to sustainable development", *Corporate Social Responsibility and Environmental Management*, Vol. 12 No. 3, pp. 121-128.

Othman, M.F.I. and Chan, T. (2013), "Barriers to Formal IT Governance Practice - Insights from a Qualitative Study", In *System Sciences (HICSS), 2013 46th Hawaii International Conference on*, (pp.4415-4424), Wailea, HI, USA: IEEE.

Pallant, J. (2011), "*SPSS Survival Manual: a step by step guide to data analysis using SPSS for Windows*", 4th edition, McGraw Hill.

Park, C. (2005), "New Variant PhD: The changing nature of the doctorate in the UK", *Journal of Higher Education Policy and Management,* Vol. 27 No. 2, pp. 189–207.

Parker, T. (2013), "The view from below – a management system case study from a meaning-based view of organization", *Journal of Cleaner Production*, Vol. 53, pp. 81-90.

Parmar, B.L., Freeman, R.E., Harrison, J.S., Wicks, A.C., Purnell, L. and de Colle, S. (2010), "Stakeholder Theory: The State of the Art", *The Academy of Management Annals*, Vol. 4, No. 1, pp. 403-445.

Peppard, J. and Ward, J. (2004), "Beyond strategic information systems: towards an IS capability", *The Journal of Strategic Information Systems*, Vol. 13 No. 2, pp. 167-194.

Perrini, F., Russo, A. and Tencati, A. (2011), "Deconstructing the relationship between corporate social and financial performance", *Journal of Business Ethics*, Vol. 102 Supplement 1, pp.59-76.

Peter, J. P. (1981), “Construct Validity: A Review of Basic Issues and Marketing Practices”, *Journal of Marketing Research,* Vol. 18, pp. 133–45.

Pfeffer, J. and Salancik, G. R. (2003), *The external control of organizations: A resource dependence perspective*, Stanford, CA: Stanford University Press.

Pizzuti, T. and Mirabelli, G. (2015), “The global Track&Trace System for food: General framework and functioning principles”, *Journal of Food Engineering*, Vol. 159, pp. 16-35.

Pizzuti, T., Mirabelli, G., Sanz-Bobi, M.A. and Goméz-Gonzaléz, F. (2014), “Food Track & Trace ontology for helping the food traceability control”, *Journal of Food Engineering*, Vol. 120, pp. 17–30.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., Podsakoff, N.P. (2003). “Common method biases in behavioral research: A critical review of the literature and recommended remedies”. *Journal of Applied Psychology*, Vol. 88 No. 5, pp. 879-903.

Podsakoff, P.M. and Organ, D.W. (1986), “Self-Reports in Organizational Research: Problems and Prospects”. *Journal of Management*, Vol. 12 No. 4, pp. 531–544.

Pojasek, R.B. (2006), “Quality toolbox: is your integrated management system really integrated?”, *Environmental Quality Management*, Vol. 16 No. 2, pp. 89-97.

Poltronieri C.F., Ganga G.M.D., Gerolamo M.C. (2019), “Maturity in management system integration and its relationship with sustainable performance”, *Journal of Cleaner Production*, Vol. 207, pp. 236-247.

Poltronieri C.F., Gerolamo M.C., Dias T.C.M., Cesar L. and Carpinetti, R. (2018), “Instrument for evaluating IMS and sustainable performance”, *International Journal of Quality & Reliability Management*, Vol. 35 No. 2, pp. 373-386.

Power, D. and Gruner, R.L. (2015), “Exploring reduced global standards-based interorganizational information technology adoption”, *International Journal of Operations & Production Management*, Vol. 35 No. 11, pp. 1488-1511.

Power, D. and Terziovski, M. (2007), “Quality audit roles and skills: Perceptions of non-financial auditors and their clients”, *Journal of Operations Management*, Vol. 25 No. 1, pp. 126-147.

Prajogo, D.I. (2005), “The comparative analysis of TQM practices and quality performance between manufacturing and service firms”, *International Journal of Service Industry Management*, Vol. 16 No. 3, pp. 217-228.

Priem, R.L. and Butler, J.E. (2001), “Is the resource-based "view" a useful perspective for strategic management research?”, *The Academy of Management Review*, Vol. 26 No. 1, pp. 22-40.

Proto, M., Malandrino, O. and Supino, S. (2013), “The Implementation of Integrated Management System in Agri-Food SMEs”, in Salomone, R. et al. (eds.), Product-Oriented Environmental Management Systems (POEMS), Springer Science+Business Media Dordrecht, pp. 89-101.

Psomas, E.L. and Jaca, C. (2016), “The impact of total quality management on service company performance: evidence from Spain”, *International Journal of Quality & ReliabilityManagement*, Vol. 33 No. 3, pp. 380-398.

Psomas, E.L., Kafetzopoulos, D.P. (2015), “HACCP effectiveness between ISO 22000 certified and non-certified dairy companies”, *Food Control*, Vol. 53, pp. 134-139.

