

## Tables

Table 1. Qualitative studies on IMS

Author(s)	Country (cases)	Field of activities	Aspects studied
Bonk-Kassner et al. (1997)	Germany (1)	Laboratory	GLP, DIN EN 45001, GMP, ISO 9001 IMS
Chan et al. (1998)	Hong Kong (1)	Railway corporation	IMS (quality, safety, environment) based on MBNQA
Fresner (1998)	Austria (1)	Textile mill	Cleaner production project followed by QMS development
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
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
Pun et al. (1999)	Hong-Kong (1)	Laboratory services	Self-assessed QMS framework integrating MBNQA, ISO 9001 and ISO 14001
Amundsen (2000)	Norway (10)	Food processing	Energy MS into an Integrated quality and environmental MS
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
Renzi and Cappelli (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
Wilkinson and Dale	UK (3)	Gas measuring equipment, Casting,	Key issues for integration/culture, audits, motives,

(2000) von Ahsen and Funck (2001)	Germany (1)	Healthcare products Automobile supplier	benefits, barriers, and enablers QMS and EMS integration on the basis of ISO 14001
Beckmerhagen et al. (2003b)	Germany (1)	Nuclear waste disposal facility	Auditing of a combined quality and safety management system
Mackau (2003)	Germany (1)	Construction	Employees involvement even at strategic level
Fresner and Engelhardt (2004)	Austria (2)	Anodizing (metal coating) plant, Brewery	Environmental and economic performance improvement through IMS applying Cleaner Production approach
Labodová (2004)	Czech Republic (2)	Heat production for central heating Supply of drinking water and wastewater treatment	Testing of a risk-based IMS model
Santos et al. (2004, 2011)	Portugal (1)	Foundry	Implementation of the quality, environment and health and safety management systems' integration in a casting plant
Milliman et al. (2005)	USA (1)	Water and sanitation services	Security, EH&S Integrated Management System
Oskarsson and von Malmborg (2005)	Sweden (3)	Submersible pumps and mixers , Rolling bearing and seals, Power and automation technologies	Integration of Management Systems and Sustainability Organization of management, communication, and driving forces
Zutshi and Sohal (2005)	Australia (3)	Pharmaceutical, Furniture, Radio and telecommunication components	Problems and benefits of integration
Hughes and Karapetrovic (2006)	Canada (1)	Electric utility	ISO 9001 QMS augmented by ISO 10002 complaints MS
Grosskopf et al. (2007)	USA (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
Griffith and Bhutto (2008)	UK (5)	Construction contracting companies	IMS framework to enhance environmental performance
ISO (2008)	Germany (1), Canada (1), Spain (4), Chile (1), worldwide (3),	Aluminum, chemical (3), professional Services, Mining, Automotive (3), Construction, Beverages, IT, Hotel,	Drivers, objectives, starting points, methodologies, tools, impediments, lessons learned, and benefits for IMS in organizations of different size, activity, sector,

	Costa Rica (1), UK (1), Malaysia (1), France, Israel	Defense, and Consulting	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
Azadeh et al. (2009)	Iran (1)	Gas refinery	Health and Safety, Environment and Ergonomics IMS
Campos and Medeiros (2009)	Brazil (1)	Electricity distribution	IMS model based on linear programming, set theory and combinatorial mathematics
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
Spilka et al. (2009)	Poland (1)	Production plant	IMS (Q-E-H&S) e efficiency and effectiveness evaluation
Asif et al. (2010a, 2010b)	Pakistan (4)	Pharmaceutical plant, Textile plant, Automobile plant, Dairy plant	Organizational changes
Badreddine et al. (2010)	Tunisia (1)	Petroleum plant	Integration strategies and outcomes
Blecken et al. (2010)	Germany (2)	Precision machine parts (1), Utility vehicle industry (1)	Bow-tie risk analysis transformed to Multiobjective influence diagram (MID) technique for QSE management planning
Ho (2010)	Malaysia (1)	Construction	Lean Quality Management System
Khanna et al. (2010)	India (1)	Refractory manufacturing	Integrated lean TQM model integrating ISO9001, ISO 14001, OHSAS 18001 and six-s with a 50-point audit checklist
Leopoulos et al. (2010)	Greece (1)	Chemical industry	Business excellence model Advantages achieved by IMS implementation
López-Fresno (2010)	Spain (1)	Airline	Suppliers evaluation process organization/ decision view
Zeng et al. (2010)	China (1)	Construction company	IMS model based on systemic approach
			Integrated QEH&S risk management approach using FMEA

