Developing a safety and quality management system for a small company

Utilizing the ISM Code and the ISO 9001:2015 standard

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Abstract

In this thesis work the objective is to find beneficial parts of the ISM Code and ISO 9001:2015 quality management standard for a small company, without certifying either of the management systems officially. The work is made as a commission for a company manning and operating vessels, transporting people and goods at sea, doing construction projects in archipelago, maintaining, repairing, and docking leisure and commercial vessels.

As a result of the study a safety and quality management system shall be created for the company based on the codes, concentrating on utilizing beneficial parts and avoiding common mistakes in management system implementation. System shall be handed to client in form of a manual or manuals describing the system. To be able to get the most out of the codes potential and avoiding common problems studies of the management systems benefits, effectivity, integration and deficiencies were examined. Management system manuals from similar companies were also studied to find useful models to implement in the system being created.

The client received an integrated safety and quality management system manual, which fulfils the requirements of the utilizable parts of the implemented codes. Additionally an electronic filing system, check lists, registers and other relevant files were produced to support the system.

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Tiivistelmä

Opinnäytetyössä oli tarkoituksena selvittää ISM Koodin ja ISO 9001:2015 laadunhallintastandardin tarjoamat hyödyt pienyritykselle sertifioimatta niiden mukaista johtamisjärjestelmää. Opinnäytetyö tehtiin toimeksiantona yritykselle, jonka toimialoihin kuuluu varustamotoiminta, saaristo- ja vesirakentaminen, kauppa- ja huvialusten korjaus, huolto ja telakointi sekä korjauskonepajatoiminta.

Tutkimuksen tuloksena tuli laatia turvallisuus ja laadunhallintajärjestelmä ja palauttaa toimeksiantajalle turvallisuusjohtamisen ja laadunhallinnan käsikirja tai käsikirjat, joissa on hyödynnetty mainittuja koodeja parhaimmaksi katsotulla tavalla. Hyötyjen tunnistamiseksi ja mahdollisten riskitekijöiden välttämiseksi työssä tutustuttiin tutkimuksiin järjestelmien hyödyistä, haitoista, yhdistämisestä sekä järjestelmien tehokkuudesta. Muita vastaavien johtamisjärjestelmien käsikirjoja eri yrityksistä tutkittiin, joista soveltuvia osia hyödynnettiin käsikirjan laatimisessa.

Toimeksiantajalle toimitettiin integroitu turvallisuus ja laadunhallintajärjestelmän käsikirja, jossa koodien edellyttämät toimintatavat ovat soveltuvilta osin määriteltyinä kohdeyritykselle. Lisäksi toimitettiin tiedostonhallintajärjestelmä, tarkistuslistoja, rekistereitä ja muita järjestelmän toiminnan edellyttämiä tiedostoja.

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Abstrakt

Den här examensarbetens syfte var att söka förmånliga delar i ISM-koden och ISO 9001:2015 ledningssystemstandarden för kvalitetsprocesser åt ett litet företag utan att certifiera ett hanteringssystem. Examensarbeten gjordes som ett uppdrag för et företag vars verksamhet omfattar rederioperationer, byggoperationer i skärgård, tekniska verkstadsarbete, underhållning, reparation och dockning av kommersiella- och fritidsfartyg.

Utforskningens mål var att formulera ett eller flera manualer om säkerhets- och kvalitetsledningssystem som utnyttjar ovanstående koder på bästa sätt. Olika studier av dessa ledningssystem undersöktes för at identifiera metoder samt för- och nackdelar. Andra liknande system i andra företag undersöktes även för at nå bättre uppfattning om typiska manualer om säkerhets- och kvalitetssystem.

En integrerad handbok om säkerhets- och kvalitetshanteringssystem levererades till uppdragsgivare. Handboken inkluderar de handlingssätt som krävs enligt koderna lämpligt definierade för målföretaget. Filhanteringssystem, checklistor, registerformer och andra filer som systemet kräver levererades även.

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1   Introduction

During past years safety of shipping has increased due to international regulations. Customer and marketing pressures have been motivating to develop well managed and safely operating organizations. As International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) has become mandatory regulation to follow, new means to increase marketing value of companies as well as means to improve performance of companies' processes are sought from implementing internationally standardized management system standards. In industrial companies organized and systematic management is a priority to achieve well operating processes and get maximal profit by utilizing minimum resources. The management system standards provide means to organize and develop management systems which effectively support improvement.

The ISM Code is not a mandatory regulation for companies with small vessels. The international standards are always optional and utilized by companies which are motivated to seek improvement. Official certificate may be achieved by any company successfully implementing such code. To keep the certificate valid, the system must be audited yearly and that is often considered costly for a process which doesn't guarantee any direct benefits. Implementation of such management system standard or code without certificating it can still provide the achievable benefits for internal processes in the company.

A small start-up company founded just before doing this study gave a commission to study the beneficial parts of the ISM Code and ISO 9001:2015 quality management standard and provide a manual of how to implement these identified beneficial parts in to the processes the company assumes to commence.

1.1 Research problem and objective

In this thesis the objective is to examine how a small company operating in shipping, docking, ship maintenance and repair can utilize ISM Code and ISO 9001:2015 quality management standard to enhance its processes and perform operations in safe and professional manner. Problem is to identify the beneficial parts and avoid the excessive bureaucracy a full implementation of the codes would require. Common difficulties in such implementation processes have been studied widely as are the benefits and effectivity of the codes. The previously studied information will be utilized in this study.

After examining how to best benefit of the codes, a management system, which fulfils the applicable requirements of ISM Code and ISO 9001:2015, is to be created for the company and presented in form of a manual or manuals. The manuals shall include description of safety and quality management methods and processes in the company. Intention is not to implement either code to their absolute full extent, since the company, due to its size, is not required or willing to certify the management system. Following the implemented system should not require excessive effort by the management or the employees. Direct conflicts with the codes are not accepted. The product handed to the company will include the manual or manuals setting the processes for the company and the most relevant attachments required. Some measures to fulfil the requirements of the codes are left for the company to be established according to its needs and written instructions in the provided manual.

Due to the state of the company being in the beginning of its operations, the manual will not be complete when it is handed to the company. The manual will never be finished, since the basic principle of such a manual is the continuous development for the identified needs. Especially in the beginning of a new company's operations the development will be significant. Manual should be easily modified according to arising needs including assumed growth of the company.

1.2 Delimitation

In this work I concentrate only to fulfil the requirements set by ISM code and ISO 9001:2015 standard and to specify, how to make best benefit of them. The product will be created to comply with the applying legislation, but the legislation will not be presented in the thesis work.

Certification of the company is not relevant at the moment, therefore external audits and certification procedures shall not be determined.

1.3 Client

The work is made as a commission from a multi-areal start-up company founded in spring of 2018, later referred as the company or client. The company employs 4 people. Operations are concentrating on manning and operating vessels, transportation of people and goods at sea, construction projects in archipelago, ship and boat maintenance and repair work and docking. In the beginning the company has one vessel in domestic traffic for transportation purposes. Growth in the fleet is expected in form of purchasing a barge equipped with a crane. Negotiations of purchasing a dockyard are ongoing.

