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Conceptual Framework for Integrating Key Elements of a Safety Management System into Organisational Performance Management

Georgi Hrenov

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Declaration:
Hereby I declare that this doctoral thesis, my original investigation and achievement, submitted for the doctoral degree at Tallinn University of Technology, has not been previously submitted for doctoral or equivalent academic degree.

Georgi Hrenov

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Kontseptuaalne raamistik ohutuse juhtimissüsteemi põhielementide integreerimiseks organisatsiooni tulemusjuhtimisse

GEORGI HRENOV

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Contents

List of publications

The list of author's publications, on the basis of which the thesis has been prepared:

I **Hrenov, G.**, Paas, Õ., Tint, P., & Reinhold, K. (2016). Workers' representation in OHS activities: Example of Estonian industrial sector. *Agronomy Research*, Volume 14(2), pp. 377–391. https://agronomy.emu.ee/wp-content/uploads/2016/05/Vol14-_nr2_Hrenov.pdf.

II **Hrenov, G.**, Tint, P., & Reinhold, K. (2017). Employers' role in the improvement of safety level in Estonian enterprises. *Environment. Technology. Resources: Environment. Technology. Proceedings of the 11th International Scientific and Practical Conference,* Volume I, pp. 115–120. DOI:10.17770/etr2017vol1.2520.

III **Hrenov, G**., Reinhold, K., & Tint, P. (2017). Working Environment Specialist's role in the Improvement of Safety Level in Estonian Enterprises. *In: Proceedings of 16th International Scientific Conference Engineering for rural development,* Volume 16, pp. 832–840. DOI:10.22616/ERDev2017.16.N170.

IV **Hrenov, G.** (2022). Conceptual Model for the Development of OHS Management in SMEs. *In: Leva, M.C., Patelli, E., Podofillini, L., & Wilson, S. (Eds.). Understanding and Managing Risk and Reliability for a Sustainable Future: Proceedings of the 32nd European Safety and Reliability Conference,* August 28-September 1, 2022, Dublin, Ireland. Published by Research Publishing, Singapore. Pp. 2718–2725. DOI:10.3850/978-981-18-5183-4_S18-05-625-cd.

The copies of publications I–IV are included in the Appendices.

Other publications related to the topic:

Tint, P., **Hrenov, G.**, Siirak, V., Traumann, A., Kritševskaja, M., & Klauson, D. (2016). Improvement of workplace ergonomics in atrium-type buildings. *Proceedings of the Latvian Academy of Sciences. Section B, Natural, exact, and applied sciences*, 70 (5), pp. 20−24. DOI:10.1515/prolas-2016-0051.

Hrenov, G., Vilcane, I., Urbane, V., & Tint, P. (2017). Improving Job Satisfaction with Different Intervention Methods among the School Personnel in Estonia and Latvia. *Agronomy Research,* Volume 15(4), pp. 1602–1612. DOI:10.15159/AR.17.012.

Hrenov, G., Reinhold, K., Tint, M., & Tint, P. (2018). The role of employers, safety engineers, and safety reps in the improvement of safety level at enterprises. *In: Haugen, S., Barros, A., van Gulijk, C., Kongsvik, T., & Vinnem, J.E. (Eds.). Safety and Reliability – Safe Societies in a Changing World: Proceedings of ESREL 2018,* June 17-21, 2018, Trondheim, Norway (1st ed.). CRC Press. Pp. 2879–2887. DOI:10.1201/9781351174664-361.

Hrenov, G., Reinhold, K., Järvis, M., Tint, P. & Prause, G. (2023). Managing the Hazards of Ammonia in Seaports as a Potential Alternative Fuel for Green Shipping. *In: Brito, M.P., Aven, T., Baraldi, P., Čepin, M., & Zio, E. (Eds.). The Future of Safety in a Reconnected World: Proceedings of the 33rd European Safety and Reliability Conference,* September 3-8, 2023, Southampton, United Kingdom. Published by Research Publishing, Singapore. DOI: 10.3850/981-973-0000-00-0 esrel2023-paper.

Author's contributions to publications

The author of this thesis is the first author of three selected articles and the sole author of one article. His contributions to the articles in this thesis are:

Article I: First author. In this article, the author conducted interviews with workers' environment representatives (WERs), carried out a quantitative survey with WERs, performed the statistical analysis, and interpreted the survey results.

Article II: First author. In this article, the author participated in interviews with employers (EMPs), carried out the quantitative survey, conducted the statistical analysis and explained the survey results.

Article III: First author. This article investigated the working environment specialists' (WESs) potential to improve enterprises' safety level. The author was involved in the interviews with WESs and carried out a quantitative survey and statistical interpretation of the results.

Article IV: Sole author. This article summarizes the collected data on the research-based framework and practical examples of safety elements for developing systematic OSH management in SMEs. The Conceptual Model for the Development of OSH Management in SMEs that was developed in terms of EMPs, WESs, and WERs to emphasize their effective collaboration in improving OSH performance is presented in this article.

Abbreviations

CQCA	Conventional qualitative content analysis
EMP(s)	Employer(s)
SDG(s)	Sustainable Development Goal(s)
HR	Human Resource
ILO	International Labour Organization
LE(s)	Large Enterprise(s)
ME(s)	Medium Enterprise(s)
MISHA	Method for Industrial Safety and Health Activity Assessment
MRQ	Main Research Question
OSH	Occupational Safety and Health
OSHMS(s)	Occupational Safety and Health Management System(s)
PM	Performance Management
RA	Risk Assessment
RG(s)	Research Gap(s)
RQ(s)	Research Question(s)
SE(s)	Small Enterprise(s)
SET	Social Exchange Theory
SLT	Safety Leadership Theory
SME(s)	Small and Medium-sized Enterprise(s)
WER(s)	Working Environment Representative(s)
WES(s)	Working Environment Specialist(s)
WHO	World Health Organization

Explanations of abbreviations used in the thesis.

Terms

Conceptual framework	- constructed to organize the findings from the review of scientific literature and empirical research to present deeper knowledge about a phenomenon under study (Shields and Rangarjan, 2013).
Hazard	- viewed in the OSH context, this refers to a potential source, action, or event that may cause harm or disease (WHO, 2009). Hazards may include sources that could cause harm or situations, conditions, or circumstances that could lead to injury or ill health (ISO 45001:2018).
Health	- discussed in the OSH context and referring to occupational health. A working life resource comprising complete mental, social, and physical welfare and not merely the absence of illness or disability (WHO, 1986; 2010).
Ill-health	- considered in the OSH context and referring to work-related sickness. An adverse effect on a person's physical, mental, or cognitive condition due to a work-related situation (ISO 45001:2018).
Incident	- discussed in the OSH context and referring to occupational injury and ill health (ISO 45001:2018). An incident mays also be called an accident.
Injury	- viewed in the OSH context and referring to an occupational injury, or fatality due to an accident (ISO 45001:2018).
Leader	- discussed in the OSH and general management context and referring to a person with character and influence to whom people turn for supervision, advice, or help in work matters (Cavazotte et al., 2021). In the framework of this study, EMPs, WESs, and WERs are perceived as safety leaders at different organisational levels.
Management	- considered the administration of the organisation in this study context. Management is usually split into three levels: administrative, managerial, top or senior management; executive or middle management; and supervisory, operative, or lower management (Yukl, 2010).
Management commitment to safety (OSH)	- defined as the extent to which managers prioritize OSH matters and their effectiveness in handling and communicating safety concerns (Neal and Griffin, 2004).
Occupational safety and health (OSH)	- viewed as the conditions, situations, and features that affect or might affect the occupational safety and health of employees and other individuals in

	the workplace (ISO 45001:2018). The terms 'occupational safety and health' (OSH), 'occupational health and safety' (OH&S), 'health and safety at work', 'safety and health at work', etc., can be used interchangeably. In this study, 'safety' also refers to occupational safety and health where appropriate.
Key elements of safety (management system) or Key elements of OSHMS or Safety elements	- viewed as organisational measures, institutional arrangements, activities, and procedures that can be developed as essential components (key elements) of a systematic approach to managing workers' safety, health and well-being within an organisation to mitigate and control safety risk in the workplace. In this thesis, 'key elements of OSHMS' and 'safety elements' is interchangeable with 'key elements of safety'.
Occupational safety and health management system (OSHMS) or Safety management system	- viewed as a planned and systemic approach to handling OSH hazards that is coordinated by executive management and supported by the necessary organisational structure, human and technical resources, policies and procedures, managerial work, and organisational measures (Frick and Kempa, 2011; Frick, 2011; Baryshnikova et al., 2021). In this thesis, 'safety management system' is interchangeable with 'occupational safety and health management system'.
Occupational safety and health (or OSH) performance or Safety performance	- perceived as the outcome of safe working records over a period; if many injuries and/or fatalities were reported during a given period, the OSH performance might be considered low (Fogarty and Shaw, 2010; Atak and Kingma, 2011). In this thesis, 'safety performance' is interchangeable with 'OSH performance'.
Organisation	- defined as a team of people who execute organisational tasks and responsibilities, and whose relationships maximize organisational welfare and individual targets (ISO 45001:2018).
Organisational context	- viewed as the conditions under which the organisation is functioning and referring to external and internal issues relevant to organisational activity (such as the industry, location, culture, and period); also defined as the organisation's social role, task, and physical context.
Organisational performance	- perceived as an organisation's ability to make business decisions and approve policies that can positively affect business, society, and the environment (Marzook and Al-Ahmady, 2022).

Performance management (PM)	- defined as a systematic process for the achievement of organisational objectives through continuous communication and feedback between management and employees (Johanson et al., 2022).
Risk	- viewed in the OSH context and referring to a situation, circumstances, event, or likelihood that a worker may be injured or adversely affected by negative health effects when exposed to a hazard (Rosa, 1998; ISO 45001:2018).
Safety	- discussed in the OSH context as a concept that includes all organisational measures and practices that are taken to preserve the life, health, and physical integrity of workers (OHS Act, 1999).
Safety behaviour	- defined as an indicator of safety culture and OSH performance that demonstrates how employees ignore safety rules, perform prohibited activities, and execute their tasks inappropriately while working (Rundmo and Hale, 2003).
Safety climate	- defined as the shared attitude and perception of management and workers regarding OSH policies, programs, and practices (Kines et al., 2011).
Safety culture	- viewed as the group of viewpoints, values, competencies, attitudes, and models shared by managers and workers regarding OSH management in an organisation (Cox and Cox, 1991; Kines et al., 2011).
Safety knowledge or OSH knowledge	- defined as workers' understanding of an organisation's safety procedures and rules (Jiang and Probst, 2016). In this thesis, 'OSH knowledge' is interchangeable with 'safety knowledge'.
Safety leadership	- viewed in the OSH context and defined as leaders' ability to inspire, motivate, and supervise employees to achieve common organisational safety goals (Donovan et al., 2018; Rahlin et al., 2022).
Small and medium-sized enterprises (SMEs)	- defined as organisations employing more than 9 to 249 employees, which partially agrees with the European Commission definition of SMEs (cf. EC User Guide, 2020).
Sustainability or Sustainable development or Business sustainability	- defined as the ability to sustain a business process over time (Robert et al., 2005). Generally, this consists of three main concepts: economic, social, and environmental sustainability. In this thesis, 'sustainable development' and 'business sustainability' is interchangeable with 'sustainability'.

Well-being	- discussed in the OSH context and referring to comprehensive actions to promote the safe, healthy, and productive activity of the workforce in a well-managed organisation by qualified workers (Anttonen et al., 2009).

Explanations of terms used in this thesis.

Introduction

A high level of occupational safety and health (OSH) is not only a preference but a fundamental right of workers, according to the International Labour Organization (ILO, 2008) and the European Pillar of Social Rights (2017), which was proclaimed during the Estonian presidency of the council of the EU. Estonia is a comparatively new EU member state but has made significant progress in developing a safety culture over the last decades as the improvement in reported OSH outcomes demonstrates. The synergy between safety performance and work productivity has attracted considerable interest among Estonian industrial companies in recent years (Tint et al., 2010; Traumann et al., 2013; Pille et al., 2014; Reinhold et al., 2015; Paas, 2015a; Järvis et al., 2017).

OSH is a multidisciplinary field that comprises the analysis, identification, control, and prevention of work-related risk factors and hazards to protect and ensure the health, safety, and well-being of people at workplaces (Alli, 2008; Alzyoud and Ogalo, 2020). According to the World Health Organization (WHO, 2020), OSH is closely connected to the public health system. The concept covers all aspects of workers' health, including their physical working conditions and individual and psychosocial characteristics, which depend on employee personalities and approaches and focuses on injury and ill-health prevention. The WHO (2020) reports that health and well-being at work generally correspond with workers' productivity, job satisfaction, and work motivation, ultimately fostering socioeconomic and sustainable development throughout the world. In 2015, the UN General Assembly also formulated 17 Sustainable Development Goals (SDGs) to address global social and economic challenges (UN, 2015). These goals highlight the interrelated environmental, social, and economic dimensions of sustainable development. In this context, human and business sustainability accentuates that decent working conditions and economic growth (SDG 8) are important elements of workers' health and well-being (SDG 3) (Kuzmina et al., 2021; Mariappanadar and Hochwarter, 2022).