Psomas, E.L., Kafetzopoulos, D.P. and Fotopoulos, C.V. (2013), “Developing and validating a measurement instrument of ISO 9001 effectiveness in food manufacturing SMEs”, *Journal of Manufacturing Technology Management*, Vol. 24 No. 1, pp. 52-77.

Pun, K.F. and Hui, I.K. (2002), “Integrating the safety dimension into quality management systems: A process model”, *Total Quality Management*, Vol. 13 No. 3, pp. 373-391.

Qi G., Zeng S., Li X. and Tam C. (2012), “Role of Internalization Process in Defining the Relationship between ISO 14001 Certification and Corporate Environmental Performance”, *Corpopare Social Responsibility and Environmental Management*, Vol. 19 No. 3, pp. 129-140.

Ramos, T.B., Cecílio, T., Douglas, C.H. and Caeiro S. (2013), “Corporate sustainability reporting and the relations with evaluation and management frameworks: the Portuguese case”, *Journal of Cleaner Production*, Vol. 52, pp. 317-328.

Ranängen, H. (2015), “Stakeholder management in reality: Moving from conceptual frameworks to operational strategies and interactions”, *Sustainable Production and Consumption*, Vol. 3, pp. 21-33.

Ranängen, H. and Zobel, T. (2014), "Exploring the path from management systems to stakeholder management in the Swedish mining industry", *Journal of Cleaner Production*, Vol. 84, pp. 128-141.

Raykov, R. and Marcoulides, G.A. (2011), *Introduction to Psychometric Theory*, Routledge Taylor & Francis Group, New York.

Rebelo M.F., Santos G. and Silva, R. (2016), "Integration of management systems: towards a sustained success and development of organizations", *Journal of Cleaner Production*, Vol. 127, pp. 96-111.

Rebelo, M., Santos, G. and Silva, R. (2014), "Conception of a flexible integrator and lean model for integrated management systems", *Total Quality Management & Business Excellence*, Vol. 25 No. 5-6, pp. 683-701.

Rebelo, M.F., Santos, G. and Silva, R. (2014), "A generic model for integration of quality, environment and safety management systems", *The TQM Journal*, Vol. 26 No. 2, pp. 143-159.

Rebelo, M.F., Santos, G. and Silva, R. (2016), "Integration of management systems: towards a sustained success and development of organizations", *Journal of Cleaner Production*, Vol. 127, pp. 96-111.

Renzi, M.F. and Cappelli, L. (2000), "Integration between ISO 9000 and ISO 14000: Opportunities and limits", *Total Quality Management*, Vol. 11 No. 4-6, pp. 849-856.

Resende-Filho, M. A. and Hurley, T. M. (2012), "Information asymmetry and traceability incentives for food safety", *International Journal of Production Economics*, Vol. 139, pp. 596-603.

Resende-Filho, M.A. and Buhr, B.L. (2008), "A principal-agent model for evaluating the economic value of traceability system: a case study with injection-site lesion control in fed cattle", *American Journal of Agricultural Economics*, Vol. 90 No. 4, pp. 1091-1102.

Rhodes, J., Bergstrom, B., Lok, P. and Cheng, V. (2014), "A framework for stakeholder engagement and sustainable development in MNCs", *Journal of Global Responsibility*, Vol. 5 No. 1, pp. 82-103.

Ringsberg, H. (2014), “Perspectives on food traceability: a systematic literature review”, *Supply Chain Management: An International Journal*, Vol. 19 No. 5/6, pp. 558-576.

Ringsberg, H.A. (2015), “Implementation of global traceability standards: incentives and opportunities”, *British Food Journal*, Vol. 117 No. 7, pp. 1826-1842.

Robinson, J. P., P. R. Shaver, and L. S. Wrightman (1991b), *Measures of Personality and Social Psychological Attitudes.* San Diego: Academic Press.

Robinson, J. P., P. R. Shaver, and L. S. Wrightsman (1991a), “Criteria for Scale Selection and Evaluation”, In *Measures of Personality and Social Psychological Attitudes,* J. P. Robinson, P. R. Shaver, and L. S. Wrightsman (eds.). San Diego, CA: Academic Press.

Rocha, M. and Searcy, C. (2012), “Embedding sustainable development in organizations through an integrated management systems approach”, *Sustainable Development - Policy and Urban Development - Tourism, Life Science, Management and Environment*, Prof.Chaouki Ghenai (Ed.), ISBN: 978-953-51-0100-0, InTech, DOI: 10.5772/26830.

Rocha, M., Searcy, C. and Karapetrovic S. (2007), “Integrating sustainable development into existing management systems”, *Total Quality Management and Business Excellence*, Vol. 18 No. 1-2, pp. 83-92.

Rondinelli, D. and Vastag, G. (2000), “Panacea, Common Sense or Just a Label? The Value of ISO 14001 Environmental Management Systems”, *European Management Journal*, Vol. 18 No. 5, pp. 499-510.