The company is operating in area of maritime industry where the ISM Code is commonly used and an effective code. Even if following the ISM code is not mandatory for the client company, due to its size, the management crew of the company with sailing experience on commercial vessels, has a strong belief that implementing ISM code and proper safety management system is beneficial.

Implementing a standardized quality management system in an industrial company is considered as a normal practice nowadays. Implementing a quality management system according to ISO 9001:2015 standard in the company is believed to bring systematic and professional like operation which should support marketing by gaining reputation of high quality and good customer services.

The client assumes high quality, safety and environment protection provided by organized management system to be beneficial for its operations. Reputation of the company is suspected to be based on professional skills, ecologic operations and well managed operations. For this objective the codes give readily prepared guidelines to form a management system. It is also considered to be the easiest way to take both codes in use directly from the beginning of the company's operation as it might require a lot more effort to later adjust the procedures to fulfil the requirements.

2 Regulations and standards

The two required codes and their integration are studied to achieve adequate knowledge and understanding of them. Thorough studies are required to form a functional system as a product which gives best benefit to the client and avoids common mistakes and difficulties of implementing and using such system.

2.1 IMO and ISM Code

International Maritime Organization is a specialized agency under United Nations carrying responsibility of safety and security of shipping and prevention of marine pollution by ships. IMO is a global standard setting authority aiming to create universal regulatory framework for shipping industry. IMO was first established in 1948 after establishment of the united nations (IMO, 2018).

International Safety Management Code is an IMO code under international convention for the Safety Of Life At Sea (IMO, 2018). Following ISM Code became mandatory gradually between 1996 and 2002 for most vessels of over 500 GT in international traffic by SOLAS convention chapter IX (European parliament and the council, 2006). The Code establishes safety-management objectives and requires safety management system, later SMS, to be created by the ship owner or any person who has assumed responsibility of a ships operation. Objectives of the code are to ensure safety at sea, prevent human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property (IMO, 2018).

2.1.1 Safety Management System (SMS)

Objective of a safety management system is to provide safe practices in ships operation ensuring safe working environment. Means to achieve objectives are to identify risks and establish preventive measures against them, and to ensure continuity of development in safety management skills of personnel working under the system, including improvement of preparedness for emergencies related to safety and environmental protection. Safety management system is established for the whole company and covers related shore personnel as well as onboard personnel.

Following subjects can be identified as main subjects in company safety management system

- Safety and environmental protection policies, which includes safety related values and objectives of the company and describe principles to achieve the objectives of the safety management system.

- Company responsibility and authority. Company personnel being responsible for the ships safe operation and pollution prevention must be documented in the SMS including all their relevant responsibilities, authorities and interrelations.

- Designated person(s) ashore (DPA). The DPA has direct access to highest management of the company and works as a connecting link between vessels and the company management. Several DPAs may be designated if necessary.

- Master's responsibilities and authority. Responsibilities among others are to implement the SMS in ships operation and observe, motivate and utilize the use of SMS. Master should also review and report of deficiencies in the system. These responsibilities shall be clearly stated in the safety management system.

- Resources and personnel covers procedures to ensure having safe and qualified manning onboard at all times.

- Plans for shipboard operations. Planning of normal operational procedures onboard ship is required. Concentration should be aimed to key operations concerning safety and prevention of pollution.

- Emergency preparedness. Procedures shall be established to identify potential emergency situations and to prepare for operation in the identified emergency situations by training. Preparedness of shore-based organization for emergency situations on the companys ships should also be ensured.

- Reports and analysis is a subject of non-conformities, accidents and hazardous occurrences such as near misses. Procedures how to report, analyse and create corrective actions to prevent reoccurrence shall be defined.

- Maintenance of ship and equipment shall be ensured by specifying appropriate procedures. Inspection, reporting and correcting shall be ensured by the procedures as well as identifying equipment which leads or may lead into hazardous situations in case of a failure and means to prevent and handle the failures.

- Documentation. A system ensuring that all documents are available in relevant locations shall be established to control all documents and data which are relevant to SMS.

- Company verification, review and evaluation processes include periodical review and audit of the SMS. These processes shall be established including procedures to create and implement corrective actions to identified deficiencies.

(European parliament and the council, 2006).

2.1.2   Effectivity

Effectivity of implementing ISM code in the company for enhancing safety and protection of the maritime environment has been identified to begin from the top management of the company. In Finnish shipping companies' requirements of the ISM Code have been implemented effectively and the importance of the code is recognized. Results have been achieved in enhancing maritime safety. Management level of a shipping company often considers safe working environment and prevention of pollution as for their benefit, but economic efficiency of implementing ISM Code is still not evaluated feasibly, since systematic methods to follow costs of safety are not commonly utilized in shipping industry (Lappalainen, et al., 2011).

Maritime Administration of United Kingdom has stated in its report several points as their view of general areas, where poor implementing of the ISM code has given rise to or has contributed to preventable problems. Usual reasons for such occurrences are identified among a ships onboard management. Identified reasons are lack of understanding or trust on the ISM code, wrong estimation of professional skills of colleagues and unclear instructions. Reasons related to shore management are identified in adding scheduling pressures to ships in such amounts that SMS is not anymore followed, lack of continuity of records and information when either ship changes owner, or crew is changing on board. Significant identified reason is misunderstanding the concept of Non-conformity. If the faults, near misses and deficiencies in SMS are not reported to management responsible for updating SMS, it is not possible to further develop it according to the needs of the company (United Kingdoms Maritime Administration, 2004).

The importance of reporting has to be highlighted also in the system being produced. The purpose of reporting is not to admit made mistakes or to find a person to blame of hazardous occurrences. Fear for loss of appreciation or thrust often motivates to leave non-conformities unreported. While the real purpose of the reporting is to raise awareness of the possible hazards and apply means to prevent them from happening in future.

Paris memorandum of understanding on port state control 2016 states that the most frequently recorded deficiencies found in port state control inspections are ISM deficiencies. Under the rising economic pressures, it is not surprising that ship owners start to cut corners to lower operational expenses to remain competitive. It is understood that manning and maintenance are often the areas of choice (Paris MoU, 2016). This supports the claim of working safety management system to originate from the ship owners top management.

2.1.3   Applicability

ISM Code is mandatory for most vessels in international traffic of over 500GT. Regardless that the company does not currently have such vessels in its fleet, the ISM Code is applicable for its operation, as it is applicable for all vessels of any size. (European parliament and the council, 2006). The management of the company considers it to be a good practice to create safety management system to ensure safe operation of the company and to prepare for possible growth of the fleet, which might bring following the ISM Code mandatory.