Akther et al. (2022) identified safety issues as one of five core streams in the Human Resource (HR) management literature in their systematic literature review. Employee safety, health, and well-being are of significant research interest, which has led to the intensive development of this branch of management and business literature over the last decades. Private companies' motivation to improve OSH should derive from humanitarian, legal, economic, and sustainable objectives, including other types of commercial activity (Brauer, 2006; Reese, 2017; Lee, 2018). Workplace safety is a legal and moral expectation and requirement for every company to maintain its license to operate (Corcoran and Shackman, 2007; Lo et al., 2014; Fan et al., 2022). In times of increasing crises (whether medical, political, or financial), every organisation should systematically monitor the overall business environment and forecast the potential losses (Polinkevych et al., 2021) due to workers' risky behaviour at work (De Merich et al., 2020).

Under circumstances of protracted crises (such as the pandemic that started in 2020 and the war that began in Ukraine in 2022), business sustainability has become a considerable issue for the private sector, especially small businesses, from social, economic, environmental, and political perspectives (US-OSHA, 2016). Sustainability permits small business entrepreneurs' endeavours to survive despite crises and continue through future generations (Adam et al., 2022). Thus, the development of OSH management has become a competitive advantage for companies' sustainable growth

(Nordlöf et al., 2017). This doctoral thesis is positioned as part of the HR management literature as a response to Hasle et al.'s (2021) call for more studies on the integration of OSH management into organisational management.

This thesis focuses on Estonian small and medium manufacturing enterprises (SMEs) (see Terms). These companies are the foundation of the EU's and Estonia's non-financial business economies and are seen as engines of employment, economic growth, social integration, and innovation (SBA Fact Sheet, 2019; Landstad et al., 2022). In 2019, SMEs represented 99.8% of all non-financial companies in the EU-28, representing 21 million business units. They are responsible for around two-thirds (65%) of the total EU employment and generate 53% of the total gross value added (Gama and Geraldes, 2012; Annual report on European SMEs, 2021). In Estonia, SMEs have even greater prevalence and value in the national economy; they employ 79.2% of the workforce and account for 76.7% of the total value added (SBA Fact Sheet, 2019). Micheli et al. (2018) reviewed publications and confirmed that SMEs tend to have poorer management of working conditions in comparison to larger enterprises (LEs) with 250 or more employees: this is evident in the higher frequency of accidents with more severe consequences in SMEs.

Other characteristics of SMEs include their heterogeneous nature, lack of connective representation, geographical dispersion, and relatively short organisational lives (Dawson et al., 1988; Storey, 1994; Lamm, 1999; Eakin et al., 2000; Walters, 2001; Micheli and Cagno, 2008). Additionally, in contrast to LEs, relatively poor OSH management and outcomes could be characterised as typical features of SMEs. Workers' safety and health are not priorities for SMEs as they tend to focus more on their economic performance and ignore fundamental safety issues such as OSH legislation requirements and risk evaluation and control (Barbosa et al., 2019).

A comprehensive management literature review (Chapter 1) was undertaken, focused on OSH management and performance in the organisational context of manufacturing SMEs, to determine the current research situation. This detailed review allowed the author to identify interrelated research gaps (**RG**s) and the research problem (**RP**), which were used to develop this thesis. Many scientific publications highlight the importance of management's commitment to safety, effective safety leadership, and employees' active participation in safety-related activities (Ollé-Espluga et al., 2015; 2019; Subramaniam et al., 2016; Ghahramani, 2016a; Rostykus et al., 2016; Järvis et al., 2017; Bayram, 2019; Tappura and Nenonen, 2019; Wang et al., 2021). However, this knowledge must be translated into useful frameworks and practical interventions to improve the safety level of SMEs.

There are relatively many frameworks, models, and international standards that apply to the development of systematic safety management in organisations (HSE, 1997; ILO, 2001; ISO 45001). However, these are rather general and theoretical, often costly, and very complex for SMEs to implement (Santos et al., 2013; Masi and Cagno, 2015; Walters and Wadsworth, 2016; Tremblay and Badri, 2018). The standards fail to offer practical guidance or organisational measures to support SMEs' key persons - employers (EMPs), working environment representatives (WERs), and working environment specialists (WESs) in OSH management (Arocena and Núñez, 2010; Legg et al., 2015; Hagqvist et al., 2020). Thus, there is a knowledge gap between the existing frameworks and the SMEs' needs to develop organisational performance management (PM) given their limited financial and human resources (**RG1**).

Safety issues are increasingly linked to companies' productivity, sustainability, and reputations (Fernández-Muñiz et al., 2009; Hasle and Zwetsloot, 2011, Fan et al., 2014;

Tappura and Nenonen, 2019). Although good safety performance positively affects both economic and organisational performance (Levine and Toffel, 2010; Veltri et al., 2013; Tompa et al., 2016), many organisations continue to separate OSH management from their business models (Shevchenko et al., 2018; Hasle et al., 2019b) and do not include OSH performance in organisational PM (Hasle et al., 2021; Johanson et al., 2022). Research into the possibility of integrating OSH management into PM has emerged in the last few years in the OSH management literature (Balfe et al., 2017; Kontogiannis et al., 2017; Yao and Johanson, 2022), arguing the importance of OSH and its integration with organisational management, but broad understanding remains scarce and based mainly on ethical requirements and benefits arguments (Hasle et al., 2021). Thus, there is a general lack of empirical studies and practical examples of how to incorporate the key elements of the OSH management system into a sustainable PM in the safety management literature (**RG2**).

Given this context, this thesis seeks to fill the gaps between several interconnected theoretical areas (such as OSH management and OSH performance) in the context of organisational PM, as shown in Figure 1, and particularly focuses on the roles of key persons (EMPs, WERs, and WESs) in the context of managerial commitment to safety and employee representation.

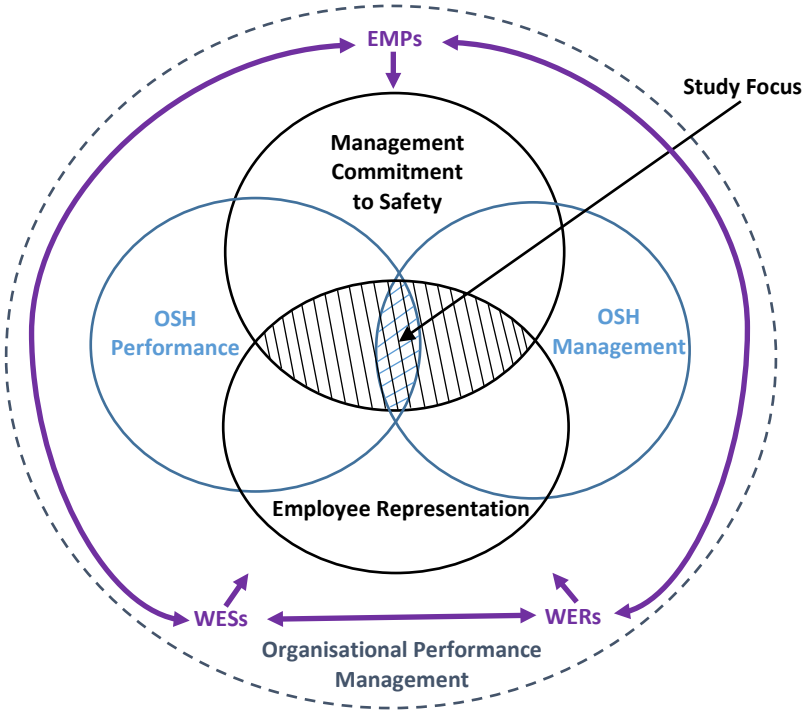

Figure 1. *The study focus.*
Source: Composed by the author.

The **research problem** lies in the relatively limited resources and structural features of SMEs, despite their predominance as an organisational type, resulting in greater risk exposure (Masi and Cagno, 2015; Stephen et al., 2015; Vinberg, 2020; Landstad et al.,

2022). Many authors have shown that people working at SMEs are more susceptible to workplace hazards and experience more serious occupational injuries and ill health than those working at LEs (Morse et al., 2004; Walters, 2006; Hasle and Limborg, 2006; Targoutzidis et al., 2014; Micheli et al., 2018). SMEs have no internal knowledge related to OSH, and due to a lack of staff, they do not delve into safety issues and regulations (Micheli and Cagno, 2010; Cagno et al., 2011; Hasle and Refslund, 2018). Given the identified knowledge gaps in the literature (**RG1** and **RG2**) and SMEs' organisational factors, there is a need to discover how SMEs' key persons can develop organisational PM in cooperation by incorporating key elements of a safety management system (see Terms) into organisational PM for better safety performance (**RP**).

The central aim and contribution of this thesis is, therefore, to provide a **Conceptual framework for the integration of key elements of a safety management system into organisational performance management** as a tool to improve different organisations' safety performance, especially that of SMEs. By focusing on the research aim, the author identified the main research question (**MRQ**): How can senior management, in cooperation with employee representatives and safety professionals, integrate key elements of a safety management system into organisational performance management? Because the author is examining a complex phenomenon, the MRQ was divided into more specific objectives that are defined as a group of research questions (**RQ**s) to make the study process more manageable and understandable. The following research questions were developed:

RQ1: How can employee representatives' core activities contribute to the development of occupational safety and health management?

RQ2: How can management commitment affect the improvement of safety performance?

RQ3: How can safety professionals influence managers and employee representatives for effective cooperation in occupational safety and health management?

RQ4: Which safety elements support cooperation between employers, employee representatives, and safety managers?

This doctoral thesis is based on four publications (see the List of Publications). All four publications related to the MRQ are interlinked and provide information to answer the research questions and achieve the research goal. The relationship between the research aim, the research questions, and the publications (Articles I–IV) is shown in Figure 2.

The literature review revealed the lack of in-depth research on the topic of this thesis, affirming the need to apply an exploratory **survey research strategy** and use a research design that combined several qualitative and quantitative research methods (qualitative interviews and quantitative questionnaires) – a **sequential mixed-method approach** to address the set of research questions (Runnalls and Cowley, 2004; Ma, 2012; Pluye and Hong, 2014; Antwi and Hamza, 2015; Molina-Azorin, 2016). This method helps to discover new insights that reveal the nature of the study phenomenon and, ultimately, measure its prevalence (Creswell, 2013; Creswell and Creswell, 2017; Creswell and Plano Clark, 2018). To investigate the complex phenomenon of OSH management, pragmatism was chosen as the main research paradigm (Pappas, 2017) and a methodology was developed according to this paradigm (Denscombe, 2008).

In the exploratory sequential mixed-methods study design, qualitative data were first collected and analysed and the resulting topics were used to develop quantitative research to further investigate the research problem (Onwuegbuzie et al., 2010; Creswell and Plano Clark, 2018; Tashakkori et al., 2020). The qualitative research was conducted

as semi-structured face-to-face interviews to explicate the roles of key persons in OSH matters and examine the prospects for improving SMEs' safety performance and interviews were conducted in Estonian manufacturing enterprises of different sizes. The qualitative findings were then adapted for further quantitative study with the same companies in the form of a modified MISHA questionnaire (Kuusisto, 2000; Paas, 2015c) and statistical data analysis.