Runge, B.J., Hames, S.D. and Shearer, S.C. (2004), “The perceived cultural compatibility index: an extension”, *The Leadership & Organization Development Journal*, Vol. 25 No. 5, pp. 411-423.

Russell, S., Forgionne, G. and Yoon, V. (2009), “Decision support-related resource presence and availability awareness for DSS in pervasive computing environments”, *International Journal of Decision Support System Technology*, Vol. 1 No. 1, pp. 15-34.

Salomone, R. (2008), “Integrated management systems: experiences in Italian organizations”, *Journal of Cleaner Production*, Vol. 16 No. 16, pp. 1786-1806.

Sampaio, P., Saraiva, P. and Domingues, P. (2012), "Management systems: integration or addition?", *International Journal of Quality and Reliability Management*, Vol. 29 No. 4, pp. 402-424.

Santos G., Barros S., Mendes F. and Lopes N. (2013), "The main benefits associated with health and safety management systems certification in Portuguese small and medium enterprises post quality management system certification", *Safety Science*, Vol. 51 No. 1, pp. 29–36.

Santos, G., Mendes, F. and Barbosa, J. (2011), "Certification and integration of management systems: the experience of Portuguese small and medium enterprises", *Journal of Cleaner Production*, Vol. 19 No. 17-18, pp. 1965-1974.

Satolo, E.G., Calarge, F.A. and Cauchick Miguel, P.A. (2013), "Experience with an integrated management system in a sugar and ethanol manufacturing unit: Possibilities and limitations", *Management of Environmental Quality: An International Journal*, Vol. 24 No. 6, pp.710- 725.

Saunders, M., Lewis, P., Thornhill, A. (2009), Research Methods for Business Students, 5th ed., FT Prentice Hall, Pearson Education Limited, Harlow, UK.

Savino M.M. and Batbaatar, E. (2015). "Investigating the resources for Integrated Management Systems within resource-based and contingency perspective in manufacturing firms". *Journal of Cleaner Production*, Vol. 104, pp. 392-402.

Savino M.M., Shafiq, M. (2018), "An extensive study to assess the sustainability drivers of production performances using a resource-based view and contingency analysis", *Journal of Cleaner Production*, Vol. 204, pp. 744-752.

Schaltegger, S. and Burritt R.L. (2010), "Sustainability accounting for companies: Catchphrase or decision support for business leaders?", *Journal of World Business*, Vol. 45 No.4, pp. 375–384.

Schaltegger, S., Beckmann, M. and Hansen E. G. (2013), "Transdisciplinarity in corporate sustainability: Mapping the field", *Business Strategy and the Environment*, Vol. 22, pp. 219-229.

Schneider, L., Wallenburg, C.M. and Fabel, S. (2014), "Implementing sustainability on a corporate and a functional level – Key contingencies that influence the required coordination", *International Journal of Physical Distribution & Logistics Management*, Vol. 44 No. 6, pp. 464-493.

Scott, R. (1987), "The adolescence of institutional theory", *Administrative Science Quarterly*, Vol. 32, pp. 493-511.

Searcy, C. (2012), "Corporate sustainability performance measurement systems: A review and research agenda", *Journal of Business Ethics*, Vol. 107, pp. 239-253.

Searcy, C., Karapetrovic, S. and McCartney, D. (2005), "Designing sustainable development indicators: analysis for a case utility", *Measuring Business Excellence*, Vol. 9 No. 2, pp. 33-41.

Searcy, C., Morali, O., Karapetrovic, S., Wichuk, K., McCartney, D., McLeod, S. and Fraser, D. (2012), "Challenges in implementing a functional ISO 14001 environmental management system", *International Journal of Quality & Reliability Management*, Vol. 29 No. 7, pp. 779-796.

Sebhatu, S.P. and Enquist, B. (2007), "ISO 14001 as a driving force for sustainable development and value creation", *The TQM Magazine*, Vol. 19 No. 5, pp. 468-482.

Seigerroth, U. (2011), "Enterprise modeling and enterprise architecture: The constituents of transformation and alignment of business and IT", *International Journal of IT/Business Alignment and Governance*, Vol. 2 No. 1, pp. 16-34.

Seth, A. and Thomas, H. (1994), "Theories of the firm: Implications for strategy research", *Journal of Management Studies*, Vol. 31, No. 2, pp. 165-191.

Seuring, S. and Gold, S. (2012), "Conducting content-analysis based literature reviews in supply chain management", *Supply Chain Management: An International Journal*, Vol. 17 No. 5, pp. 544-555.

Seuring, S. and Müller, M. (2008), "From a literature review to a conceptual framework for sustainable supply chain management", *Journal of Cleaner Production*, Vol. 16 No. 15, pp. 1699-1710.

Siggelkow, N. (2007), "Persuasion with case studies", *Academy of Management Journal*, Vol. 50 No. 1, pp. 20-24.