2.2 ISO standards

The International Organization for Standardization (ISO) is an independent worldwide federation of national standards bodies. Objective of the ISO is to create international standards, by bringing together experts for sharing knowledge and develop solutions for global challenges. Standards are documents containing practical information and best practices, often described as an agreed way of doing something or a solution to a global problem (International Organization for Standardization, 2016). ISO technical committees consisting of the experts carry out the work of preparing the standard. Every member body interested in the subject has the right to be represented on that committee. Other governmental and non-governmental international organizations in liaison with ISO also take part in the work (International Organization for Standardization, 2015b).

2.2.1 ISO 9001:2015 briefly

The Quality management standard ISO 9001 is based on process approach to organizations operations. This enables the organization to plan its processes and the interaction of processes to be able to understand and fulfil the requirements, evaluate value of the processes and by that improve efficiency of processes and whole operation.

Potential benefits of implementing quality management system (QMS):

- Company will be consistently able to provide products and services which meet the set requirements.

- QMS provides means to enhance level of customer satisfaction

- Using quality management system brings up risks and opportunities in the area it concerns.

- System brings ability to demonstrate conformity to specified requirements of the quality management system.

(International Organization for Standardization, 2015a).

ISO 9001:2015 revision is concentrated more to risk-based thinking than the previous versions. Handling risks has always been in the ISO 9001 quality management system, but the new revision is aiming for systematic approach for risks to be identified, considered, and controlled throughout the process of developing the system (International Organization for Standardization, 2015c).

2.2.2 Effectivity/Why to implement

Implementing a quality management system does not on its own assure improvement in company operations or quality, but correctly implemented system gives company or organization means to achieve improvement through systematic approach to achieving company objectives (International Organization for Standardization, 2016).

The effectivity of a quality management system is highly influenced by internal and external motivations towards utilizing the system. If the company has internal motivation, like objective to reduce the customer complaints or develop the management style, the benefits for the company itself are significant. Whereas if the motivation is external, forced by customers or market situation only without internal interests to implement such a system, the benefits are external. Actual benefits to the

company externally motivated for implementing the system are minor and the system is binding resources causing more costs than what could be compensated with the achieved benefits (Castillo-Peces, et al., 2017).

The quality management system provides means to utilize traceability data to obtain several benefits. The traceability data of past projects may be utilized in offer calculations and planning coming projects. Traceability data enables manufacturing, delivering and otherwise processing individual items or services according to customers requirements. The data may be used during the process to provide customer with information of the status of the process. If a mistake or other undesired event has taken place, the traceability data may be used to minimize costs of the event by preventing reoccurrences, arranging corrective actions and possibly a withdrawal. Efficiently commenced corrective actions minimize the damage to the company's public image. As does the effective response to customer complaints, which may be done by utilizing the traceability data and data collected of the phases of producing the product or service. In general traceability data is beneficial in improving performance and quality (Töyrylä, 1999).

The reputation of the company is expected to increase, when the company has certified a generic standard by the International Organization for Standardization, like the quality or environment management system. Well designed and functional management styles which are brought by successful implementation of such standard directly influence the operational performance of merchant fleet (Celik, 2008). The system itself requires strict handling of company's operations and the fact that the certification has been achieved, proofs that the requirements are really fulfilled. Customer who is familiar with the standard knows immediately that the certified company from which the product or service will be bought makes effort to satisfy the customer.

2.2.3 Applicability in a small company

Regardless of the organizations size or type, the ISO 9001 requirements are formed in a generic way, making it applicable for the company. It is planned to be applicable in large international companies with large amount of workforce as well as in small organizations with very limited personnel. (International Organization for Standardization, 2016)

2.2.4 ISO 14001:2015

Environmental management systems standard ISO 14001 is commonly implemented standard in branch of industry. It provides organizations a framework to protect the environment and respond to

changing environmental conditions, considering socio-economic needs. Requirements that enable an organization to achieve intended results regarding environmental management are specified in the standard (International Organization for Standardization, 2015b). Due to the limited time of creating this system and the fact that ISM Code includes some measures to manage environmental issues, the ISO 14001 standard was not implemented into the system.

2.3 Combining the regulations and standards

Intense competitiveness, constant technological progress and customer requirements on market encourage companies and organizations to engage new projects, such as certifiable management systems. Among clients responsibly operating company in form of quality, environment, and occupational health and safety has become increasingly important. Request for higher standards has transformed it to necessity for a competitive company to get a certification for a system as a proof of meeting normative standard requirements. In smaller organizations common reason is being a supplier to large companies or governments which set certain requirements for their supply chain. Often the requirements may be fulfilled in practice only by certifying the management system of the supplier (Hortensius, 2013).

Several management systems based on different codes, like ISM Code, standards created by ISO or other standardization bodies may be implemented separately into one company. Certification is granted by a certifying agency accredited by a supervisory body. (Oliveira, 2013) Implementation and maintenance of a management system requires full commitment, involvement and training of workforce, sustainable internal audits, a management review of the system and effective corrective actions (Gerolamo, et al., 2014).

Multiple parallel management systems get easily counterproductive, difficult to manage and raise situations where question of prioritizing is between productive processes or excessive bureaucracy (Oliveira, 2013). Different educational backgrounds and perspectives of employees, organisational structures, increased probability of mistakes and failures and effort duplication are pointed out as core problems in conforming multiple management systems (Domingues, et al., 2010).

2.3.1 Integration of different management systems

During the last decade increasing strategy of companies is the integration of management systems. Internal and external factors motivate integration. Most commonly identified reasons to integrate

systems are utilizing similarity and compatibility between standards, aiming for improvement in productivity, internal communication and internal processes performance, marketing issues, customers pressure and promotional aspects (Domingues, et al., 2010). By integration a state where there is only one integrated management system to be followed rather than multiple systems in parallel may be achieved. Integrating management systems has proved to be an effective way to reduce undesired effects of several parallel management systems (Abad, et al., 2016) (Abad, et al., 2014).

Usually integration process follows four common steps. First step is having separate management systems in use simultaneously. Next the common elements in systems are identified and the integration begins. After integration is complete, the result is an integrated management system (Domingues, et al., 2010). There is no one single way to perform system integration. Integration process consists of aligning and consolidating objectives, policies, procedures, resource management and critical review (Gerolamo, et al., 2014).

It is possible to integrate management systems to different extents. The levels of integration are divided differently by different authors, but the most common evaluation system of integration level is a three-level system. Abad et. al, propose three sequential levels of integration as follows:

- Level 1 ("Documental harmonisation"): is achieved when only the documentation structure is integrated (i.e., the system's written procedures).

- Level 2 ("Partial integration"): businesses integrate the documentation structure and one or two of the components (system support processes, strategic processes, audit processes) that comprise the process map.

- Level 3 ("Full integration"): at this level of integration, both the documentation structure and the three components of the process map are fully integrated (Abad, et al., 2014).

Resistance against integration is often faced due to limitation in human and financial resources, losing focus on company core business, lack of expertise in systems, satisfaction to current systems, doubts in integrations effect on adding value to company, scepticism of middle managers and lack of customer pressure (Domingues, et al., 2010).