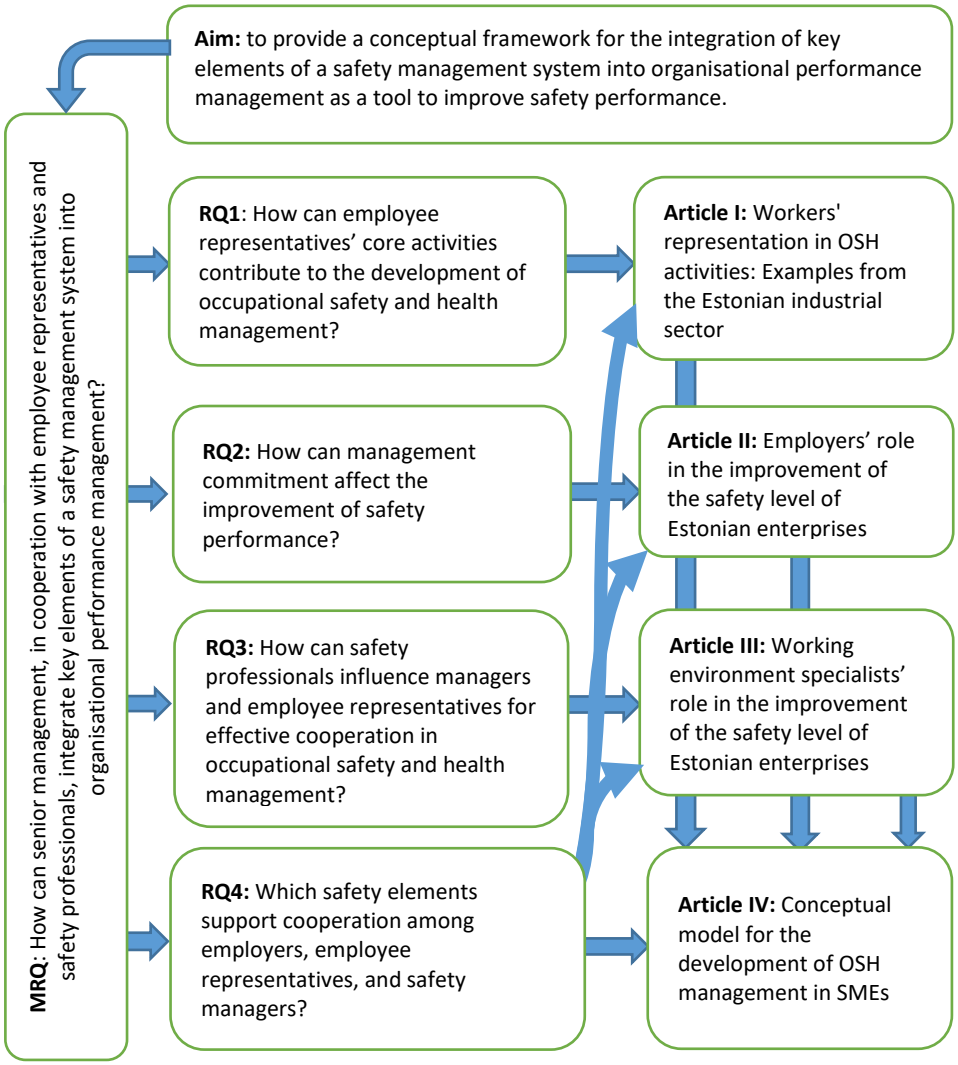

Figure 2. *Relationships between the research aim, the research questions, and the publications (Articles I–IV).*
Source: Composed by the author.

Article I examines the potential for improving safety performance by prioritising WERs' roles and core activities in the working environment (RQ1). This study showed that WERs often have formal positions and low hierarchical status in SMEs. Company management has limited knowledge of WERs' roles and the benefits of their activities.

Performing WER work is effectively limited by contradictory expectations from employers and co-workers. Therefore, it is crucial to prevent dangerous situations or even accidents by increasing WERs' knowledge of OSH.

Article II discusses the employer's role and influence on OSH management as well as the possibility of increasing employers' interest in improving their OSH knowledge and, consequently, the level of safety of their organisations (RQ2). Research has shown that senior management plays a critical role in improving safety performance. The implementation of an OSH management system powerfully affects the improvement of OSH performance. SME manager–owners' safety awareness is extremely important.

Article III analyses the role that safety professionals play in maintaining a safety management system (RQ3). A systematic approach to OSH management is essential to enhance an organisation's safety performance, and the WES is primarily responsible for implementing it. The main opportunities to influence the level of OSH in the company are through safety professionals (WESs) as they are more skilled in the field and supported by OSH legislation.

Article IV identifies key elements of safety to increase organisations' safety level through close collaboration between EMPs, WESs, and WERs (RQ4). This article analyses OSH management and practices in manufacturing enterprises to find the drivers and barriers that management (EMPs and WESs) and workers' representatives (WERs) encounter when managing OSH. In organisations where management does not prioritise safety, employees follow the EMP's example and also fail to comply with safety policy. WERs that are only formally elected are of no practical importance for OSH management, and frequently other workers or colleagues are not informed about the rights and possibilities of that position. For EMPs and WESs, the importance of WERs who are aware of the problems in the work environment becomes apparent only after an injury has occurred or an employee becomes seriously ill with an occupational disease.

The author conducted these studies from 2015–2022 with 15 Estonian enterprises in different manufacturing fields, with participants in 36 interviews and 37 questionnaires. The research was performed in three steps. During the first stage, qualitative research was conducted, which included a review of the literature and semi-structured interviews with WERs, WESs, and EMPs. In the second stage, quantitative research was conducted via questionnaire surveys (the questionnaire was first piloted and then corrected before the main study) with the same target groups and a statistical analysis of the data collected via computational techniques. The third stage included the elaboration of results and construction of the conceptual framework for the integration of safety elements into organisational PM.

This thesis makes the following **scientific and theoretical contributions**: First, it presents a research-based conceptual framework for incorporating safety elements into organisational PM, which helps organisations, especially SMEs, manage OSH cost-effectively and easily by using key elements of safety that influence the improvement of safety performance (to fulfil RG1 and RG2).

Second, it expands safety leadership theory (SLT) by investigating the theoretical perspectives on the multilevel manifestation of leadership in organisations and revealing the relationship dynamics (safety behaviour, management commitment, and safety participation) between key actors in OSH management, such as safety leaders at different organisational levels, through various impacts including motivational inspiration, influence, goal-setting, and performance monitoring.

Third, it adopts social exchange theory (SET) in the context of OSH management by illuminating regular and informal processes of social exchange among all stakeholders (such as managers and employee representatives), the study shows that reciprocity and management commitment to shared safety goals can promote multilevel cooperation and interpersonal relationships. It extends SET by showing that organisational support, effective communication channels, and a positive social climate in work environment are essential components of the social exchange mechanism, where positive psychosocial exchanges can enhance safety and organisational performance, while negative ones can damage safety outcomes.

The thesis makes the following **practical and empirical contributions**: First, it makes a practical contribution to achieving SDGs 3 and 8 and developing OSH management in the EU by supporting an OSH framework that considers SMEs' particular needs, which are foundational to the EU economic model. A conceptual framework was proposed to highlight the key elements of OSH management that directly help stakeholders improve SMEs' safety and health performance through organisational performance measures.

Second, it adds new practical knowledge to the HR literature regarding the roles of key personnel in OSH management by discussing their beliefs, attitudes, behavioural patterns, influencing tactics, decision-making, and impact on safety performance. It assesses their contributions to OSH performance and provides information on effective stakeholder collaboration.

Third, it provides new empirical information about OSH management from a broad (multilevel) perspective that features key persons and shows OSH management as a part of general management that emphasises stakeholders' safety leadership and stresses their influence on OSH performance and organisational performance. This knowledge can be used to develop competencies in vocational and managerial education.

Fourth, it demonstrates a multilevel, nested form of OSH management with active participation from all stakeholders, which differs from traditional single-level research in adopting a more dynamic approach that determines a strategy for the development of OSH management at all levels.

This thesis consists of a cover paper and four published articles. The cover paper includes an introduction, three main chapters, and a conclusion. Chapter 1 reviews the theoretical framework of the study and the current literature on this topic. Chapter 2 represents the materials and methodology of the study. Chapter 3 focuses on the analysis of the study results and contains a discussion based on Chapter 1. In the conclusion (Chapter 4), alongside this study's theoretical and empirical contributions, practical implications, recommendations, and suggestions are provided for further research, and the study's limitations are discussed. Finally, a list of references, abstracts, and appendices (including Articles I–IV) is presented.

1 Theoretical framework and literature review

The main goal of every scientific study is to build up a cumulative framework of knowledge and theory (Gall et al., 2010; Turner et al., 2014). For this cumulative framework of knowledge and theory to gain a foothold in a discipline's knowledge base, it must first be tested through systematic empirical verification (Jaccard and Jacoby, 2010). Jaccard and Jacoby also noted that to pass this rigorous systematic empirical testing, research efforts needed to address both the conceptual and the empirical realms. The theoretical position on which the research model is based resides in the conceptual realm. In this study, the theory is defined as "a conceptual framework that identifies the connections, or lack of connections, between concepts/constructs to describe a phenomenon that furthers the academic knowledge base and supports researchers and practitioners in the field in which the phenomenon takes place" (Turner et al., 2018, p. 38). The theory provides the structure and basis for the hypotheses that are tested during theory validation (Turner et al., 2019).

The following chapter addresses the theoretical foundations and conceptual rationale of this thesis. A comprehensive review of the existing safety and management literature, focusing on OSH management, its key persons, and related theories, was adopted to discover where this study fits within the organisational context of SMEs. A detailed literature review process (presented in Figure 3) was realised.

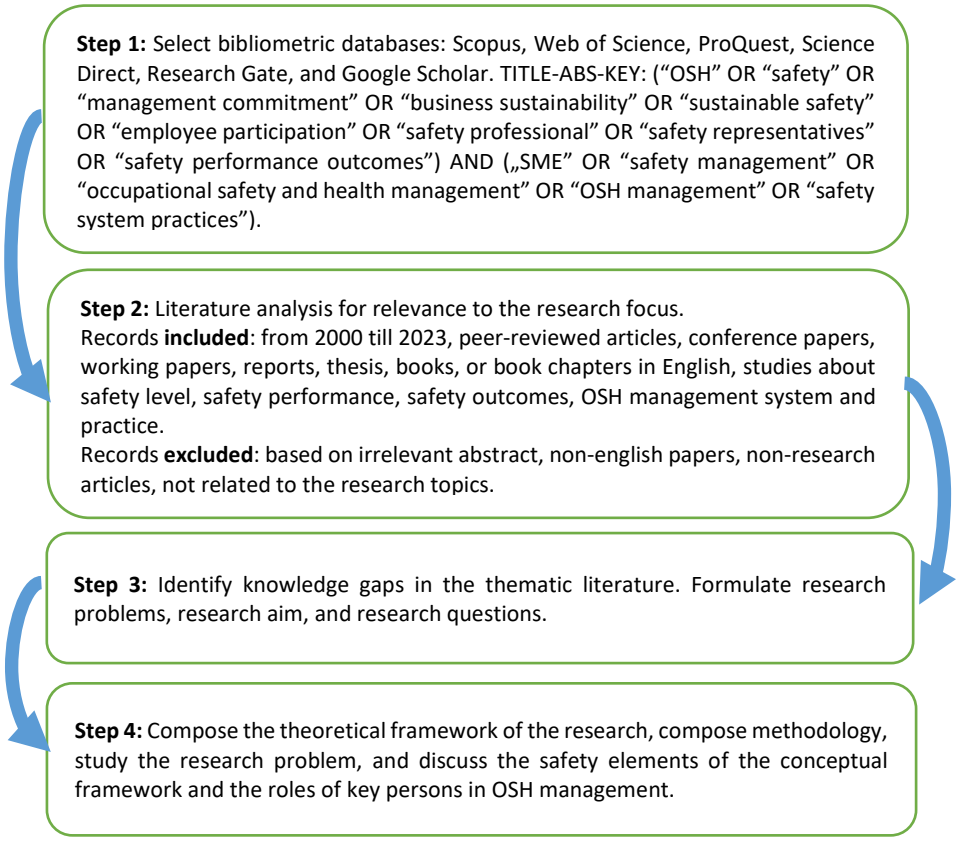

Figure 3. *Detailed literature review during the research process.*
Source: Composed by the author.

From this detailed literature review, the author identified relevant research knowledge gaps (RGs), which were adopted as the basis for developing the current thesis. To create the initial set of records, a computer-based literature search of bibliometric databases and resources was conducted in Scopus, Web of Science, ProQuest, Science Direct, Research Gate, and Google Scholar. To explore useful findings and minimise bias, it focused on peer-reviewed journal articles, conference papers, working papers, reports, thesis, books, or book chapters published between 2000 and 2023. To focus the search results, keyword observation was limited to the publications' titles and abstracts, and the abstracts were analysed for relevance to the research focus. The search strategy combined sets of keywords using AND/OR commands. After excluding irrelevant articles, the final set consisted of 168 peer-reviewed papers and other references (such as OSH standards, legislation, etc.) and was used to create the synopsis of the theoretical foundations and body of OSH management, its key actors, knowledge gaps, and research problems that is presented in this chapter.

1.1 Theoretical foundations

The theoretical foundations for this thesis are two scientific theories: safety leadership theory (SLT) and social exchange theory (SET). Although more research on OSH management has been conducted in recent years, there is still insufficient knowledge about how OSH management and safety leadership can affect employee productivity and organisational sustainability (Saleem and Malik, 2022). The author used both SLT (Bass, 1985) and SET (Blau, 1968) to explain how the management commitment to safety, the influence of leadership, employees' work attitudes towards safety, and workplace behaviour can affect safety performance and outcomes (Hofmann et al., 2003; Michael et al., 2006; Ahmad et al., 2023). Safety leadership is a key driver in inspiring employees to participate in safety measures and comply to improve safety performance (Kapp, 2012). Additionally, safety leadership may affect organisational performance through employee motivation and commitment, workload regulation, and the costs associated with accidents or ill health (Sievänen et al., 2013; Clarke, 2013; Tappura and Nenonen, 2019). Conversely, limited leadership skills among key people in an enterprise can hinder organisational performance and safety outcomes (Tappura and Hämäläinen, 2012).