Simon A. and Bernardo M. (2014), "How does human resources management influence the implementation of integrated management systems?", *1st International Conference on Quality*

Engineering and Management, Proceedings Book, pp. 291-302, 14th-16th September, Guimarães, Portugal.

Simon A., Bernardo M., Karapetrovic S. and Casadesus M. (2011). "Integration of standardized environmental and quality management systems audits", *Journal of Cleaner Production*, Vol. 19, pp. 2057-2065.

Simon A. and Douglas, A. (2013), "Integrating management systems: does the location matter?". *International Journal of Quality & Reliability Management*, Vol. 30 No. 6, pp. 675-689.

Simon A., Karapetrovic S. and Casadesús, M. (2012a), "Evolution of integrated management systems in Spanish firms", *Journal of Cleaner Production*, Vol. 23 No. 1, pp. 8-19.

Simon A., Karapetrovic S. and Casadesús M. (2012b), "Difficulties and benefits of integrated management systems", *Industrial Management & Data Systems*, Vol. 112 No. 5, pp. 828-846.

Simon A., Yaya L.H.P., Karapetrovic S., Casadesús M. (2014). "An empirical analysis of the integration of internal and external management system audits", *Journal of Cleaner Production*, Vol. 66, pp. 499-506.

Simon, A. and Bernardo, M. (2014), "How does human resources management influence the implementation of integrated management systems?", 1st International Conference on Quality Engineering and Management, *Proceedings Book*, pp. 291-302, 14th-16th September, Guimarães, Portugal.

Simon, A. and Douglas, A. (2013). Integrating management systems: does the location matter?. *International Journal of Quality & Reliability Management*, Vol. 30 No. 6, pp. 675-689.

Simon, A. and Yaya, L.H.P. (2012), "Improving innovation and customer satisfaction through systems integration", *Industrial Management & Data Systems*, Vol. 112 No. 7, pp. 1026-1043.

Simon, A., Bernardo, M., Karapetrovic, S. and Casadesus, M. (2011), "Integration of standardized environmental and quality management systems audits", *Journal of Cleaner Production*, Vol. 19, pp. 2057-2065.

Simon, A. and Douglas, A. (2013), "Integrating Management Systems: Does the location matter?" *International Journal of Quality & Reliability Management*, Vol. 30 No. 6, pp. 675-689.

Simon, A., Karapetrovic, S. and Casadesús M. (2012a), "Difficulties and benefits of Integrated Management Systems", *Industrial Management & Data Systems*, Vol. 112 No. 5, pp. 828-846.

Simon, A., Karapetrovic, S. and Casadesús, M. (2012b), "Evolution of integrated management systems in Spanish firms", *Journal of Cleaner Production*, Vol. 23 No. 1, pp. 8-19.

Simon, A., Yaya, L.H.P., Karapetrovic, S. and Casadesús, M. (2014), "Can integration difficulties affect innovation and satisfaction?", *Industrial Management & Data Systems*, Vol. 114 No. 2, pp. 183-202.

Simon, A., Yaya, L.H.P., Karapetrovic, S. and Casadesús, M. (2014), "An empirical analysis of the integration of internal and external management system audits", *Journal of Cleaner Production*, Vol. 66, pp. 499-506.

Singh V., Kumar A. and Singh T. (2018), "Impact of TQM on organisational performance: The case of Indian manufacturing and service industry", *Operations Research Perspectives*, Vol. 5, pp. 199-217.

Siva, V., Gremyr, I., Bergquist, B., Garvare, R., Zobel, T. and Isaksson, R. (2016),"The support of Quality Management to sustainable development: A literature review", *Journal of Cleaner Production*, Vol. 138, Part 2, pp. 148-157.

Soderlund, R., Williams, R. and Mulligan, C. (2008), "Effective adoption of agri-food assurance systems", *British Food Journal*, Vol. 110 No. 8, pp. 745-761.

Sodhi, M. S. (2015), "Conceptualizing Social Responsibility in Operations Via Stakeholder Resource-Based View", *Production and Operations Management*, Vol. 24, No. 9, pp. 1375–1389.

Sousa R. and Voss, C.A. (2008), "Contingency research in operations management practices". *Journal of Operations Management*, Vol. 26 No. 6, pp. 697-713.

Spilka, M., Kania, A. and Nowosielski, R. (2009), "Integration of management systems on the chosen example", *Journal of Achievements in Materials and Manufacturing Engineering*, Vol. 35 No. 2, pp. 204-210.

Starik, M. and Kanashiro, P. (2013), "Toward a theory of sustainability management: Uncovering and integrating the nearly obvious", *Organization & Environment*, Vol. 26, No. 1, pp. 7-30.

Storøy, J., Thakur, M. and Olsen, P. (2013), "The TraceFood Framework – Principles and guidelines for implementing traceability in food value chains", *Journal of Food Engineering*, Vol. 115 No. 1, pp. 41-48.