2.3.2 Previous studies of integrating ISM code and ISO 9001:2015

Ville Koskinen studied as a bachelor's thesis a process of partly integrating ISO 9001:2008 to an active SMS system. The objective was to create safety and quality management system, where ISO 9001 standard was implemented only for office processes, but not onboard vessels. SMS covered vessel operations as a mandatory regulation in his work. The process of certifying the system was in significant role in the thesis work (Koskinen, 2016).

Metin Celik has proposed a systematic approach to explore compliance levels of the ISM Code and ISO 9001:2000 quality management standard. In the study the codes are observed, and the compatibilities of separate clauses are studied and evaluated by giving a numeric value to represent compatibility for integration. The compatibility of a single clause of ISM Code is recognized to be better if the information content of the clause is smaller (Celik, 2008). As the structure of ISO 9001 has changed significantly since the 2000 revision, the evaluation of the quality management standard is not applicable in this study.

2.3.3 Risks in implementing and integrating several regulative systems

The high level of bureaucracy in branch of shipping is already identified as a high risk to safety, and quality of the company's processes. It is identified to form a harmful mental attitude towards paperwork, management systems and manuals. The attitude created easily steers functions to only consider about fulfilling the requirements of reporting, documenting, auditing etc. and not so much to concentrating on the effects and ways to effect on the safety and quality.

In Finnish shipping companies the raising amount of bureaucracy is a noticeable problem. In implementing such regulations as ISM Code, the lack of uniformity in interpretation and implementation is seen as a challenge (Lappalainen, et al., 2011).

Problems in implementing integrated management systems vary depending on strategic decisions. Poor leadership from top managers has huge effect on largest problem in implementing systems, employees resistance to changes. Overcoming this is possible by implementing communication plans during the integration process, motivating employees by incentives and explaining expected benefits as well as employees roles in the process. It is recognized that integrating more systems simultaneously increases the resistance, which should be taken into account when planning the organizations strategy of implementing several systems. Increasing participation and involvement of workers at all stages of integration process is recommended. Another challenge is recognized in

governance structures which haven't been adjusted to fit for the needs of the integrated system. Challenges are recognized to increase when the systems are integrated in smaller organizations. (Abad, et al., 2016) Regardless to the challenges faced, smaller firms are achieving higher level of integration compared to large firms with operational and organizational complexity. It is easier to achieve full integration in whole management of a small firm, whereas in a large company integrating systems to full extent in all management levels being interested of different areas is challenging (Abad, et al., 2014).

3   Applying the regulations and standards in the company

From the beginning it was clear that the company being just founded does not have any operational processes which could have been utilized by simply writing them up and determining needed new procedures to ensure that the requirements by the codes would be fulfilled. On the other hand, there was a unique possibility to start to fulfil the empty frame with the processes and requirements created based on completed studies of management systems, company managements visions and strategy, personal experiences on similar businesses and the requirements of the ISM Code and ISO 9001:2015 standard. After discussions of company strategies and the managements vision of the operations, the management was not setting any strict guidelines or requirements for the work. Full and unlimited support was offered to solve raising questions regarding the system and organizational solutions. Several conversations and couple of meetings were gone through during the process regarding various areas of the management system and organization being created.

To be able to create a functional system which explains thoroughly enough all the relevant processes, the conversations with company management and reading through the codes alone will not result in sufficient knowledge. Similar system manuals of integrated systems and separate safety or quality management systems were studied to get a proper image of the common structure and ingredients in such a manual. Articles of implementing a system or integrated system, integration processes, integrability, effectivity and achievable benefits, difficulties in implementing and integrating and the methods to avoid difficulties were studied. Another method of gathering information about specific areas was by interviewing professionals of the particular area.

Studies showing the significant benefits of integration and the simplicity of the supposed end result were leading factors to choose integration of the codes. The product offered for the company will be a combination manual of integrated management system based on the before mentioned codes. The combination manual, if it is carefully structured and compressed in understandable form, is

considered simple for employee to study, and comprehend if compared to multiple manuals of different systems.

3.1 System development

While doing this work, both codes were studied ISM code and ISO 9001:2015 standard. It was easy to notice that there are plenty of subtitles of similar meaning, as well as many common requirements to fulfil. Both are aiming to continuous improvement and are relying on planned processes, analysing risks, and observing internal operations to determine chances to improve. Due to these similarities and the nature of the company's operations it is considered reasonable to combine the safety and quality management system manual in one complete integrated system. Safety and quality management system will be referred as SQMS or the system later in this document. SQMS manual is referred to as the manual or SQMS manual.

3.1.1 Initial requirements

Requirements for the product were initially set in cooperation with the company. The system was supposed to be planned for a company with a metal workshop, one vessel of 13m overall length and 22 tons, one full day employee and three part-time vessel operators. Currently there was going on planning of purchasing a barge and a leisure boat dockyard with fuel selling equipment, which was an additional challenge to include in the system. System should allow easy adjustability for future growth in number of employees and by purchasing new vessels or equipment.

3.1.2 Analyse for applicability

As it is earlier shown, ISM Code and ISO 9001 are considered generally applicable on target company. Especially for an uncertified system which is, as suggested, implementing only the most beneficial parts of the codes.

External audits and certification processes are not applicable due to the nature of the created system. Even though the integrated system is created by following the requirements, it is not going to be certified and therefore costly and time consuming external audits are completely left out of the SQMS as well as the certificates and certification organizations related to SQMS.

ISO 9001:2015 chapter 8.3 covers design and development of products and services. This chapter is left out of the SQMS. The client is not going to offer for sale any of its own products. The company is providing the customers with products and services based on the provided orders and designs.

3.1.3 Combining code requirements

As the new ISO 9001:2015 is adjusted to be more in line with other management system standards, the adjustments have been made considering other ISO standards like ISO 14000 (environment), ISO 22000 (Food Safety) and so on (Ruostekoski, 2017). The ISM Code is not following this standard form for management systems. Therefore, it is not directly integrable to ISO standard and requires analysis of the integrable parts and planning to include also the clauses which are required only by one of the codes, so that they don't interfere with the other one.

While there are similar titles required by both codes, there are also similar requirements to fulfil. These requirements are not necessarily under the same subject or title. The compressing of the management system was done when the titles of the SQMS manual were drafted. All the required particulars were set under suitable titles and from that started the producing of the actual manual. At that point by reading the produced draft through and keeping eye on the table of contents, a view of the system was achieved, the final structure was adjusted, and some of the information was further compressed under suitable common titles.

3.1.4 Structure of the SQMS manual

For the appearance and the structure of safety or quality management manual there can be found different models from other companies. Combination manual of both codes, SMS based on ISM and QMS according to ISO 9001 standard are not as common. Several management system manuals of all types were examined briefly to get a slight vision of what the actual structure in the SQMS manual being created might be. By listing the requirements and titles, a structure of the system was formed (*Figure 1.*).