As this study considers the key actors in safety management (EMPs, WERs, and WESs) safety leaders at different organisational levels with different responsibilities, the research on safety management was conducted through the lens of SLT (Bass, 1985). SLT postulates that leaders can affect safety directly and indirectly (Rahlin et al., 2022). Directly, leaders act as role models for followers by engaging in safety-related behaviours and encouraging them to enact safe behaviours by watching and praising them. Indirectly, safety leadership creates norms about safety practices and procedures, generating a specific safety climate in the organisational culture. Many scholars have concluded that there are two widely used styles or theories of leadership in safety management: transactional leadership and transformational leadership (Muchiri et al., 2019; Gracia et al., 2019; Xue et al., 2020; Cheung et al., 2021; Rahlin et al., 2022). At the same time, safety researchers predominantly agree that effective safety management requires a combination of transformational leadership approaches and transactional leadership approaches (Clarke, 2013; Tappura and Nenonen, 2019).

Transformational leadership includes a complex array of behaviours to inspire motivation, promote loyalty, exert idealised influence, ensure personal contact, and stimulate personal growth (Bass and Riggio, 2006; Kapp, 2012). Leaders serve as role

models, inspire goal achievement, take an active interest in co-workers' work matters, and encourage them to overcome obstacles that impede their goals (Tappura and Nenonen, 2019). Transactional leadership includes goal-setting by the leader, active performance monitoring against those goals, and punishing or rewarding employee performance (Cheung et al., 2021). Both transformational and transactional leadership approaches are associated with effective leadership, and authentic leaders (Cavazotte et al., 2021) demonstrate both (Tappura and Nenonen, 2019).

The literature review identified safety leadership's crucial role in safety management (Tappura and Nenonen, 2019; Rahlin et al., 2022; Sari et al., 2022), and some publications showed that the relationship between OSH performance and safety leadership is significant (Martínez-Córcoles and Stephanou, 2017; Gracia et al., 2019). A growing body of research confirms safety leadership's positive influence on safety performance in industries such as non-profit organisations (Aga, 2016), manufacturing (Oah et al., 2018), and railroad construction (Stiles et al., 2018). Oah et al. (2018) also showed that supportive leadership fosters good leader–member relationships and increases employees' commitment to safety. Likewise, Bahkia et al. (2020) found that leadership type has a considerable impact on employee commitment. Fernández-Muniz et al. (2017) stated that clear safety leadership and a visible safety commitment from senior management were conditions for improving safe employee behaviour and safety performance.

SET, grounded in work by Homans (1958), Thibaut and Kelly (1959), and Blau (1968), is another theory applied in this thesis. SET theory hypothesises that in any social cooperation where one group or person acts in a way that benefits another group or person, a mutual expectation arises that obliges the other group or person to reciprocate later by acting to benefit the first group or person (Uhl-Bien and Maslyn, 2003; Cropanzano and Mitchell, 2005; Törner, 2011; Alfes et al., 2013). The opposite is also true: if negative treatment occurs, poor counter-treatment or unsatisfactory behaviour will be returned. Unlike the acquisition of material benefits through economic exchange, the provision of benefits through social exchange is voluntary (Aryee et al., 2002). In other words, this theory describes relationships as outcome-oriented social behaviours based on reciprocity (Gouldner, 1960).

The applicability of SET and the norm of reciprocity in surveys of organisations has been confirmed by previous studies (Huang et al., 2016; Saleem and Malik, 2022). The perception of organisational support and investment in the working environment creates employee commitment through favourable attitudes towards the organisation (DeJoy et al., 2004). That is, workers respond according to how they feel they are treated in their organisations (Mearns et al., 2010). Dejoy et al. (2010) found support for the application of SET in the context of a safety climate, such as managerial commitment to safety as part of social exchange dynamics, as employees responded more positively when they perceived a higher level of organisational support for OSH. As SET suggests, an employee's possible response can build trust between stakeholders through active, direct participating or indirect participation through representatives in the development of OSH management (Shea et al., 2016). Similar results show that the social exchanges that occur between management and workers contribute to the strengthening of organisations' safety culture (Saleem et al., 2021).

The broader literature on social exchange confirms that employees' perceptions of how an organisation values their contributions to performance and its concern about their welfare are closely related to withdrawal behaviour (Rhoades and Eisenberger,

2002). Kath et al. (2010) showed that, as predicted by SET, when positive exchange relationships were disrupted by negative perceptions of management commitment to safety, employees tended to 'pay back' the organisation by intending to leave. Morrow and Crum (1998) found that perceived risk control and a good safety climate were positively associated with the intention to stay with an organisation. Waldman et al. (2020) noted that socially responsible behaviour, such as safe behaviour cannot be sufficiently implemented without the influence of leaders at different organisational levels, including top managers, middle and line managers, safety managers, foremen or safety representatives, etc. A socially responsible manager who demonstrates concern for their subordinates (as stakeholders) (Siegel, 2014) and thereby acts as a role model for OSH management will ensure the development and maintenance of effective OSH policy and procedures, providing the necessary knowledge, skills, and abilities and resulting in the creation of a safer work environment and sustainable operational performance (Cavazotte et al., 2021; Saleem et al., 2022).

According to the logic of reciprocity in operations (Huang et al., 2016), when employees receive something of value from their managers, they can be assumed to try to return it through hard work and following the methods required to achieve performance goals. Employees who receive training from responsible managers tend to be supportive and endeavour to keep the workplace safe, thereby improving social exchange (Saleem and Malik, 2022). From the SET perspective, the social climate of the work environment is very important in connection with organisational performance. Saleem et al. (2022) showed that social support from managers helps employees solve their problems. Management support as a social exchange mechanism (through open and direct communication between the managers and the employees) helps workers regulate their workloads and prevent the accumulation of work. In addition, the confidence gained by communicating and discussing issues allows employees to regulate the flow of work, which reduces disorganisation. If a disorder is minimised or eliminated, organisational functions run more smoothly and employee productivity improves.

Such informal and regular processes of social exchange among all stakeholders should foster interpersonal, multilevel relationships based on reciprocity and commitment to goals (O'Kane et al., 2022). SET can offer a valuable theoretical lens through which to examine the roles of key personnel (EMPs, WERs, and WESs) in OSH management. Thus, SET can help organisations understand how to integrate key elements of safety into organisational PM to improve organisational performance and outcomes.

1.2 Safety and health at work as necessary parts of business sustainability

Sustainability or the sustainable development process in business activities and modern society presents a real challenge from the economic, social, and environmental perspectives (UN, 2015) because purely profit-oriented production leads to unequal distribution and the intensive use of resources, as well as their overexploitation (Lee, 2018; Małysa and Gajdzik, 2021). Sustainability can be manifested in many processes, areas, and approaches (Gajdzik et al., 2020). One such process is OSH management, which intends to eliminate accidents by integrating human, material, and financial resources (Małysa and Gajdzik, 2021). Poor OSH management in SMEs in some regions of the world is widely acknowledged by the academic community, but only a few

attempts to propose new models for OSH evaluation and management have arisen (Cagno et al., 2014; Farina et al., 2015; Bianchini et al., 2017; Zocca et al., 2018; De Merich et al., 2020). Cunningham et al. (2015) indicate that scientific knowledge of OSH in SMEs is in its infancy. They also examine how SMEs' features, such as the number of workers, industry, the lifetime of the business, company structure, management skills, and organisational culture, can make conducting research and developing policies and practices to help design a better SME work environment challenging.

OSH is not a priority for SMEs as they tend to focus more on their economic performance and neglect safety and health issues (Legg et al., 2015; De Merich et al., 2018). In SMEs, especially in small and micro enterprises (those with <50 employees), manager–owners' knowledge and awareness that OSH management brings many advantages is limited (Michael et al., 2005; Klimecka-Tatar and Niciejewska, 2016). The key factors affecting OSH management in SMEs that were identified include poor managerial and training skills, a lack of financial resources and management support, the regulatory compliance burden, poor relationships with regulators, the high cost of hiring OSH consultants, dependence on LEs, and difficulty implementing and understanding good OSH practices (Masi and Cagno, 2015; Stephen et al., 2015; Tappura et al., 2017; Tremblay and Badri, 2018). Other aspects contribute to dissimilarities in OSH management between SMEs and LEs have also been identified, such as a weaker top management commitment to safety (Cagno et al., 2011; Park et al., 2013; Bonafede et al., 2016), especially when owner–managers also act as safety managers (Barbeau et al., 2004; Hasle and Limborg, 2006; Wang et al., 2018); insufficient attention given to evaluating risks, conducting safety audits, and monitoring the workplaces (Reinhold et al., 2015); and a trend towards the adoption of non-systematic OSHMSs and informal HR practices among SME owners (Sørensen et al., 2007; Hasle et al., 2009; Arocena and Núñez, 2010).

There is no common understanding of OSH management, conceptually or practically (Gallagher et al., 2001; Robson et al., 2007). However, the core elements of OSH management are internationally agreed upon (Hale, 2003; Robson et al., 2007; Vinodkumar and Bhasi, 2011). Various standards and guidelines describe the key features of systematic OSH management (HSE, 1997; ILO, 2001; Robson et al., 2007). OSH management in the EU was established by the Framework Directive 89/391/EEC (1989). However, the significant differences between mandatory OSH management and privately disseminated, voluntary OSHMS must be considered (Frick et al., 2000; Schreyer et al., 2021). OSH management and OSHMSs are not explicitly characterised and are often used interchangeably (Robson et al., 2007; Ramli et al., 2011). Nielsen (2000) observed that OSHMSs are not an articulated set of management systems if they lack clear boundaries between safety activities, OSH management, and safety management systems.

Mandatory OSH management requires employers to secure employees' health and safety under various terms and conditions in the work environment per legislation, but these requirements vary significantly from country to country. Workplace risk control, a fundamental part of OSH management, includes evaluating risks and their potential impacts, realising preventive measures, and implementing safety policies to reduce occupational accidents and illnesses (Dunn, 2012; Niciejewska and Kiriliuk, 2020). In addition to mandatory OSH management, many voluntary initiatives are launched by institutions in the private and public sectors (Hudson, 2000; Wokutch and VanSandt, 2000; Dupont, 2003). Voluntary OSHMSs specify that companies comply with legal requirements (i.e. regulations on noise, chemicals, air pollution, machine safety, etc.) and

specific corporate, national, or international standards, such as ISO 45001 (Li and Guldenmund, 2018).

The use of systematic forms of OSH management has increased in recent decades (Uhrenholdt Madsen et al., 2019). Many definitions of OSHMS exist (HSE, 1997; ILO, 2001; Robson et al., 2007; Ramli et al., 2011). This study applies the following definition of OSHMSs (according to Frick and Kempa, 2011; Frick, 2011; Baryshnikova et al., 2021) as a combination of planning and systematic strategy to handling OSH risks that are integrated to improve OSH performance, led by executive management, and supported by the appropriate organisational structure. Management defines the policy on which this management system is based and allocates resources for its operation (Gunduz and Laitinen, 2017).

Furthermore, aspects such as safety training, internal communication, prevention, emergency planning, monitoring, and the analysis of the activities, financial resources, and the number of staff involved in OSH activities affect safety performance in organisations (Bluff, 2003; Gallagher, 2000; Fernández-Muñiz et al., 2012b). OSHMSs differ from traditional OSH programs by being more proactive, better integrated into the organisational process, and appropriately incorporated into organisations' assessment and continual improvement (Robson et al., 2007). Institutions that implement OSHMSs have a clear vision of their safety and health goals, communicate these goals to their workforce, evaluate the risk data, define corrective actions, and have better attitudes towards employee training (Bottani et al., 2009).

There is some concern about the application of OSHMSs among SMEs, mainly because what is known about the OSH management strategy has been developed mostly for LEs. OSHMS standards are intended for large, homogeneous companies and do not suit SMEs' heterogeneity (Hale and Hovden, 1998; Micheli et al., 2019). When considering the implementation of systematic OSH management in small organisations, it is essential to emphasize that small firms are not miniature versions of larger ones (Walters, 2001). According to Zwetsloot et al. (2000; 2020), formal management systems based on guidelines and standards are unattractive for smaller businesses, which tend to be more informal and flexible. Thus, OSHMSs can be considered too bureaucratic and poorly adapted to small institutions' business practices (Santos et al., 2013).

In summary, while many models and standards exist to manage OSH in organisations, mostly LEs, the majority of them are too complicated and costly for SMEs. They do not help practically nor do they offer organisational measures to support SMEs' key persons in OSH management towards business continuity and sustainability. Thus, there is a knowledge gap between the existing frameworks and those that SMEs need to develop sustainable OSH management that incorporates their limited financial and human resources (RG1). There is a need to discover how SMEs' key persons can develop OSH management that uses key elements of a safety management system without external consultants, difficult implementation, and high-priced certification.

1.3 The need to integrate safety elements into performance management

OSH issues are becoming, in light of the SDGs, increasingly associated with productivity, sustainability, and a positive company image (Fernández-Muñiz et al., 2009; Hasle and Zwetsloot, 2011; Fan et al., 2014; Tappura and Nenonen, 2019). Many researchers have noted that good safety performance positively affects both economic and organisational

performance (Levine and Toffel, 2010; Veltri et al., 2013; Tompa et al., 2016), but many companies continue to decouple OSH management from their general performance management systems (Shevchenko et al., 2018; Hasle et al., 2019b), failing to integrate OSH management into organisational PM (Hasle et al., 2021; Johanson et al., 2022). Johanson et al. (2019) also suggested that OSH management could be significantly improved if its key elements were incorporated into performance management systems.