Tang, Q., Li, J., Sun, M., Lv, J., Gai, R., Mei, L. and Xu, L. (2015), "Food traceability systems in China: The current status of and future perspectives on food supply chain databases, legal support, and technological research and support for food safety regulation", *BioScience Trends*, Vol. 9 No. 1, pp. 7-15.

Tangpong, C. (2011), "Content analytic approach to measuring constructs in operations and supply chain management", *Journal of Operations Management*, Vol. 29 No. 6, pp. 627-638.

Tarí, J., Heras-Saizarbitoria, I. and Pereira, J. (2013), "Internalization of quality management in service organizations", *Managing Service Quality: An International Journal*, Vol. 23 No. 6, pp. 456-473.

Tarí, J.J. and Molina-Azorín, J.F. (2010), "Integration of quality management and environmental management systems: Similarities and the role of the EFQM model", *The TQM Journal*, Vol. 22 No. 6, pp. 687-701.

Tarka, P. (2018), "An overview of structural equation modeling: its beginnings, historical development, usefulness and controversies in the social sciences", *Quality & Quantity,* Vol. 52, pp. 313–354.

Teece, D.J., Pisano, G. and Shuen, A. (1997), "Dynamic capabilities and strategic management", *Strategic management Journal*, Vol. 18 No. 7, pp. 508-533.

Teixeira, S. and Sampaio, P. (2013), "Food safety management system implementation and certification: survey results", *Total Quality Management & Business Excellence*, Vol. 24 No. 3-4, pp. 275-293.

Terlaak, A. and King, A.A. (2006), "The effect of certification with the ISO 9000 quality management standard: A signaling approach", *Journal of Economic Behavior & Organization*, Vol. 60, pp. 579-602.

Testa F., Boiral O. and Iraldo F. (2018a). “Internalization of Environmental Practices and Institutional Complexity: Can Stakeholders Pressures Encourage Greenwashing?”, *Journal of Business Ethics*, Vol. 147 No. 2, pp. 287-307.

Testa F., Boiral O. and Heras-Saizarbitoria I. (2018b), “Improving CSR performance by hard and soft means: The role of organizational citizenship behaviours and the internalization of CSR standards”, *Corporate Social Responsibility and Environmental Management*, Vol. 25 No. 5, pp. 853–865.

Testa, F., Rizzi, F., Daddi, T., Gusmerotti, N.M., Frey, M. and Iraldo, F. (2014), “EMAS and ISO 14001: the differences in effectively improving environmental performance”, *Journal of Cleaner Production*, Vol. 68, pp. 165-173.

Thakur, M. and Hurburgh, C.R. (2009), “Framework for implementing traceability system in the bulk grain supply chain”, *Journal of Food Engineering*, Vol. 95 No. 4, pp. 617-626.

Thakur, M., Martens, B. J. and Hurburgh C. R. (2011), “Data modeling to facilitate internal traceability at a grain elevator”, *Computers and Electronics in Agriculture*, Vol. 75 No. 2, pp. 327-336.

Thakur, M., Mosher, G.A., Brown, B.R., Bennet, G.S. Shepherd, H.E. and Hurburgh, C.R. (2009), “Food safety series - Traceability in the bulk grain supply chain”, *Resource Magazine*, Vol. 16 No. 3, pp. 20-22.

Tolbert, P. and Zucker, L. (1996), “The institutionalization of institutional theory”. In S. Clegg, C. Hardy, & W. Nord (Eds.), *Handbook of organization studies*, pp. 175-190. Thousand Oaks, CA: Sage.

Tranfield, D., Denyer, D. and Smart, P. (2003), “Towards a methodology for developing evidence-informed management knowledge by means of systematic review”, *British Journal of Management*, Vol. 14 No. 3, pp. 207-222.

Trienekens, J. and Zuurbier P. (2008), “Quality and safety standards in the food industry, developments and challenges”, *International Journal of Production Economics*, Vol. 113 No.1, pp. 107-122.

Trienekens, J.H., Wognum, P.M., Beulens, A.J.M. and van der Vorst, J.G.A.J. (2012), "Transparency in complex dynamic food supply chains", *Advanced Engineering Informatics*, Vol. 26 No. 1, pp. 55-65.

van de Schoot, R., Lugtig P. and Hox, J. (2012), "A checklist for testing measurement invariance", *European Journal of Developmental Psychology*, Vol. 9 No. 4, pp. 486-492.

Scott, W.R. (2008), "Approaching adulthood: the maturing of institutional theory", *Theory and Society*, Vol. 37, pp. 427-442.

Van der Spiegel, M., Luning, P.A., Ziggers, G.W. and Jongen, W.M.F. (2005), "Evaluation of performance measurement instruments on their use on their use for food quality systems", *Critical Reviews in food science and nutrition*, Vol. 44 No. 7-8, pp. 501-512.