The initial plan was to create four different manuals which describe the SQMS. More operational manuals may be added if needed in case of growth in company. The first one is general manual concerning all areas of company's operation and the three following ones are specific operational manuals for different areas. The vessel manual is mainly based on requirements of ISM Code which has been utilized also in developing safe working practices in other operational areas. As required by

ISO 9001 standard means to ensure quality of the produced services and products are implemented in operational procedures throughout the system.

Safety and Quality management system	General manual	General
		Company policies
		Management and responsibilities
		Company processes
		Quality management
		Documentation
	Vessel manual	General
		Masters responsibilities
		Manning and familiarization
		Rest hours and watch keeping
		Safe working practices and ppe.
		Operational procedures
		Emergency procedures
		Reporting
	Shipyard, Maintenance, and repair work manual	General
		Familiarization
		Safe working practices and ppe.
		Operational procedures
		Emergency procedures
		Reporting
	Workshop manual	General
		Familiarization
		Safe working practices and ppe.
		Operational procedures
		Emergency procedures
		Reporting

Figure 1. The systems structure

3.1.5   PDCA model

Plan-Do-Check-Act model is a system for developing a process recommended by ISO.

- Plan or establish the objectives, determine resources needed to fulfil the objectives and identify risks and opportunities.

- Do the planned operations as planned

- Check the process and monitor the results, take notes and report

- Act accordingly by creating corrective measures to avoid observed harmful occurrences in future (International Organization for Standardization, 2015a).

The PDCA model cycles continuously to ensure continual improvement. If this SQMS is placed in the PDCA cycle after handing it to the company, it would be on the "Do" stage. The process of creating the system will be the "Plan" phase, where the system will be planned to the extent possible without taking part in the operation. Since the company is in the beginning of its operations, the next phase of "Do" will be to start the processes in the company. Processes should follow the SQMS manual created as much as practically is possible. The company is aware of the system being in development and the risks in the operations have to be considered with extreme caution and not limiting to the risks addressed in the system manual. Functionality of the SQMS is monitored and "Checked" during the implementation and initiating the operations. After some time has passed and notes reported of system performance have been received, "Act" phase is initiated by creating and implementing corrective actions. The process of developing the system is implemented in the SQMS manual. The key methods to make use of PDCA cycle are determined as instructions for reporting, means to utilize reported information in development, methods to implement corrective actions effectively, and managements responsibilities to monitor the operation and the effectivity of SQMS.

3.1.6   Recognizing and avoiding risks in implementation

All of the earlier studied risks are not considered applicable in the company, but some of them are and the system is prepared to face them and minimize the undesired effects. Recognized risks in the target company are mainly identified in paperwork required from the employees by the SQMS. The professional attitude and will to end up in highest possible quality service or a product with safe practises are not assumed to become a problem. Current management in the company has high motivation for implementing the SQMS in use, regardless of that, the importance of commitment to

implementation process was mentioned in the manual and informed to whole group of management personnel.

Considerable risk in taking the SQMS into use is the amount of bureaucracy required to keep it up and to follow the set guidelines for operations. It is well understood in the company that the system will be beneficial to whole organization. Even though the amount of bureaucracy has been minimized as well as the authors knowledge, understanding and familiarity with the codes allows. It will be seen later in practice if the planned procedures are suitable for the company in question. Internal audit scheme has been planned to recognize problems faced by the system and to be prepared for the need to further adjust the system to better suitable direction.

A concern of very common problem in management systems is regarding reporting. It is essential for a functioning management system and its development to get the best benefit of it, to get reports of all the identified deficiencies in the system and possible hazardous situations. It is to be highlighted that the purpose of the reporting is not to place guilt on the person who has ended up in an undesired situation after following the given instructions. Objective is to identify areas to improve in company level. During implementation of the system the reporting will be explained to company personnel.

The mostly paperless filing system might result in some problems in scanning and saving files in correct locations. Most probable problem regarding paperwork might be found in a set requirement to fill operational follow up form when completing work tasks. Problems might be met in availability of such forms in practice and the thoroughness of filling them as instructed. The forms getting lost during the project is also possible. One solution for this problem might be to create electric document of which only certain parts are fillable and not modifiable after saving the file. The file would then be always available in the project folder for the management to observe the progress of the project.

3.2   Applying the system in the company

After planning the structure and important points to concern, producing the actual system began. The SQMS manual was made as a single file including all operational manuals. The planning phase created already useable frame by set titles and information required below them to utilize as a frame for the system. The sections were first filled to the extent which was possible by gathered information. After the manual was filled with all available information it was sent to the client who revised it and gave brief comments. During a telephone conversation of several hours the commented system was gone through and the questions of the given comments were handled. New information enabled

further development of the manual, after which the language and wording were checked. In following parts developing of some of the important areas in the system are briefly explained.

3.2.1 Documentation

ISO 9001 specifies all information required for quality management to be documented and archived in a suitable way to allow tracing of operations and operators. Means to collect and create data of completed work have to be determined. ISM Code on its behalf requires documentation and archiving information relevant to safety management. Study by M. Celik states that clause 11 of ISM Code concerning documentation would not be easily integrable to other management systems (Celik, 2008). In this case it was considered as best practice to create one guide of documenting all relevant information regarding safety and quality. The documentation of processes was determined to be saved in electronic form to a filing system accessible through internet. Some of the documents regarding vessel operations are required in paper form. A list of papers and storing positions was created to ensure accessibility.

To achieve required accuracy of collected data from completed operations, a traceability data system was created. The system consists of unique numberings for projects, products and items, work follow up form including all relevant information linked to the numbering as well as a filing system to store and allow easy usage and efficient utilization of the data.

3.2.2 Filing system

An electronic filing system was created to satisfy the needs of storing and sharing collected data of the company's operations in a paperless form. This is considered to reduce the effort of transporting papers for filing purposes and minimize risks for lack of documentation. Official papers of the vessel including vessels logbooks, which are required in paper form by legislation, are filed onboard.

Storing times of old information had to be considered, especially concerning vessels legal documents. Discussion with company management led into conclusion that all data of completed operations should be stored and protected without time limit. Modern data storing methods are not limited to available space in this kind of organizations so there is no need to erase data.

3.2.3   Data handling and protection

The filing system is saved onto a trusted file hosting service. The filing system access permissions are shared to company employees according to their position in the company. Permissions to modify the files in the system are limited to company CEO and quality manager. Back up procedures and data protection means were established to ensure preservation of data.

Regulation (EU) 2016/679 is stepping into force in European Union in May of 2018 and setting strict limitations to storing, handling and sharing personal data. Register of company personnel is available in the filing system only for determined persons. Other registers of personnel are not created or stored to be able to control the collected data. The same protective procedures are utilized for customer data. Procedures to ensure permissions for recording personal data and for erasing unnecessary data were determined.

3.2.4   Internal and external issues

ISO 9001:2015 standard requires the quality related internal and external issues to be determined. Identifying risks and opportunities and taking them into account while producing and developing the SQMS is more effective when their causes have been identified. ISM Code does not set similar requirements for establishing and documenting internal or external issues (European parliament and the council, 2006). To be able to create a SMS which effectively guides company to improvement it is necessary to consider similar aspects.