Performance management (PM) is defined in this thesis as the systematic process for achieving organisational objectives through ongoing communication and feedback between management and subordinates (Johanson et al., 2022). The term 'performance' itself indicates a direct connection with goals and objectives, as well as the results of activities or operations. An efficient organisational PM is usually based on interactive communication between the involved employees and other stakeholders (Ferreira and Otley, 2009; Johanson et al., 2022). The literature reports different organisational PM models, but most researchers (DeNisi and Murphy, 2017; Schleicher et al., 2018; 2019; Brown et al., 2019) agree that an effective PM system is based on the Deming/Shewhart cycle (Plan-Do-Study-Act or PDSA) and includes the following phases (Figure 4): PM policy making; PM planning, which determines what is included in effective performance (Plan); PM implementation (Do); PM evaluation (Study); PM improvement (Act) (Deming, 1993).

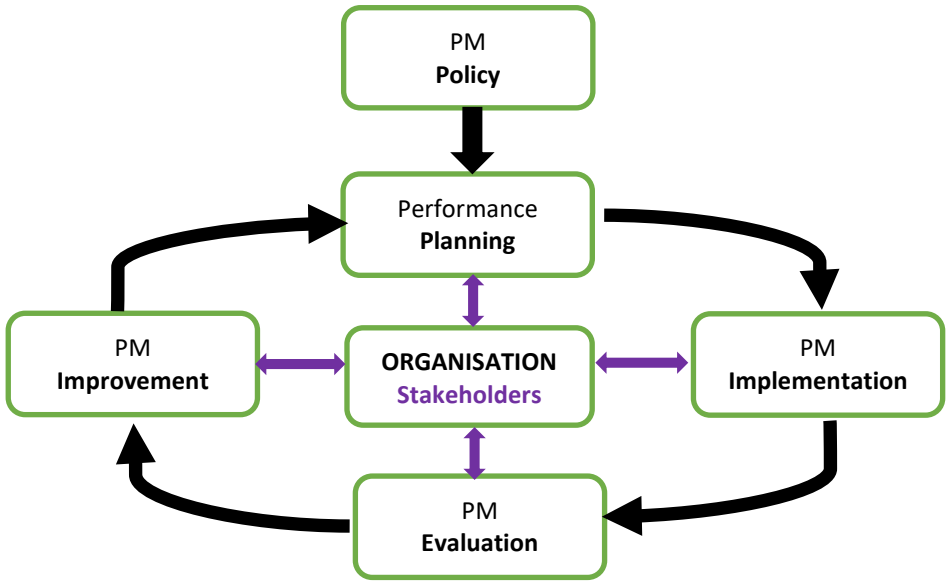

Figure 4. *Framework of organisational performance management (PM).*
Source: Composed by the author based on Deming (1993).

The impact of OSHMSs on companies' factual safety performance has been the subject of some scientific discussion (Hasle and Zwetsloot, 2011), and studies have shown their positive impact on OSH performance and injury rates (Mearns et al., 2003; Lo et al., 2014; Heras-Saizarbitoria et al., 2018; Lafuente and Abad, 2018). OSH management focuses on managing the same people in the same manufacturing or working environments as organisational PM (Pagell et al., 2015; 2020). While OSH management activities are mainly related to top management representatives (such as general managers, operations

managers, line managers, safety managers, etc.), other people (such as workers' representatives or trade union representatives) may also affect OSH management and overall PM (Tappura, 2017). However, the effectiveness of OSH management depends on the commitment of people at all organisational levels, especially senior management's promises and support, as well as workers' involvement in safety processes (Fernández-Muñiz et al., 2012a; Lawani et al., 2017). In general, both the active role of safety managers and the involvement of employees are linked to OSH performance and organisational performance (Hale et al., 2010; Vinodkumar and Bhasi, 2011; Yorio and Wachter, 2014; Trucco et al., 2020).

As described in subsection 1.2, safety management is generally considered an essential component of business continuity and sustainability, as is organisational management (Hasle et al., 2019b; Neri et al., 2022), although they have different focuses and priorities (Hasle et al., 2021). Organisational management traditionally focuses on improving organisational outcomes related to profitability, quality, delivery, and resilience (Tan et al., 2007), although some studies have demonstrated its positive impact on OSH outcomes (Pagell et al., 2014; Veltri et al., 2013) and there is growing interest in this effect (Hamja et al., 2019; Mousavi et al., 2020). Safety management focuses on the improvement of safety outcomes (Teufer et al., 2019; Wang and Rosenman, 2018), and safety is not usually considered an organisational priority (Neri et al., 2022). As safety measures are associated with some decline in productivity (Cagno et al., 2018), some researchers have promoted their implementation by emphasising OSH management benefits from ethical, economic, and production perspectives (Grimani et al., 2018; Steel et al., 2018).

In summary, the relationship between ensuring OSH and operational performance is often described in contradictory terms, which creates tension in research and practice. Some studies suggest that this tension can be resolved by applying a performance management system in which safety and operational objectives complement each other. Recently, literature has begun to emerge on the possibility of integrating OSH management with general PM from a sustainability perspective (Balfe et al., 2017; Kontogiannis et al., 2017; Yao and Johanson, 2022); however, these studies appear rather scarce and report inconsistent results (Teufer et al., 2019; Johanson et al., 2022), resulting in few clear recommendations for the key people responsible for implementing safety activities (Provan et al., 2018; Callari et al., 2019; Grill and Nielsen, 2019; Sharma and Mishra, 2021). Thus, the safety management literature generally lacks empirical studies and practical examples of concepts for incorporating the key elements of OSH management systems into organisational PM (RG2). There is a need to discover how SMEs can sufficiently integrate key elements of safety into an organisation's PM through cooperation among key persons.

1.4 The impact of employee representation on OSH management

The role of employee representation in OSH at work is the subject of extensive scientific work (Gallagher et al., 2001; 2003; Saksvik et al., 2003; Walters, 2006; Walters and Nichols, 2007, 2009; Menéndez et al., 2009; Bohle and Quinlan, 2010; Knudsen et al., 2011; Pillay, 2012; Hasle and Seim, 2014; Rasmussen et al., 2014; Haight, 2014; Ollé-Espluga et al., 2015, 2019; Ghahramani, 2016a; Rostykus et al., 2016; Järvis et al., 2017; Bayram, 2019). The workers' right to elect their OSH representatives (safety representatives or WERs) developed in the 20th century in most of Western Europe, during the post-war decades. Since 1989, the Directive (1989) has required provisions for

OSH representatives in all EU countries, and this requirement has been extended to countries that previously lacked such representatives (Walters and Nichols, 2009).

Currently, many forms of employee representation in OSH matters exist throughout the world. In the European Union and Estonia, the most common form of representative participation in OSH is estimated to be through WERs. WERs are defined in this thesis as employees who are authorised to represent other workers regarding OSH issues in the workplace. Considering national forms and thresholds of employee representation in OSH, it is estimated that in 2015, WERs were present in 58% of establishments in the EU-28 and about 60% of enterprises in Estonia (EU-OSHA, 2016). These employee thresholds vary throughout Europe. In Estonia, a WER must be elected if ten or more workers are present onsite and a working environment council is mandatory for enterprises with 150 or more employees (OHS Act, 1999). WERs' main function is to guarantee employee participation and voice in efforts to create safe, healthy, and secure working conditions. However, this role may be performed through common worker representation mechanisms, such as trade unions and shop stewards or employees' trustees, or through specialised OSH representative bodies, such as an OSH committee or working environment council – a joint representative body with WERs and management representatives (OHS Act, 1999; Menéndez et al., 2009).

Employee representation and cooperation are long-standing traditions in Scandinavian countries, which is also reflected in OSH legislation. This tradition arises from organisational change and development initiatives that concentrate on collective participation, involvement, and dialogue among all organisational parties to achieve positive change (Saksvik et al., 2003). Workers might participate in safety activities directly, individually or in groups, or they might participate through WERs, members of joint OSH committees, or work councils (Walters and Frick, 2000). Employee participation via safety representatives can then occur at different levels: providing information to employees after making decisions; consulting employees before making decisions to potentially influence those decisions through the exchange of views; and delegating certain powers to employees or their representatives.

Under European safety legislation, minimum legal rights are established for effective employee representation, including the election of WERs by workers, paid time for representation, protection against discrimination from the employer, the guarantee of information about existing hazards and risks, the right to inspect the workplace and investigate employee appeals, the right to consultations regarding OSH procedures and to make submissions to the management, the right to accompany labour inspectors in workplace inspections, and, if necessary, the right to make a formal application for labour inspections (Walters and Frick, 2000; Johnstone et al., 2012).

Employee participation is seen as a keystone of systematic OSH management and is included in most OSH management standards and guidelines. ISO 45001 strongly emphasises that organisations must identify the relevant 'needs and expectations of workers' and 'commit to consultation' within their safety policies. Gallagher et al. (2001), Walters (2002), Walters and Nichols (2007), and Knudsen et al. (2011) found that a high level of worker participation in OSH management tends to more effectively improve the working environment. There are various modes and formats of employee participation in OSH management (Walters and Frick, 2000; Bohle and Quinlan, 2010; Hasle and Seim, 2014).

Worker participation is needed because managers either do not know or cannot adequately control all situations in the working environment (Walters and Frick, 2000).

Workers' knowledge is usually exploited as a method of informing and training other employees to play secure and supportive roles in management-driven OSHMSs (Gallagher et al., 2001). WERs' role has also changed over time in some areas, but not in Estonia, where it is continuous and often formal (Järvis et al., 2017) as mandatory employee representation also indicates that representatives' role is not only to protect employees' interests but also to engage in the implementation of labour laws. WERs, as employee-elected representatives, can occupy senior positions as they participate in problem-solving (Walters and Nichols, 2007; Rasmussen et al., 2014).

Employers have various ways to attract employees, including toolbox talks, safety training, joint OSH committees, and day-to-day cooperation (Bohle and Quinlan, 2010; Pillay, 2012; Rostykus et al., 2016). Two principles can be distinguished from these elements: managers need workers' experience, competence, and motivation to detect or reduce hazards, and employees need representation to help increase and realise their interests in OSH (Walters and Frick, 2000). Mullen et al. (2017) indicated that a strong relationship exists between workers' participation in safety activities and reduced injuries at work. However, only some scientific articles in the literature investigate the connection between employee involvement in OSH-related matters and performance (Bayram, 2019; Trucco et al., 2020).

Hasle and Seim's (2014) results also require a deeper examination of the real functioning of OSHMSs and WERs' roles in them, as well as their implications for the working environment. Other authors (Haight, 2014; Ghahramani, 2016a) noted that employees' involvement and participation in OSH management are important for the continuous improvement and reduction of workplace hazards. Järvis et al. (2017) indicated crucial benefits from active WERs, such as accentuating special requirements onsite, getting feedback from employees, being present to observe safety behaviours, and observing what is happening to improve the communication between management and staff. These conditions for employee active participation can more easily be met if there is support both within the workplace and beyond it (Walters and Frick, 2000). This support can be provided by management dedicated to safety, WESs, trade unions, labour inspectors, or safety representative training providers.

In summary, employee representation has a long-standing tradition in European countries and is reflected in EU legislation. Worker representation mechanisms can be implemented either through general representation mechanisms (trade unions) or specialised OSH representative bodies, such as OSH committees. Employee participation is considered the cornerstone of systematic OSH management and is included in most OSH management standards and guidelines. A high level of employee participation in OSH management is generally more effective for improving working conditions.

1.5 Management commitment to safety

Employers perform a critical role in OSH management as they are usually responsible for risk prevention measures (OHS Act, 1999). Many studies have examined organisational aspects and management commitment concerning employees' safety behaviour and representation (O'Toole, 2002; Mearns et al., 2003; Neal and Griffin, 2004; 2006; Hale et al., 2010; Jitwasinkul et al., 2016; Subramaniam et al., 2016; Wang et al., 2021). Furthermore, only a few articles in the recent literature address significant organisational elements, including safety leadership, safety awareness, safety procedures, support from superiors, and autonomy, that influence managerial commitment to safety (Michael et al.,

2005; Conchie et al., 2013; Tappura et al., 2017) and affect OSH representatives' regular safety activities (Walters and Nichols, 2009; Dyreborg, 2011; Hasle et al., 2019a).

Many studies and authors (Gallagher and Underhill, 2012; Walters and Nichols, 2007; Daswir et al., 2018) have identified the managerial commitment to safety as a key prerequisite for effective OSH management and a factor that is influenced by both immediate and broader contexts. Strong institutional pressure can improve safety performance and change employees' thinking and real commitment to OSH issues (Bayram, 2018). Such commitment should be initiated at the top management level and extend to all employees of an organisation (Fernández-Muñiz et al., 2009).