Vassiliou, A., Kabourakis, E. and Papadopoulos, D. (2008), "Traceability and ethical traceability in the Greek olive oil chain". In C. Coff, D. Barling, M. Korthals, & T. Nielsen (Eds.), *Ethical traceability and communicating food* (pp. 167-191), Netherlands, PA: Springer.

Vladimirov, Z. (2011), "Implementation of food safety management system in Bulgaria", *British Food Journal*, Vol. 113 No. 1, pp.50-65.

Voss, C., Tsikriktsis, N. and Frohlich, M. (2002), "Case research in operations management", *International Journal of Operations & Production Management*, Vol. 22 No. 2, pp. 195-219.

Wagner, M. (2009), "Innovation and competitive advantages from the integration of strategic aspects with social and environmental management in European firms", *Business Strategy and the Environment*, Vol. 18 No. 5, pp. 291-306.

Wagner, M. (2011), "Corporate performance implications of extended stakeholder management: New insights on mediation and moderation effects", *Ecological Economics*, Vol. 70 No. 5, pp. 942-950.

Wagner, M. (2015), "The link of environmental and economic performance: Drivers and limitations of sustainability integration", *Journal of Business Research*, Vol. 68, pp. 1306-1317.

Watson, R.T., Boudreau, M.-C. and Chen, A.J. (2010), "Information systems and environmentally sustainable development: energy informatics and new directions for the IS community", *MIS Quarterly*, Vol. 34 No. 1, pp. 23-38.

Wernerfelt, B. (1984), “A resource-based view of the firm”, Strategic Management Journal, Vol. 5, pp. 171–180.

Weyandt, A.J., da Costa, S.R.R., Nunes, M.L. and Gaspar, A. (2012), “Social responsibility of fish processing companies located in Portugal and Spain”, Social Responsibility Journal, Vol. 8 No. 1, pp. 100-113.

Weyandt, A.J., da Costa, S.R.R., Nunes, M.L. and Gaspar, A. (2012), “Social responsibility of fish processing companies located in Portugal and Spain”, *Social Responsibility Journal*, No. 8 No. 1, pp. 100-113.

Wiengarten, F., Humphreys, P., Onofrei, G. and Fynes, B. (2017), “The adoption of multiple certification standards: perceived performance implications of quality, environmental and health & safety certifications”, *Production Planning & Control*, Vol. 28 No. 2, pp. 131-141.

Wiengarten, F., Pagell, M. and Fynes, B. (2013), “ISO 14000 certification and investments in environmental supply chain management practices: identifying differences in motivation and adoption levels between Western European and North American companies”, *Journal of Cleaner Production*, Vol. 56, pp. 18-28.

Wilkinson, G. and Dale, B.G. (1998a), “System integration: the views and activities of certification bodies”, *The TQM Magazine*, Vol. 10 No. 4, pp. 288-292.

Wilkinson, G. and Dale, B.G. (1998b), “Manufacturing companies’ attitudes to system integration: a case study examination”, *Quality Engineering*, Vol. 11 No. 2, pp. 249-256.

Wilkinson, G. and Dale, B.G. (2000), “Management systems standards: the key integration issues”, Proceedings of the Institution of Mechanical Engineers, Part B: *Journal of Engineering Manufacture*, Vol. 214 No. 9, pp. 771-780.

Wilkinson, G. and Dale, B.G. (2001), “Integrated management systems: a model based on a total quality approach”, *Managing Service Quality*, Vol. 11 No. 5, pp. 318-330.

Will M., Brauweiler J., Zenker-Hoffmann A. and Delakowitz B. (2019), “An Inquiry to Consider CSR in Integrated Management Systems”, In: Leal Filho W. (eds) *Social Responsibility and Sustainability*, World Sustainability Series, Springer, Cham.

Wilson, K. (2002), "Quality assurance issues for a PhD by published work: A case study", *Quality Assurance in Education*, Vol. 10 No. 2, pp. 71-78.

Windolph, S.E., Harms, D. and Schaltegger, S. (2014), "Motivations for Corporate Sustainability Management: Contrasting Survey Results and Implementation", *Corporate Social Responsibility and Environmental Management*, Vol. 21 No. 5, pp. 272-285.

Witjes, S., Vermeulen, W.J.V. and Cramer, J.M. (2017), "Exploring corporate sustainability integration into business activities. Experiences from 18 small and medium sized enterprises in the Netherlands", *Journal of Cleaner Production*, Vol 153, pp. 528-538.

Wognum, P.M., Bremmers, H., Trienekens, J.H., van der Vorst, J.G.A.J. and Bloemhof, J.M. (2011), "Systems for sustainability and transparency of food supply chains – Current status and challenges", *Advanced Engineering Informatics*, Vol. 25 No. 1, pp. 65-76.

Wong, C.Y., Wong, C.W.Y. and Boon-itt, S. (2015), "Integrating environmental management into supply chains", *International Journal of Physical Distribution & Logistics Management*, Vol. 45 No. 1/2, pp. 43-68.

World Commission on Environment and Development (1987), "Our Common Future", Oxford University Press, Oxford.