The safety and quality related issues were established and utilized in the process of developing the system. The issues were included in the SQMS manual to allow utilizing, adjusting, and evaluating them later during the process of development of the system.

3.2.5   Interested parties

Company's interested parties are hard to define before the company actually is functional and its business companions are stable and habitual. Most probably the relevant interested parties will be product suppliers for the maintenance and repair operations, some operators connected to shipping business, accountant office and long-term customer organizations. According to the quality standard, determination of interested parties is not required if the company considers the interested parties to be irrelevant to its quality (International Organization for Standardization, 2015a). The mentioned

interested parties in SQMS manual are considered relevant to achieving the set quality requirements, but in practice it will be shown if the list is complete or needs further adjustments.

3.2.6 Company policies

Company policies are a mandatory written description of important values and objectives in the company and means to concretize them. Policies should support the strategic direction of the company and include commitment for satisfying applicable requirements and to continual improvement of the management system (International Organization for Standardization, 2015a) (Banda, et al., 2016).

When determining company policies, it is important to list the objectives and values to identify the unique features of the company. Then it is necessary to list the requirements of the codes. A vision of typical policies implemented in management systems was achieved by studying several available SMS, QMS, and integrated management system manuals. Company management was interviewed by telephone to determine the company's vision of the objectives, strategy and policies. Based on the gathered knowledge and studying the codes a first proposal of the policies was written in the manual. Revising the system during the process, minor modifications were done to alcohol and drug policy to satisfy legal limitations regarding termination of employment.

3.2.7 Management and responsibilities

The codes require the management and its responsibilities to be determined and documented. Management and organisational structure had to be created from the beginning. Several discussions with founder of the company were gone through to determine how to end in a best possible result. At the moment of writing this thesis, management included only one person, the founder. As the company was just beginning its operation during the development of the system, it was still unclear how the starting of operation would require changes in management crew. A lot was depending on what kind of growth future will bring to the company.

Eventually it was decided that the management positions should be created to allow some growth in management crew. Chief executive officer (CEO), designated person ashore (DPA) and quality manager positions were determined including their responsibilities. CEO would take care of the tasks of the other positions in management level as long as there are no additional personnel employed for the positions. Additional DPA2 was determined as a DPA deputy to ensure having a contact person ashore while the full time DPA is onboard. Master of a vessel was listed in company management as master has a remarkable ability to take part in decisions made in company, especially regarding its

vessel operations and management. This structure would make the future growth easier as the system is readily created to for shared responsibilities and it is not necessary to update the whole manual in case there is new management level position created.

All tasks and responsibilities are briefly explained in the system to fulfil the requirements set by ISM Code and ISO 9001. In the system it is pointed out that every employee is responsible for completing the given work following set procedures to ensure safety and quality of the product or service. Responsibilities are determined for each management level position and means to establish responsible person for each project are included in relevant processes.

3.2.8   Determining of company processes

Company processes in general manual are describing the processes in the office. The processes are divided in main processes and support processes. The main processes consist of processes directly related to the product or service to be produced. Support processes are the processes which are required to make the production possible, safe, or leading to high quality.

Initial proposal of all company processes was created based on requirements set by codes, interviewed top managements vision of the company's strategy and objectives and utilizing applicable parts of management system manuals from other organizations. The company management revised the proposal. Revision didn't bring up any major changes, but some details were added to protect the company's privacy.

To determine processes of financial management the company management was interviewed to get information of how the financial management is organized. To gain further knowledge of the subject, a professional bookkeeper was consulted. The required processes for legal accounting, like buying, selling, bookkeeping and taxation were inserted into the system. A short description of separation of costs and profits to different areas of business was included to clarify means to evaluate cost efficiency of company's operational areas.

3.2.9   Implementing means to develop

Both of the codes set requirements for internal auditing and reviewing the management system. Effectivity, suitability and fulfilling the requirements should be monitored. (European parliament and the council, 2006) (International Organization for Standardization, 2015a). The internal audit and management reviewing shall be organized in a way which brings objective evaluation of the system

and brings up imperfections which should be set under further development. Means to get external feedback are limited to customer feedback and conversations with interested parties. External audits and certification processes are not established in the SQMS produced.

Methods to react and apply corrective actions for identified deficiencies and opportunities for improvement must be established (European parliament and the council, 2006) (International Organization for Standardization, 2015a). Handling the identified imperfections in the company will be generally done in company meetings, which are organized regularly. Additional meetings are held in acute cases. Urgent actions for example in case of serious non-conformity may have to be taken to react effectively for a serious deficiency.

Corrective actions and corrections established in the meetings will be implemented in the company with methods documented in the SQMS manual. Responsibilities for implementation processes are pointed out for specific persons as well as the responsibility for evaluating the effectivity of the implemented corrections as required by the codes.

3.2.10 Safe working practices and personal protective equipment.

Safe working practices area covers in all separate manuals the basic principles and individual responsibilities to safe working environment. The object of separating safe working practices in the manuals is to increase awareness of required work permits and risk assessments, responsibility to utilize personal protective equipment for own good, need to avoid unsafe methods and identify hazardous objects and areas. Highlighted area is the importance of being competent for the task and actions to be taken if the employee does not feel like having such competence.

Separate operational manuals have their safe working practices and personal protective equipment. chapters modified for the area, so that they include the most important equipment in each operational area. For example, vessel operational manual defines situations to wear life vest or safety harness and in workshop manual importance of not to wear any loose hanging clothes or jewellery in risk to get caught in moving parts or tools is pointed out.

3.2.11 Familiarization

A proper familiarization is the most effective way to prevent accidents. Familiarization consists of information about working environment and practises, duties related to common safety, contact details of relevant responsible persons, personal responsibilities and what is expected from the

employee (Vattulainen, 2008). The familiarization parts of the manuals were drafted by the knowledge achievable at the moment, but they require further development when the operations of the company are running and all the necessary points to include in the familiarizations are identifiable. In future, accurate familiarization procedures can be found in relevant parts of the SQMS manual, which are required to be studied to achieve proper familiarization. Familiarization practises and responsibilities will be stated in each of the manuals for separate operational areas. Personal familiarization given by company manager is often easier to comprehend than written document and it gives a chance to ask if some detail is not understood. Personal familiarization by manager is also required to estimate the suitability of the new employee for the job. To ensure proper familiarization of all the required aspects, familiarization checklists will be established for separate operational areas.

3.3 Establishing operational procedures

3.3.1 Vessel procedures

Vessel procedures cover normal operational models established as required by the ISM Code (European parliament and the council, 2006). Establishing vessel procedures was challenging due to varying amount of crew. Vessel procedures were established through conversations with the company personnel. Most of the employees have been sailing onboard the particular vessel before it was purchased to the company.