In SMEs, owner–managers play a key role in the decision-making process, so they tend to concentrate on handling production matters. Allocating financial and human resources to areas other than manufacturing is often problematic (Costa et al., 2020). SME management is usually informal because of the lack of formal structures and processes and the low level of employee representation (Walters, 2001). OSH management cannot be separated from other aspects of running SMEs, such as general and operational management (Hasle et al., 2012a). SME owner–managers work overtime and devote time to the most stressful issues, spending less time and energy on non-core tasks, which SME owner–managers often perceive as including OSH management (Legg et al., 2015).

Hasle et al. (2012a) assumed that most owner–managers identify with their businesses. They tend to delegate responsibilities to employees because they want to support a good attitude within their company, which the employees often accept through the social contract. Furthermore, they suggest that owner–managers are usually favourable towards creating a good working environment, but this is a secondary issue with the potential to generate problematic economic and ethical situations. Managers who are more open to improving OSH are more likely to implement accident prevention programs (Park et al., 2013) and believe that improved safety will support employee well-being and output while decreasing expenses for compensation (Brosseau and Li, 2005).

As the most crucial element in any organisation, a person must be appropriately trained by supporting their mind, enhancing their competence, and motivating them to act safely and avoid accidents. The responsibility for these issues rests with the manager, who usually owns the small business. It is also based on the relationships within the organisation as the workers perceive the owner as their mentor and leader (Klimecka-Tatar and Niciejewska, 2016). In recent decades, the legal system of OSH has changed towards more reflective regulation, which is characterised by a higher level of self-regulation. Thus, the responsibility for employees' OSH is transferred more clearly to the managers of enterprises (Windapo et al., 2018).

In the study of certified and non-certified organisations, management commitment and employee involvement were recognised as the most critical aspects of OSHMS (Flin et al., 2000; Rundmo and Hale, 2003; Guldenmund, 2007; Ghahramani, 2016b). Fernández-Muñiz et al. (2012b) postulated that the top management commitment to safety positively affected safety behaviour, employee satisfaction, and business competitiveness. Other frequently studied areas include safety communication, training, and supportive and supervisory environments (Seo et al., 2004; Evans et al., 2007).

The management commitment to safety can be motivated by various influences, although an awareness of the opportunities and consequences of legal action is an important motivator (Tappura et al., 2017). The top management commitment involves more than a safety policy posted on an information board. OSH goals must be rooted in

organisations, with OSH objectives at the top management level and included in all teams' agendas. Managers are responsible for setting and analysing objectives that are integrated into general management (Benett and Foster, 2005; Almost et al., 2018). The managerial commitment to safety must be shown in management's observable activities and demonstrated by their behaviour as well as their words (Alam et al., 2020; Abdullah and Abdul Aziz, 2020).

In summary, the employer plays a crucial role in OSH management and is responsible for risk prevention measures. Studies have identified various organisational factors, such as safety leadership, safety awareness, and safety procedures, that influence the managerial commitment to safety. The managerial commitment to safety is a key prerequisite for effective management and is influenced by both immediate and broader contexts. In SMEs, owner–managers play a key role in the decision-making process, and the management commitment to safety positively influences safety behaviour, employee satisfaction, and business competitiveness.

1.6 Safety professionals' influence on OSH management

Despite the recognition of the crucial role that company management plays in OSH matters, the preventative work for reducing labour accidents and illnesses remains the primary responsibility of WES (Veltri et al., 2013; Wybo and Van Wassenhove, 2016). The profession of safety professional or practitioner is defined in many ways (Brun and Loiselle, 2002; Pryor, 2016; Hale et al., 2020). In this thesis, a WES is defined as a specialist who performs OSH-related tasks as part of their employment (cf. OHS Act, 1999). It does not include external OSH consultants or advisors. Professionals who specialise in OSH have been working in industrial enterprises since the beginning of the 20th century (Wybo and Van Wassenhove, 2016; Provan et al., 2017). OSH professionals' job structure, position in the organisational hierarchy, purpose, and mission vary greatly by industry and organisation. Brun and Loiselle (2002) found over 100 different names for this profession (e.g., safety manager, OSH specialist, safety practitioner, coordinator, etc.). Over the past two decades, public pressure and political influence on safety and risk management have led to significant changes in safety professional practices (Provan et al., 2017).

Today, the most common objectives of this profession are: identifying, evaluating, and controlling risks (Ferguson and Ramsay, 2010); increasing safety culture and reducing injuries and occupational diseases (Johnson, 2014); improving working conditions and legal compliance (Olsen, 2014); ensuring that the right decisions are made regarding personal safety (Leemann, 2014); preventing lethal and non-lethal accidents (Manuele, 2016); influencing managers to improve safety management (Olsen, 2014); and constructing safety knowledge management and infrastructure (Provan et al., 2017). In a survey of New Zealand safety practitioners, Olsen (2014) found that a considerable part of their job contained activities within OSH management, such as writing safety policies and procedures, auditing, and recording documentation. This study also reported that WESs influence management and other stakeholders in an organisation to participate in OSH activities.

Harris et al. (2011) and Guennoc et al. (2019) indicated that the present degree of knowledge about the activities of OSH managers is insufficient, and the complexity of their roles is often undervalued. The literature review demonstrates that this profession has been investigated primarily through qualitative surveys to gather insights about the heterogeneity of safety managers' activities and the workplace realities they must address

(Brun and Loiselle, 2002; Hale et al., 2005; Aksoy and Mamatoğlu, 2019). The research exposes WESs' diversity of missions, positions, and relative freedom in activities. Biggs et al. (2013) discussed how OSH professionals report production and cost pressures, competition with business priorities, and workload and time constraints as the most common barriers to building a safety culture in their organisations. One of a safety professional's key roles is to improve their organisation's OSH management. Brun and Loiselle (2002) and Pryor (2016) reported that the majority of OSH managers interact with top management and attend management meetings infrequently and participate little in critical planning and decision-making processes.

According to Hale and Guldenmund (2006), the WES profession depends heavily on the context of the organisation (e.g., industry sector, OSH budget, contact with decision-makers, and professional autonomy) and personal characteristics (experience, education, training, communication, and problem-solving skills). WESs' role and ability to affect the safety culture of their organisations depend on their position in the hierarchy (Wybo and Van Wassenhove, 2016). As Woods (2006) suggested, independence is a key aspect of the role of the OSH specialist. For a better understanding of this role, OSH professionals' activities must be considered in connection with the different elements of the context in which they are performed. More recently, although to a lesser extent, case studies have been conducted to identify the strategies that safety professionals use to ensure safety (Olsen, 2012; Daudigeos, 2013; Reiman and Pietikäinen, 2014). Reiman and Pietikäinen (2014) suggested that safety managers have three key tools for influencing safety management: safety knowledge and skills (contextual knowledge, experience, and education); personal abilities and qualities (attitude, courage, and character); and the organisation itself (management systems, formal structure, and authority).

The central role of a WES is to supply management with the necessary guidance and advice on safety practices to secure workers' OSH and then strengthen organisational performance (Tappura, 2017). WESs' tasks are often based on their energy, encouragement, and capability (Borys, 2014; Reiman and Pietikäinen, 2014), which means that effective preventative work can be very person-specific. The existing studies provide insight into how OSH professionals perceive their roles, but little data about their personal characteristics is included. An analysis of occupational safety professionals' activities seems crucial for understanding the complex realities of their profession.

In summary, WESs are specialists who perform OSH-related tasks as part of their employment. The WES role depends heavily on the context of the organisation and WESs' personal characteristics, such as experience, education, and training. The common objectives of this profession are identifying, evaluating, and controlling risks; increasing safety culture; improving working conditions and legal compliance; ensuring personal safety; and constructing safety knowledge management and infrastructure. Effective preventative work can be very individual, and analysing WESs' work is crucial for understanding the complex realities of their profession.

2 Methodology

This chapter presents the research methodology, including the philosophical foundations of this study and the research strategy, the applied research design, the sample selection and data collection activities, and the analysis measures. This includes a description of the research methods selected to appropriately answer the defined research questions (RQs).

2.1 Research philosophy

Understanding research philosophy is important for resolving research problems in new ways and not repeating existing ideas and approaches (Greetham, 2006; Zyphur and Pierides, 2019). The philosophical idea is connected to specific research concepts and, therefore, influences the identification of the research project (Easterby-Smith et al., 2012). To identify a philosophical position, a good understanding of the contrasts between different attitudes and presumptions about how knowledge is acquired when embracing a particular viewpoint is necessary (Creswell and Plano Clark, 2018). According to Easterby-Smith et al. (2012), a research paradigm is a general idea of how particular research should be performed. Gannon et al. (2021) argued that the research paradigm is based on philosophical assumptions (a set of opinions about the research process, the nature of reality, and the acquisition of knowledge) and determines methodological choices.

The philosophical orientation of this study is grounded in ontological realism and epistemological pragmatism. Ontological realism was defined by Philips (1987, p. 205) as "the view that entities exist independently of being perceived, or independently of our theories about them". Schwandt (1997, p. 133) added that "scientific realism is the view that theories refer to real features of the world. 'Reality' here refers to whatever it is in the universe (i.e., forces, structures, and so on) that causes the phenomena we perceive with our senses". A realist ontology in the context of this thesis is to consider the complex phenomenon being researched – safety management – as a social multilevel structure in an organisation, which is constantly shaped by a multitude of key people (stakeholders) acting within it at different levels. This study's epistemological position of pragmatism concerns how knowledge will be generated during the research process (Johnson and Duberley, 2000). From an epistemologically pragmatic perspective, different research methods or combinations of methods can be used to answer research questions regardless of the underlying research philosophy, based solely on their practical value (Maarouf, 2019).

As an OSH scholar and pragmatist, the author's concern when conducting surveys was to achieve practical outcomes rather than abstract conclusions; therefore, the author investigated the research problem with the intent to provide deep contributions that can influence future practice in this field. Therefore, the pragmatic research philosophy is best suited to the author's beliefs and assumptions and the research purpose. In addition, based on this, the research paradigm followed in this doctoral thesis is pragmatism. Pragmatism is a cognitive approach that is significant in realist philosophy. According to Goldkuhl (2012), the main purpose of pragmatism is the creation of practical knowledge that can be used for actions leading to targeted changes in practice. Easterby-Smith et al. (2012) and Visser (2019) characterised pragmatism as a compromise between realism and relativism.

Pragmatists believe that knowledge arises from a series of specific outcomes that are not necessarily shaped by previous events. However, they do not believe in the existence of 'predetermined frameworks' that shape truth and knowledge (Easterby-Smith et al., 2012). Thus, scholars who adhere to a pragmatic philosophical perspective may have different approaches to understanding research problems (Maarouf, 2019). The pragmatist approach to theory development calls for using abduction to support flexible and adaptive data collection and analysis (Morgan, 2007). During the abduction phase, the researcher seeks to explore the data, identify patterns, and develop plausible hypotheses through robust categorisation. Simultaneously, applying concepts from existing fields of knowledge is preferable to developing conclusions that rely solely on abstract concepts (deduction) or observation (induction) (Kelly and Cordeiro, 2020).

Methodologically, pragmatism is commonly seen as the philosophical partner for a mixed-methods approach (Denscombe, 2008). Pragmatism provides a set of knowledge and research assumptions that support a mixed-methods approach and distinguish it from quantitative approaches based on the philosophy of (post)positivism and purely qualitative approaches based on the philosophies of interpretivism or constructivism (Rallis and Rossman, 2003; Johnson and Onwuegbuzie, 2004; Maxcy, 2003). Additionally, the abductive approach is commonly used to combine qualitative and quantitative methods in sequential designs (Morgan, 2007; Baggio, 2019). The mixed-methods approach permits a study design that answers questions about the nature of complex phenomena from the participants' perspectives and investigates the relationships between measurable variables (Williams, 2007).

2.2 Research strategy and study design

As the literature review revealed a lack of in-depth studies on the thesis topic (RG1 and RG2), it highlighted the exploratory nature of the research and the need to use different research methods to examine OSH management and its outcomes in an organisational context (Creswell and Creswell, 2017). Therefore, an exploratory survey research strategy was applied. According to Check and Schutt (2012, p. 160), survey research is "the collection of information from a sample of individuals through their responses to questions". The survey research strategy allows the use of various methods to recruit participants, collect data, and apply different research instruments (Ponto, 2015). This type of research may utilise a qualitative research strategy (e.g., interviews with open-ended questions), a quantitative research strategy (e.g., use of questionnaires), or a mixture of strategies (i.e., mixed methods) (Ponto, 2015). Different survey strategies are common in social studies because they can be used to detail and examine human behaviour (Singleton and Straits, 2009). Kajamaa et al. (2020) noted that combining qualitative and quantitative research strategies minimises the weaknesses of each research tradition and balances their strengths.