Xiao, X., Fu, Z., Qi, L., Mira, T. and Zhang, X. (2015), "Development and evaluation of an intelligent traceability system for frozen tilapia fillet processing", *Journal of the Science of Food and Agriculture*, Vol. 95 No. 13, pp. 2693–2703.

Yan T., Kreuter F. and Tourangeau, R. (2012), "Evaluating Survey Questions: A Comparison of Methods", *Journal of Official Statistics*, Vol. 28 No.4, pp. 503-529.

Yeoh, W. and Koronios, A. (2010), "Critical success factors for business intelligence Systems", *Journal of computer information systems*, Vol. 50 No. 3, pp. 23-32.

Yeoh, W. and Popovič, A. (2016), "Extending the understanding of critical success factors for implementing business intelligence systems", *Journal of the Association for Information Science and Technology*, Vol. 67 No. 1, pp. 134-147.

Yin, R.K. (2003), Case Study Research: Design and Methods, *Applied Social Research Method Series,* Vol. 5, 3rd ed., Sage Publications, Thousand Oaks.

Zeng, S.X., Chun, M.T. and Tam V.W.Y. (2010), "Integrating Safety, Environmental and Quality Risks for Project Management Using a FMEA Method", *Inzinerine Ekonomika-Engineering Economics*, Vol. 21 No. 1, pp. 44-52.

Zeng, S.X., Shi, J.J. and Lou, G.X. (2007), "A synergetic model for implementing an integrated management system: an empirical study in China", *Journal of Cleaner Production*, Vol. 15 No. 18, pp. 1760-1767.

Zeng, S.X., Tam, V.W.Y. and Le, K.N. (2010), "Towards effectiveness of integrated management systems for enterprises", *Engineering Economics*, Vol. 21 No. 2, pp. 171-179.

Zeng, S.X., Xie, X.M., Tam, C.M. and Shen, L.Y. (2011), "An empirical examination of benefits from implementing integrated management systems (IMS)", *Total Quality Management & Business Excellence*, Vol. 22 No. 2, pp. 173-186.

Zeng, S.X., Xie, X.M., Tam, C.M. and Shen, L.Y. (2011), "An empirical examination of benefits from implementing integrated management systems (IMS)", *Total Quality Management & Business Excellence*, Vol. 22 No. 2, pp. 173-186.

Zhang, X., Lv, S., Xu, M. and Mu, W. (2010), "Applying evolutionary prototyping model for eliciting system requirement of meat traceability at agribusiness level", *Food Control*, Vol. 21 No. 1, pp. 1556-1562.

Zhao, M.Y., Cheng, C.T., Chau, K.W. and Li, G. (2006), "Multiple criteria data envelopment analysis for full ranking units associated to environment impact assessment", *International Journal of Environment and Pollution*, Vol. 28 No. 3-4, pp. 448-464.

Zhu, Q., Cordeiro, J. and Sarkis, J. (2013), "Institutional pressures, dynamic capabilities and environmental management systems: Investigating the ISO 9000 – Environmental management system implementation linkage", *Journal of Environmental Management*, Vol. 114, pp. 232-242.

Zu, X. and Kaynak, H. (2012), "An agency theory perspective on supply chain quality management", *International Journal of Operations & Production Management*, Vol. 32 No. 4, pp. 423-446.

Zutshi, A. and Sohal, A.S. (2005), "Integrated management system: The experiences of three Australian organisations", *Journal of Manufacturing Technology Management*, Vol. 16 No. 2, pp. 211-232.

ANNEX

Integrated Management Systems and Corporate Sustainability Performance

Survey Questionnaire

This research aims at evaluating the achieved degree of integration and the resources that Greek companies allocate when implementing and integrating multiple management systems as well as the impact of integrated management systems on corporate sustainability.

An integrated management system (IMS) includes two or more management systems embedded in a unified structure.

For instance, when a company has adopted the ISO 9001 and the ISO 14001 standards, the respective management systems for quality and the environment can be implemented either independently (zero integration) or jointly – either partially or fully integrated.

General information

Company name: _____

Number of employees: _____

Annual turnover: _____

Sector / activity: _____

Please kindly determine which of the following management systems (MSs) are implemented by your company:

MS Scope	***Standard***	***Certification***			***Is the MS included in the IMS?***		
		Yes	***No***	***First year of certification***	***Yes***	***No***	***Year of integration***
Quality							
Environment							
Occupational health and safety							
Corporate social responsibility							
Information security							
Sector							
Other (please identify)							

Please kindly rate the following statements in relation with the management systems that are implemented by your company:

		Completely disagree	*Disagree*	*Partially disagree*	*Neither agree nor disagree*	*Partially agree*	*Agree*	*Completely agree*
	RESOURCES							
	Methods and tools							
1.	Management systems use the PDCA (Plan-Do-Check-Act) cycle.							
2.	Management systems use the process map.							
3.	Management systems use the standards' common elements.							
4.	Management systems use a unifying framework tailored to company's features.							
	Awareness							
5.	Management systems are a basic component of corporate culture.							
6.	The managers are aware of the potential MS benefits.							
7.	The managers are aware of the potential MS benefits.							
8.	The company has gained experience in MS implementation.							
	Human resources							
9.	MS operation is the exclusive task of MS managers.							
10.	Employees are trained in MS implementation.							
11.	Employees are engaged in MS implementation							
	Information systems							
12.	Management systems are supported by basic IT tools.							
13.	Management systems are supported by enterprise resource planning (ERP) systems.							
14.	Management systems are supported by Business Intelligence (BI) tools.							