Current vessel in the company is planned to have only one crew member onboard during short voyages of less than 12 hours without passengers, and minimum of two when either passengers are onboard, or duration of voyage is extended. For example, making a legal system for watch keeping regarding rest hours and procedures for berthing or departure are challenging due to occasionally limited crew. It is not considered desirable to have separate manuals for all possible crewing situations, but the procedures should be defined in a way which makes it possible to operate safely according to one manual in all situations.

Watchkeeping was a subject discussed with company's management. Minimum requirements for certificates of onboard personnel in different tasks was established together with the watch keeping arrangements and company policy of safe navigation and watch keeping. Based on the created procedures a manning certificate was applied for the vessel being registered as commercial cargo vessel. After receiving the official manning certificate, the watchkeeping chapter will be adjusted if needed.

3.3.1 Dockyard procedures

In determining dockyard procedures my personal experience of work on similar boat yard as the one planned to be purchased was utilized. The experience includes readily developed procedures in the company of my earlier employment. Since the knowledge available of the client's dockyard was limited to type of machinery, equipment, and the location the procedures were left quite open for development. Making a too detailed manual for the processes might become useless if a dockyard different from the currently planned would be purchased.

Means to achieve and improve quality requirements generally by ISO 9001:2015 could be determined already as well as the methods to measure achieved quality. Safety precautions could be set to moderate level by experience and by utilizing different publications regarding maintenance and repair work safety.

3.3.2 Maintenance and repair procedures

The company management was interviewed to establish all the possible maintenance and repair projects to be performed by the company. Projects of maintenance and repair work were divided in two separate subcategories. The maintenance projects are covering actions which ensure a maximized service life of a working piece of equipment. Repair projects cover the projects where broken equipment is either fixed or replaced. Also retrofitting projects are included in repair work

The maintenance projects are supposed to concentrate on engine and equipment maintenance in boat sized vessels. The maintenance procedures are based on the equipment manufacturers maintenance guides or workshop manuals and the importance of following manufacturers maintenance procedures has been explained in the SQMS manual. If the manufacturer doesn't provide such information and the level of expertise in the company is not sufficient, it was determined in the manual that such a project shall not be commenced to prevent risk of unsuccessful maintenance work.

Projects of repair work include steelwork for vessels structures, repair work and retrofitting of equipment and especially repair work and retrofitting of marine engines. General means to achieve high quality were written based on my personal experience of working in a dockyard and retrofitting company concentrating on leisure boats. As each project is unique in this area, the importance of setting requirements for the end results and thorough planning of the project including means to achieve the set requirements was emphasized.

3.3.3 Workshop procedures

In metal workshops risks for accidents are frequent. There are usually machines which have rotating and cutting parts. Harmful noise and chemicals are often part of the working environment. Work can be also physically challenging (Vattulainen, 2008). Hot work is another area of high risks. Hazardous situations are based on couple of common factors. These management related factors are deficient planning of work and working environment, insufficient training, failures in communication, badly organised work, and incoherent objectives. Direct factors are lack of protective equipment in machines and lack of personal protective equipment, as well as lack of maintaining the machines in safe working condition, bad lighting, disorganised or badly located equipment, and unsafe working practises. Proper familiarization to the working environment and employee's tasks is the most effective way to prevent accidents (Vattulainen, 2008).

The determined management principles in SQMS manual general part, for planning, informing and improvement are designed to minimize most of the risks caused by insufficient management. Direct factors in workshop are minimized by giving information of required safety equipment and practices in safe working practises chapter. Each of the determined workshop processes are giving information of apparent safety risks in the process, risks for not achieving quality requirements and the actual operation with means to achieve set quality requirements and inspecting and reporting the result of work.

3.3.4 Emergency procedures

Common parts in emergency procedures in whole SQMS are the methods to call for help, rest of the emergency procedures have been established for each area of operation to fit the identified emergency situations. Possible emergency situations were identified by company's employee's personal experiences and by utilizing several safety management manuals and safety related publications.

In establishing vessel emergency procedures, the same challenges were faced as with normal vessel procedures. Variable amount of crew sets challenges in establishing procedures for example in a case of fire or leakage. When there are two crewmembers onboard the tasks may be divided. One can lead the actions and call for help and the other can concentrate on fixing the actual cause of the emergency. When there is only one crewmember onboard, making possible distress calls and situation assessment may take so much time that the situation gets out of control and possibilities to save the vessel or protect safety of persons or environment are reduced. In determining vessel emergency procedures ISM manuals from other vessels and a guide booklet by Finnish Border Guard "Apua! Veneilijän

turvallisuusopas" was utilized. The latter booklet was considered to include valid information taking into account the size of the vessel. The determined procedures were presented to company's management and the most efficient procedures were discussed and agreed upon.

In other emergency procedures similar problems were not faced. On shore-based operations evacuation is often easy and help from shore emergency response organizations is fast and effective. Common risks and emergency situations were identified by studying articles of workshop safety and safety in dockyard operations. Experience of the company personnel was utilized to identify the risks concerning particularly the target company. Procedures to handle emergency situations are based on the importance of protecting safety of human life by evacuating the area of hazard and by calling for help. Guidelines set by Finnish Ministry of the Interior, department for rescue services was studied to establish procedures following official guidelines given for handling emergencies in Finland (Sisäministeriö / Pelastusosasto, 2018).

4 Conclusions and discussion

After the adjustments made during the process based on company revisions, the manual provided to the client was accepted and well received. It was fulfilling the expectations and the attached documents required for the quality and safety management were seen as a positive additional effort given to the commission. The thesis work was considered well explanatory to describe the development process of the system.

4.1 Future usage and development

The client has received the material created in this work. The management of the company believes the system to be utilized in the operations and become beneficial in achieving the set targets. The fact that I, as an author for the system, am included in the management crew of the company and thereby support the implementation process and utilization of the system.

4.1.1 Implementing into use

The company is starting its operations during the year following the creation of the SQMS. As most of the procedures are described in the SQMS, the intention is to take all the determined procedures into use right from the beginning. In practice functionality of the procedures will be evaluated, and the adjustments will be done accordingly. Activity of the personnel and cautiousness are required,

since all the risks and dangers present in the operations are most probably not yet identified. The interval for evaluating the system and implementing corrective actions in the SQMS is not applicable during the first year of the operation. Constant observations are required to make the management system effective as soon as possible after the beginning of the implementation.

4.1.2 How to manage and implement changes in company

The changes made to the SQMS manual are updated to all relevant sections in company filing system and paper version of the changed pages will be printed to paper manuals. In filing system, a document is created containing update information and locations of printed paper versions of the manual, to ensure that all printed versions get updated. Changes shall be informed to all personnel by appropriate means to achieve full awareness of the changed procedures. In the SQMS manual responsibilities of the management are defined regarding the implementation of changes in the company.

4.1.3 Possibilities for growth

The manual was ordered in a form which allows possibility for growth in company. This was kept in mind throughout the project of creating the SQMS and the manual. Different structures for the manual were drafted and considered. Most of the alternative structures increased the complexity of adjusting the manual significantly and there were no better structures in other observed manuals to implement either.