Surveys by Fernández-Muñiz et al. (2012a, 2012b, 2014) also showed that both qualitative and quantitative studies are needed in OSH-focused research, particularly that seeking to improve enterprises' safety performance. In pragmatic research, a mixed-methods approach is adopted to answer applied research questions (Misak, 2013). Therefore, the author decided to adopt a sequential mixed-method design, using a cross-sectional survey to address the set of research questions (Ma, 2012; Pluye and Hong, 2014; Antwi and Hamza, 2015; Molina-Azorin, 2016). Creswell and Creswell (2017) and Barnes (2019) defined this type of study as an exploratory mixed-methods approach

in two stages, beginning with qualitative research (first stage), followed by quantitative research (second stage), and data analyses of the outcomes of both stages.

In mixed-methods research, researchers collect, analyse, and interpret quantitative and qualitative data in a single study or series of studies (Leech and Onwuegbuzie, 2008). Creswell and Plano Clark (2018) and Teddlie and Tashakkori (2009) argued that a mixed-methods approach was the best way to represent the philosophical position of most researchers. The main asset of mixed-methods research is its flexibility to answer multiple questions simultaneously, which permits validation and initiates the development of research theory (Tashakkori et al., 2020). The data from the qualitative research phase can be utilised to create a new tool, such as a conceptual framework, choose an appropriate existing one, or select variables for the quantitative research phase, during which numerical data are collected to explain a particular phenomenon (Babbie, 2010; Muijs, 2010). Creswell and Plano Clark (2018) argued that an exploratory mixed-methods design is helpful when tools or measures are not available, variables are unidentified, or a guiding basis or theory is lacking. Another reason this study design was chosen is that it allowed an extended understanding of the OSH knowledge and experiences of employers, safety representatives, and safety professionals. This led to the discovery of new insights that reveal the nature of the study phenomenon and measure its prevalence (Creswell, 2013; Creswell and Creswell, 2017).

To develop the conceptual framework, the main research stages (Saunders et al., 2019) were followed to the extent that they corresponded to the thesis objectives. First, through a detailed literature review, a significant research problem was identified, as well as a relevant research strategy to address the problem. The aim was to generate useful knowledge for building the conceptual framework. Second, the research subject and previous studies were examined to gain a general understanding of the subject. According to his research and working experience as an OSH professional, the author understood OSH management theories and practices. To properly understand OSH management in organisations of different sizes and achieve the goal of this study, the researcher's preliminary understanding was deepened by reviewing OSH management studies and the related scientific literature (see Chapter 1). Third, the study was conducted following the chosen methodology in three stages (Figure 5):

Stage 1. Qualitative research, including semi-structured face-to-face interviews with WERs, EMPs, and WESs. In addition, qualitative methods were used to focus on individuals, produce in-depth information, and investigate the actual safety situation at the studied enterprises to understand how they treated safety. The qualitative study was conducted to examine key persons' attitudes, perceptions of safety, and risk awareness, as well as employee involvement.

Stage 2. Quantitative research, including questionnaires with WERs, EMPs, and WESs and the statistical analysis of the data collected (based on MISHA) using computational techniques. Quantitative methods were used to confirm the key elements of safety identified in the qualitative research.

Stage 3. The elaboration and interpretation of results and development of the conceptual framework to incorporate the key elements of OSHMS into organisational PM (the research output). The theoretical connections and research contributions of the study concept were presented and the usefulness of the conceptual framework was assessed.

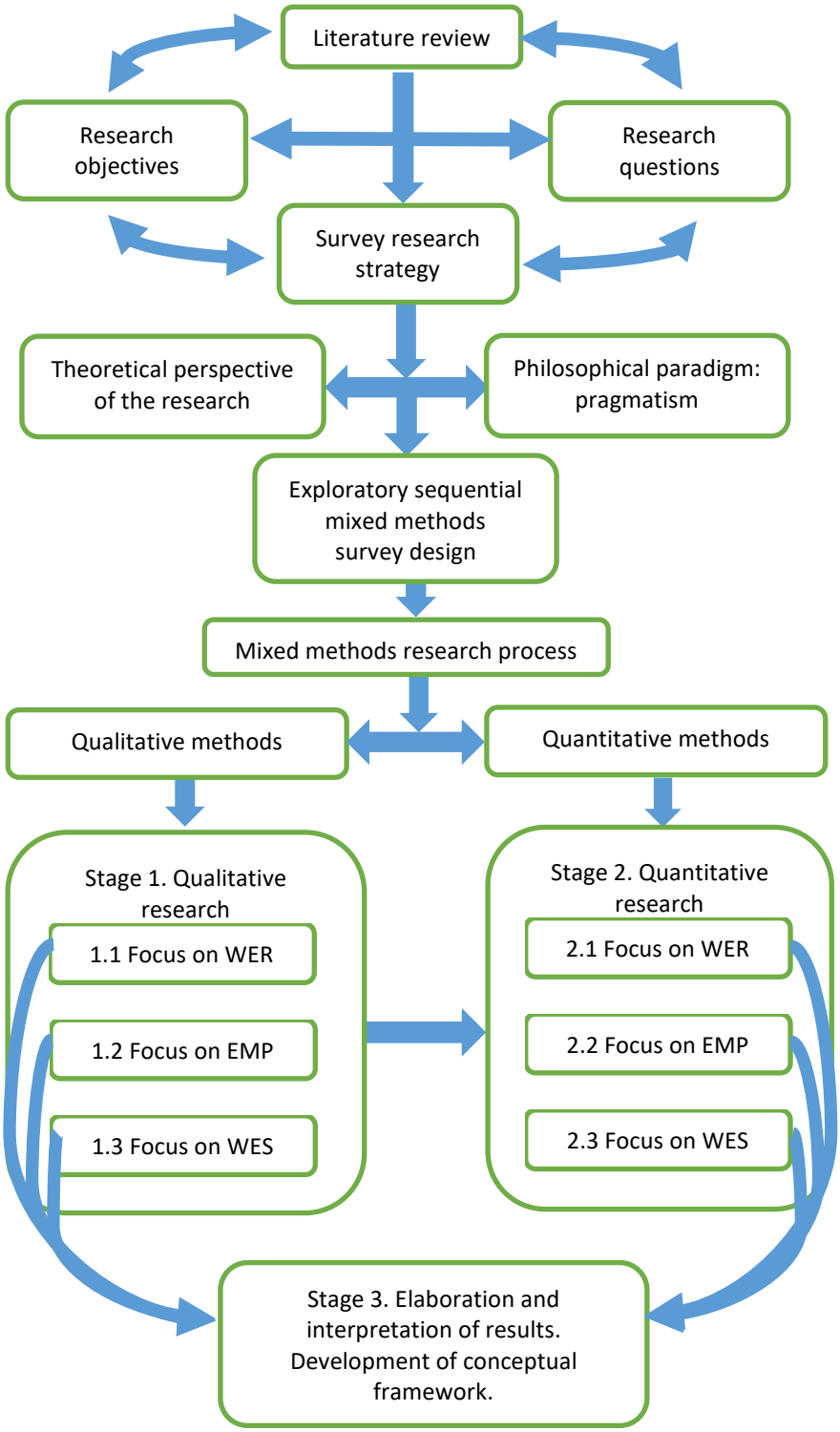

Figure 5. *Study design diagram.*
Source: Composed by the author.

This research design ensured that the findings of each stage were grounded in the results of the preceding stages, which assists in filling research gaps (Fetters et al., 2013). In this research, the strengths of the qualitative and quantitative findings are joined in one mixed-methods study to produce useful conclusions and obtain a comprehensive understanding of the research questions and phenomenon (Timans et al., 2019). The qualitative approach allowed the researcher to explore a specific context and consider the comprehensive knowledge of the phenomenon. The descriptive correlational quantitative study design provided a clear understanding of the trends, characteristics, and relationships of the study variables (McBurney and White, 2009). In addition, the mixed-methods approach allowed the phenomenon of OSH management to be measured through a multilevel approach. A diagram of the research process and study design is presented in Figure 5.

Stringent measures were taken during the design, methodology, and interpretation phases to reduce the risk of research bias. The strategies of inclusion, data collection types, relevant samples, conditions, data collection, and analysis procedures were examined during the research process (Creswell, 2013; Creswell and Creswell, 2017) (Table 1). Different procedures were applied to evaluate the data's reliability and validity and improve the reliability and validity of the conclusions (see subsection 2.5). The sub-studies, research questions, and research objectives suggested the suitability of different approaches; therefore, a descriptive multi-method approach was adopted. The conclusions were elaborated based on the combined methods and data. The research methods are presented in subsection 2.3.

Table 1. *Study design overview: exploratory sequential mixed-methods survey.*

Stage	Target group	Research question	Publication	Research method	Data collection method	Data analysis methods
1	WERs	**RQ1:** How can employee representatives' core activities contribute to the development of occupational safety and health management?	**Article I:** Workers' representation in OSH activities: Examples from the Estonian industrial sector	Exploratory, descriptive, qualitative	Semi-structured interviews	Qualitative content analysis, averages, thematic categorisation, two-step coding
	EMPs	**RQ2:** How can management commitment affect the improvement of safety performance?	**Article II:** Employers' role in the improvement of the safety level of Estonian enterprises			
	WESs	**RQ3:** How can safety professionals influence managers and employee representatives for effective cooperation in occupational safety and health management?	**Article III:** Working environment specialists' role in the improvement of the safety level of Estonian enterprises			
2	WERs	**RQ4:** Which safety elements support cooperation among employers, employee representatives, and safety managers?	**Article IV:** Conceptual model for the development of OSH management in SMEs	Exploratory, descriptive, correlational, quantitative	Modified MISHA questionnaire	SPSS, MANOVA, exploratory factor analysis, principal component method, independent t-test, and confirmatory factor analysis
	EMPs					
	WESs					
3	SMEs	**MRQ:** How can senior management, in cooperation with employee representatives and safety professionals, integrate key elements of a safety management system into organisational performance management?	**Doctoral thesis:** Conceptual framework for integrating key elements of a safety management system into organisational performance management	Elaboration and interpretation of results. Development of the conceptual framework.		

Source: Composed by the author (Articles I–IV).

2.3 Research instrument and research methods

The modified Method for Industrial Safety and Health Activity Assessment (MISHA) (Kuusisto, 2000; Paas, 2015c) was chosen as the main research instrument to assess OSH management in different manufacturing enterprises. The MISHA was initially designed and validated by Kuusisto (2000) as an outcome of reviewing various existing evaluation instruments for auditing OSHMSs. Compared to other methods used by OSH researchers, the MISHA allows various safety areas to be prioritised, devoting less attention to off-to-job safety. Paas (2015c) modified this instrument to develop a 'training through the questionnaires' learning package for senior and middle managers and employees to increase their OSH knowledge and, thus, SMEs' safety level. This tool helps SMEs conform to OSH provisions in legislation, follow best practices, and develop tacit knowledge. It covers the OSH management sector through questions and interviews with employers, WESs, and workers' representatives. It also educates the participants on safety work means and behaviours by transferring relevant OSH knowledge.

2.3.1 Qualitative research method

Semi-structured interviews were conducted in the first stage to gain a comprehensive understanding of SMEs' safety levels, with a particular focus on OSH management in SMEs. Interviews are considered the best method for describing the phenomenon of OSH management (Berry and Kincheloe, 2004) and supplementing the data obtained in the second stage of the research. The semi-structured interviews used to collect the qualitative data were designed, conducted, and analysed per Kvale's (2008) and Miles and Huberman's (1984) recommendations. The interviews were intended to collect qualitative data in an organisational context. This can illuminate the research phenomenon from the perspective of the study participants. The interviews revealed participants' awareness of OSH matters and allowed them to discuss delicate themes related to their needs and concerns (Dilshad and Latif, 2013). The interviews elicited positive and negative examples and evidence about OSH management and its aspects that support continuous safety improvement.

In semi-structured interviews, questions on specific topics are prepared, but the respondent has some freedom in answering them, which makes this type of interview easier to evaluate and summarise than an unstructured interview (Lawler et al., 1980). In addition, this structured approach makes such interviews more reproducible and less biased. According to Kuusisto (2000), semi-structured interviews are best for collecting data that can be used to explain quantitative results. The subjects addressed during the interviews were arranged, following the MISHA structure, into four main themes: organisation and administration of safety actitivities; safety participation, communication, and training; working environment; and follow-up activities (Figure 6).

For each semi-structured interview, an interview guide was prepared based on the following steps: information gathering, data analysis, and result reporting (Morgan et al., 1998). Each interview lasted about two hours. All interviews were tape-recorded and transcribed in the language in which they were conducted. The content analysis was conducted with thematic unit coding supported by the coding schedule. The interviewer needed to be highly competent in OSH legal matters as knowledge can be exchanged between the interviewer and the interviewee during an interview (Paas, 2015c).