Bernardo et al. (2011d)	Greece (5)	Chemical (1), Food and beverages (2), Aluminum products (1), Flexible packaging (1)	Integration characteristics (strategy, level, methodology, and audits)
Milliman and Grosskopf (2011)	USA (1)	Electrical and Electronic Equipment	Integrated Sustainability Management System
Simon et al. (2011)	Spain (4)	Waste management and recycling services Paper chemicals manufacturing, Plastic vinyl compounds manufacturing, Lubricants manufacturing, Road transportation services	Integration of Management Systems audits
Botta et al. (2013)	Italy (1)	Municipality	Integrated Environmental (ISO 14001 certified and EMAS registered) and Social (SA 8000) management system
Sampaio et al. (2012)	Portugal (3)	Two from the industrial and one from the service sector	Integration process time evolution/Standards Integration Motives, drawbacks, benefits and integration level
von Ahsen (2013)	Germany (7)	Car manufacturers	QMS, EMS and/or Energy MS and OHSMS - longitudinal
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
Crowder (2013)	UK (1)	Local authority bereavement service	Integration of QMS, EMS and Information Security MS
Garengo and Biazzo (2013)	Italy (1)	Kitchen furniture manufacturing	Stepwise approach of IMS (ISO/EFQM/BSC)
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
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) Spain (3)	Fabric manufacturing, Scaffolding, Software developer, Energy management, Metallurgic manufacturing, Railway administration	Cross-case analysis 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, Plastic vinyl compounds production, Lubricants production, Energy management, Metallic components production, Railway infrastructure management	Cross-case analysis Differences in integration level, sequence of implementation, integration tools, benefits and difficulties of integration between chemical and non-chemical firms
Ivanova et al. (2014)	USA (10)	Computer-electronics, Automobile parts, Plastic products, Anticorrosive products, Aluminum die castings, Paper Manufacturer, Computer manufacturer, Playground Systems manufacturer, Cosmetic products, Aerospace industry	Cross-case analysis Identification of incentives, integration and information technology pathways towards unification of MSs
Gianni and Gotzamani (2015)	Greece (1)	Finishing garments	IMS level, strategy, approach, motives, difficulties, audits, performance. Abandonment
Llonch and Bernardo (2016)	Spain (1)	Air conditioning	Implementation of an IMS as the first MS implemented within a SMEs
Gianni et al. (2016)	Greece (1)	Food industry	Sector-specific IMS

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Source: Adapted and updated from Gianni and Gotzamani (2015)

Table 2. Comparison of the organizations' integration process

Org.	Profile			Integration process				
	Ownership	Size	Sector	Strategy	Methodology	IMS Level	Audits	
							Internal	External
C1	Family owned	Medium	Chemical	EMS+QMS	Common elements	Fully integrated	Fully integrated	Partially integrated
C2	Multiple shareholders	Large	Food and Beverages	QMS+EMS+HSMS+FMS	Common elements	Fully integrated	Fully integrated	Fully integrated
C3	Multiple shareholders	Large	Aluminum products	QMS+EMS+HSMS+sectoral	Common elements	Partially integrated	Non-integrated	Non-integrated
C4	Family owned	Medium	Flexible packaging converting	QMS+EMS-FSMS+sectoral	Common elements	Fully integrated	Partially integrated	Partially integrated
C5	Multiple shareholders	Large	Food	EMS+QMS-FSMS	No integration	Non-integrated	Non-integrated	Non-integrated