Taking into account the expected growth to occur in the company, the produced manual is considered simple enough to modify for future needs. Especially naming the DPA already in this phase, even if the CEO operates as DPA, will ease the work in future if a separate DPA is hired. Otherwise excessive effort would be required to modify the whole system by sharing the responsibilities of different processes. Suspected growth in fleet of vessels will be handled by creating a separate vessel manual for each new vessel by utilizing this thesis work and the created vessel manual. Possibilities to include a dockyard have been prepared by forming a frame for dockyard operations chapter in ship maintenance and repairs manual.

4.2 Challenges faced

Biggest challenge in the process of creating the SQMS was the uncertainty. Company had no filing system, no organizational structure, nor documented strategies or visions. Often the management system is created for a company which has been operating already so that the processes which the

company is performing exist and the creator of the management system may concentrate on documenting and developing the existing processes. In this work the whole system and organization of the company had to be established and documented, which required a lot of communication to align the documented data with the founder's personal vision and strategy.

4.3 Self-evaluation

The choice of integrating the management systems proved to be right due to several studies showing its benefits in both, avoiding risk factors of several parallel management systems, and achieving improvement in organizations operations. The system which was handed to the client was relatively compact and simple enough to comprehend. I consider that the system fulfils the requirements of the codes better than was initially intended. If the official certification will be in hand at some point, and the system has been implemented successfully to the company, it will not require excessive efforts to adjust the SQMS certifiable.

Some of the articles studied did not state on which edition of ISO 9001 the studies were based on, and some of the ones where the edition was mentioned were older than the 2015 edition. Elements and requirements are similar in the old and new standard versions, so the integration and implementation problems are most probably applicable. Many of the studied publications of integration of management systems were based on integration of ISO 9001 and OHSAS 18001 occupational safety management standard. To give my study a better value, maybe utilizing only studies of the newest edition ISO 9001 standard and ISM Code rather than other safety management standards would be beneficial. I personally believe that I was able to find out relevant and applicable points from the used publications for my study. Achieved level of knowledge and studied information as well as created management system went beyond my own expectations. The three months' time period given for the work was too short to make a certifiable management system, but for this noncertifiable management system it was barely enough.

To further develop the system or widen this study, integration of ISO 14001 environment standard would be following the common trend in branch of industry. In this study it was not included due to very limited time available for the work. Later if possibility occurs, certification of the integrated management system would be an interesting project which would also bring out the deficiencies of this work.

5   References

Abad, J., Cabrera, H. & León, A., 2016. An Analysis of the Perceived Difficulties Arising During the Process of Integrating Management Systems. *Industrial Engineering and Management,* 9(3), pp. 860-878.

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

Banda, O. W. et al., 2016. A method for extracting key performance indicators from maritime safety management norms. *WMU Journal Of Maritime Affairs,* 15(2), pp. 237-265.

Castillo-Peces, C. d., Mercado-Idoeta, C., Prado-Roman, M. & Castillo-Feito, C. d., 2017. The influence of motivations and other factors on the results of implementing ISO 9001 standards. *European Research on Management and Business Economics,* 24(2018), pp. 33-41.

Celik, M., 2008. Designing of integrated quality and safety management system (IQSMS) for shipping operations. *Safety Science,* 47(2009), pp. 569-577.

Domingues, J., Sampaio, P. & Arezes, P., 2010. *MANAGEMENT SYSTEMS INTEGRATION: A SYNERGISTIC APPROACH.* Braga, Pedro Domingues.

European parliament and the council, 2006. *Regulation (EC) No 336/2006,* s.l.: European Union.

Gerolamo, M. et al., 2014. Quality and Safety Management Systems: Joint action for certification of small firms in an industrial cluster in brazil. *The South African Journal of Industrial Engineering,* 25(1), pp. 190-203.

Hortensius, D., 2013. *ISO News.* [Online]
Available at: https://www.iso.org/news/2013/02/Ref1709.html
[Accessed 18 04 2018].

IMO, I. M. O., 2018. *Brief History of IMO.* [Online]
Available at: http://www.imo.org/en/About/HistoryOfIMO/Pages/Default.aspx
[Accessed 2 4 2018].

IMO, I. M. O., 2018. *ISM Code and Guidelines on Implementation of the ISM Code.* [Online]
Available at:
http://www.imo.org/en/OurWork/HumanElement/SafetyManagement/Pages/ISMCode.aspx
[Accessed 31 3 2018].

International Organization for Standardization, 2015a. *SFS-EN ISO 9001 Quality management systems. Requirements (ISO 9001:2015).* 5 ed. Helsinki: Suomen Standardoimisliitto SFS Ry.

International Organization for Standardization, 2015b. *Environmental mnagement systems. Requirements with guidance for use (ISO 14001:2015).* Helsinki: Finnish Standards Association SFS.

International Organization for Standardization, 2015c. *ISO/TC 176 SC2.* [Online]
Available at: https://isotc.iso.org/livelink/livelink/open/tc176SC2public
[Accessed 16 04 2018].

International Organization for Standardization, 2016. *ISO 9001:2015 for Small Enterprises.* 4 ed. Geneva: ISO.org.

International Organization for Standardization, 2016. *ISO in brief.* [Online]
Available at: https://www.iso.org/publication/PUB100007.html
[Accessed 13 04 2018].

Koskinen, V., 2016. *ISO 9001 laatujärjestelmän liittäminen osaksi ISM manuaalia.* Turku: Novia UAS.

Lappalainen, F. J., Kuronen, J. & Tapaninen, U., 2011. Evaluation of the Ism Code in the Finnish Shipping Companies. *journal of maritime research,* 2012(1), pp. 23-32.

Nunhes, T., Barbosa, L. & Oliveira, O. d., 2017. Identification and analysis of the elements and functions integrable in integrated management systems. *Journal of Cleaner Production,* 142(2017), pp. 3225-3235.

Oliveira, O. J. d., 2013. Guidelines for the integration of certifiable management systems in industrial companies. *Cleaner Production,* Volume 57, pp. 124-133.

Paris MoU, 2016. *Port State Control Seafarers matter,* Hague: Paris Memorandum of Understanding.

Ruostekoski, A., 2017. *CHANGES IN THE REVISED ISO 9001 STANDARD AND THEIR EFFECTS ON AUDITS.* Vaasa: Vaasan Ammattikorkeakoulu.

Sisäministeriö / Pelastusosasto, 2018. *Pelastustoimi.fi.* [Online]
Available at: http://www.pelastustoimi.fi/turvatietoa/toimi-oikein-hatatilanteessa
[Accessed 30 04 2018].

Töyrylä, I., 1999. ACTA POLYTECHNICA SCANDINAVICA. In: *REALISING THE POTENTIAL OF TRACEABILITY.* Espoo: Finish Academy of Technology, pp. 126-128.

United Kingdoms Maritime Administration, 2004. *Casualty statistics and investigations,* s.l.: International Maritime Organisation IMO.

Vattulainen, M., 2008. *Työturvallisuus konepajassa.* Lappeenranta: Lappeenranta University of Technology.