		Completely disagree	*Disagree*	*Partially disagree*	*Neither agree nor disagree*	*Partially agree*	*Agree*	*Completely agree*
15.	Management systems are supported by decision support systems.							
	Strategic resources							
16.	Top management is commited to MS implementation.							
17.	Top management is engaged in the MS implementation and improvement.							
18.	Top management has set indicators for the assessment of MS performance.							
	Subcontracting/Outsourcing							
19.	MS operation is outsourced.							
20.	MS internal audits are outsourced.							
21.	MS documentation is outsourced.							

Please kindly rate the following statements in relation with the management systems that are implemented by your company:

		not at all	*barely*	*enough*	*moderately*	*at a high extent*	*at a very high extent*	*completely*
	Integration level							
22.	MS policies and objectives are unified.							
23.	MS planning is based on a common standard or guideline.							
24.	MS operation is assigned to a single person or department.							
25.	MS performance is evaluated in a unified mode.							
26.	MS preventive and corrective actions are performed in a unified mode.							
27.	MS non-compliance is monitored in a unified mode.							
28.	MS documents and records control are monitored in a unified mode.							
29.	Product design and development are supported by multiple MSs in a unified mode.							

		not at all	*barely*	*enough*	*moderately*	*at a high extent*	*at a very high extent*	*completely*
	Integration level							
30.	Production is supported by multiple MSs in a unified mode.							
31.	Training is supported by multiple MSs in a unified mode.							
32.	Purchasing is supported by multiple MSs in a unified mode.							
33.	Sales are supported by multiple MSs in a unified mode.							
34.	Internal audits are simultaneously conducted in a unified mode.							
35.	External audits are simultaneously conducted in a unified mode							
36.	A single, unified report is issued for MSs internal audits.							
37.	A single, unified report is issued for MSs external audits.							

Please kindly rate the contribution of the management systems that are implemented by your company on the following statements:

		Completely disagree	*Disagree*	*Partially disagree*	*Neither agree nor disagree*	*Partially agree*	*Agree*	*Completely agree*
	Corporate Sustainability Performance							
	Suppliers							
38.	Nonconforming raw materials rate has decreased.							
39.	Nonconforming products rate has decreased.							
40.	Relationships with suppliers have improved.							
41.	Suppliers' turnover rate has decreased.							
42.	Purchasing management has improved.							
	Customers							
43.	Customer complaint rate has decreased.							
44.	Communication with customers has improved.							

		Completely disagree	*Disagree*	*Partially disagree*	*Neither agree nor disagree*	*Partially agree*	*Agree*	*Completely agree*
45.	Market share has increased.							
	Shareholders / Investors							
46.	Sales have increased.							
47.	Earnings have increased.							
48.	Interest rates have decreased.							
49.	Access to loans has improved.							
50.	Insurance terms have improve7d.							
	Employees							
51.	Employee turnover rate has decreased.							
52.	Absenteeism rate has decreased.							
53.	Employee initiatives have increased.							
54.	Employee engagement in the management of systems has increased.							
55.	Employee participation in decision making has increased.							
56.	Health and safety measures have improved.							
	Environment							
57.	Communication with environmental authorities has improved.							
58.	Environmental impacts of business activities have decreased.							
59.	Water saving has increased.							
60.	Energy saving has increased.							
61.	Use of recycled materials has increased.							
62.	Recycling rate has increased.							
	State Authorities							
63.	Communication with state authorities has improved.							
64.	Collaboration with public bodies has increased.							
65.	Collaboration with academic and research institutes has increased.							

		Completely disagree	*Disagree*	*Partially disagree*	*Neither agree nor disagree*	*Partially agree*	*Agree*	*Completely agree*
	Society							
66.	Sponsoring and other measures to support local community have increased.							
67.	Rewarding by local authorities, NGOs etc. has increased.							
68.	Corporate image has improved.							

Finally, we would like to know your opinion on the following:

		Completely disagree	*Disagree*	*Partially disagree*	*Neither agree nor disagree*	*Partially agree*	*Agree*	*Completely agree*
A.	Your organization has allocated sufficient resources for the implementation of multiple management systems.							
B.	Your organization has integrated multiple management systems at a significant level.							
C.	Your organization has reaped significant benefits from the implementation of multiple management systems.							