2.3.2 Quantitative research method

Questionnaire surveys were conducted in the second stage to quantitatively assess and characterise different key aspects of OSH management. The questionnaire was first piloted with representatives from LEs, the wording was corrected, and then it was used to survey SMEs. Collecting quantitative information enables simple to highly complicated statistical analyses that measure statistical attitudes, behaviours, and performance, show relationships between data, or compare aggregated data and provide results that are easy to interpret (Coghlan and Brydon-Miller, 2014). A quantitative survey is a way to learn about a specific group of people, known as a sample. Quantitative research allows the researcher to rely on observed or measured data to investigate research questions about the sample population (Allen, 2017).

Key elements of OSHMS were evaluated by utilising safety elements in the following four areas: the organisation and administration; participation, communication, and training; the working environment; and follow-up activities (Figure 6).

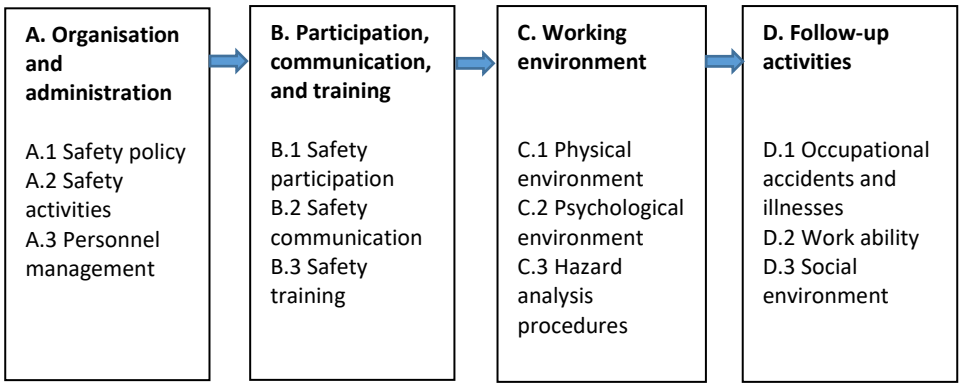

Figure 6. *Areas and safety elements of the MISHA.*
Source: Based on Kuusisto (2000) and modified Paas (2015c).

The items were rated on a 5-point Likert scale (Likert, 1932). The questionnaire was amended to accommodate some of the workplace risks that were not considered in the modified MISHA questionnaire developed by Paas (2015c) (e.g., vibration, electromagnetic fields, ionising radiation, and indoor and outdoor climate). MISHA-based questionnaires have previously been used in the literature and are considered reliable cross-sectional survey tools that are suitable to assess OSH management variables (Paas, 2015d). To assess the questionnaire answers, a 5-point Likert scale where 1 = poor, 2 = average, 3 = good, 4 = very good, and 5 = excellent was used. Subjective assessments are the basis of the Likert scale (Likert, 1932). Each area (A, B, C, and D) of the MISHA contributes 25% of the total, so the maximum total score is 100. Statistical analysis (Kern and Willcocks, 2000) was chosen to investigate the results of the quantitative survey.

2.4 Research sample and data collection

The initial data collection, which provided baseline data on the studied OSH management phenomenon, consisted of two stages: the data collection process in Stage 1 (qualitative research) entailed interviews followed by the data analysis. Interview transcripts are a useful tool to analyse key entities' social connections and communication, learning, and behaviour. Interviews are essential for obtaining less-measurable data directly from individuals. After analysing the results of the interviews, the MISHA questionnaire was updated according to the research questions and used to determine the significance of the key elements of safety. Thus, quantitative data were collected in Stage 2 via questionnaires and evaluated via factor analysis. The statistical data and analyses of empirical studies provided reliable information and strong evidence to affirm the results' reliability. To answer the research sub-questions of this thesis, empirical research was conducted from 2015–2022.

Four LEs and eleven SMEs representing Estonia's main manufacturing areas, such as the electronics, metal, and food industries, agreed to participate in the survey (Table 2). In addition to four large certified enterprises (electronics, food, and metal industries), five middle-sized enterprises (plastic, chemical, textile, and metal industries), and six small-sized companies (printing and glass industries, agriculture, construction, and transportation) with similar backgrounds were selected. Of the locally owned middle-sized enterprises, three held ISO certificates and two lacked certification. Among the small companies were locally owned small enterprises that were uncertified.

Table 2. *Sample overview*

Id.	The activity area	Size; Employees	Certified / Corporate Company	Participants of Stage 1 (interviews)			Participants of Stage 2 (question-naires)
				EMP Age	WER Age	WES Age	
I	Electronics	LE; >250	-/+	35	53	42	12
II	Food industry	LE; >250	-/+	45	34	62	
III	Electronics	LE; >250	+/-	59	66	39	
IV	Metal inds.	LE; >250	-/+	63	60	35	
V	Plastic inds.	ME; 50-249	+/-	41	25	62	25
VI	Chemical inds.	ME; 50-249	+/-	55	62	34	
VII	Chemical inds.	ME; 50-249	+/-	45	40	34	
VIII	Textile inds.	ME; 50-249	-/-	38	45	-	
IX	Metal inds.	ME; 50-249	-/-	40	53	53	
X	Printing inds.	SE; 9-49	-/-	36	39	-	
XI	Glass industry	SE; 9-49	-/-	41	49	-	
XII	Agriculture	SE; 9-49	-/-	50	43	-	
XIII	Agriculture	SE; 9-49	-/-	56	-	-	
XIV	Construction	SE; 9-49	-/-	40	55	-	
XV	Transportation	SE; 9-49	-/-	45	-	-	
			Total	**36**			**37**

Source: Composed by the author.

During the first stage of the study, the qualitative research was primarily conducted in the form of on-site, semi-structured, in-depth interviews with three target groups (WERs, WESs, and EMPs). In total, 36 interviews were conducted. The interview schedule was prepared based on the detailed literature review and areas of the MISHA. The interviewing and data collection were performed by Paas (2015a) and the author of this thesis from 2015 to 2022. Interviewing was necessary to determine the interviewees' level of OSH knowledge and their willingness to improve the work environment.

During the second stage of the study, the findings from the interviews were used to develop further quantitative research with EMPs, WERs, and WESs. The same fifteen manufacturing enterprises (Table 2) were selected as a sample because if the interviews focused on the actual safety situation, as well as key people's attitudes, perceptions of safety, and employee participation in OSH management, then at the Stage 2 it was necessary to identify general trends and specific safety elements that positively affect the OSH management. Questionnaires were distributed to a wider range of individuals from the target groups, including if the enterprise had several WES and WER, in addition to Stage 1 participants. A total of 54 questionnaires were distributed, 37 (68%) were returned completed.

A cross-sectional survey (Pluye and Hong, 2014; Creswell and Plano Clark, 2018) was conducted among manufacturing enterprises (Table 2) with different sizes of manufacturing branches. This type study is suitable for examining acute situations. It is especially useful when studying the prevalence of a certain phenomenon, including exploring causal relationships, such as risk and its potential predictors, and consequences (outcomes) and their effects on study participants (Zangirolami-Raimundo et al., 2018).

2.5 Data analysis

The data analysis methods were determined by the defined RQs, as well as the corresponding philosophical assumptions and, therefore, the chosen research methods. An overview of the interaction between the research questions, research methods, and data analysis techniques within the framework of this doctoral thesis is presented in Table 1. A mixed-methods approach to data analysis was utilised. The data were first analysed via a qualitative approach (interview coding), while the quantitative data were analysed using the Statistical Package for Social Sciences (SPSS). This research design was selected to present both qualitative and quantitative approaches in combination to generate more comprehensive practical knowledge about the research problem than either research method alone could (Rugg and Petre, 2007; Morell and Tan, 2009).

Qualitative data analysis is rooted in naturalistic research that identifies the key themes presented by research participants (Shava et al., 2021). Creswell (2007) described this as a technique for classifying oral or written material to reveal similar patterns. A qualitative content analysis approach allows insights and meanings to be extracted from the text more completely and explicitly. Conventional qualitative content analysis (CQCA) was applied to the data gathered through detailed personal interviews, and the data were analysed with little interpretation. CQCA is used in study designs that aim to describe complex phenomena (Shava et al., 2021). According to Berge (2001), the CQCA process involves encoding data categories that are obtained directly and inductively from the raw data.

The qualitative content analysis began with rereading all of the data to gather impressions and general meaning (Tesch, 1990), like reading a novel (Hsieh and Shannon, 2005). Subsequently, a word-by-word analysis of responses was utilised to derive codes, first extracting from the text the particular words that seemed to capture key concepts. These criteria were selected to address the research aim. The benefit of CQCA lies in obtaining direct information from interviewees without imposing predetermined categories or theoretical views on them. The main challenge with CQCA is that it cannot achieve a full understanding of the context, making it impossible to highlight essential categories. This may generate an inaccurate representation of the data. However, in the best case, CQCA results in the development of a concept or the construction of a model (Weber, 1990).

The qualitative findings were utilised to examine the roles that key people play in OSH administration, namely their perceptions of safety and risk, attitudes, and employees' involvement in safety issues. Additionally, the qualitative results allowed the researcher to explore the actual OSH management situation in enterprises, producing in-depth information to illuminate safety behaviour and reveal the prospects for improving SMEs' OSH performance. The main topics of the qualitative findings were utilised to develop a quantitative study in the form of a questionnaire to further examine the research problem (Creswell and Plano Clark, 2018; Tashakkori et al., 2020).

The first stage of qualitative data analysis was followed by the second stage of statistical (quantitative) data analysis to test or generalise the first-stage results. Statistical analyses (Kern and Willcocks, 2000) were chosen as the instruments to test the results of the questionnaires via IBM SPSS Statistics version 22.0 and R 2.15.2 (MANOVA, factor analysis, principal component method, independent t-test, etc.). For all statistical analyses, a *p*-value <0.05 was considered significant, and all tests were two-tailed.

Inferential multivariate analysis of variance (MANOVA) tests were conducted because there was more than one dependent variable (Osman, 2021). MANOVA was desirable to analyse variables alongside independent samples t-tests because, according to Pallant (2016) and Tabachnick and Fidell (2013), MANOVA is performed with variable means to prevent an increase in the Type 1 error rate when a series of t-tests or ANOVAs are conducted. Under such conditions, Type I errors, or finding significant differences after multiple analyses when no such statistically significant differences exist, are likely. In the ANOVA, the sum of squares (SS) was used to test hypotheses. Type III SS was calculated with simultaneous adjustments for all terms (including interacting or nested terms) (Sunwoo et al., 2020).

Partial eta squared (partial η^2) is a statistical measure employed to assess the impact of an independent variable (or factor) on the dependent variable, while considering the influence of other independent variables or factors. Its purpose is to provide insight into the practical significance and importance of a particular independent variable in explaining the observed variations in the dependent variable. By quantifying the proportion of variance attributable to a particular independent variable while taking into account other variables in the model, the partial η^2 helps researcher evaluate the strength and practical relevance of relationships in the statistical analyses. The partial η^2 value ranges from 0 to 1, where values close to 1 indicate a higher proportion of the variance that can be explained by that variable in the model after accounting for the variance explained by other variables in the model. The following rules of thumb are used to interpret partial η^2 values: 0.01 indicates a small effect size; 0.06, a medium effect size; and 0.14 or higher, a large effect size.

Factor analysis (FA) is a statistical technique designed to summarise relationships among many variables by expressing each variable as a unique combination of several basic dimensions, known as factors (Lee and Ashton, 2007). Thus, a group of correlated variables can often be considered one broad factor that is distinct from other factors generalising other groups of correlated variables. By reducing many variables to a few factors, FA provides a convenient method to simplify a set of variables and explore relationships with external criteria. In addition, FA can stimulate knowledge of the character of the variables themselves by allowing the researcher to identify common elements among variables belonging to the same factor. FA was utilised to extract the factor structure of the questionnaire to reduce the number of key elements of safety.

Structural validity was evaluated with an exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). In EFA, the Kaiser-Meyer-Olkin (K-M-O) coefficient was calculated and Bartlett's sphericity test was performed to measure the adequacy of the data for FA. EFA is one of the available methods to test scales' construct validity. For such an analysis, the K-M-O test result must be greater than 0.50 (Kaiser, 1974). As Hutcheson and Sofroniou (1999) and Şencan (2005) reported, a value of 0.50–0.60 is considered poor, a value of 0.60–0.70 is weak, a value of 0.70–0.80 is moderate, a value of 0.80–0.90 is good, and a value of over 0.90 is excellent. The K-M-O test shows if the sample size is sufficient for the selected analysis. Another test result considered in the EFA is that of Bartlett's test of sphericity. This test identifies the factors at a significance level of p-value<0.05. If the result of this test indicates that p-value>0.05, the desired level of variance cannot be achieved and the EFA cannot be performed (Buyukozturk, 2020). The K-M-O test and Bartlett's sphericity test provided the Kaiser–Meyer–Olkin measure of sampling adequacy and approximate chi-squared value (Table 3). The K-M-O and Bartlett's test results for these data are 0.833, which indicates a good sample size for factor analysis. The results of Bartlett's test of sphericity, an approximate chi-squared value of 146.290, were high and proved that the corresponding p-value was <0.05.

Table 3. *K-M-O and Bartlett's test results*

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**0.833**
Bartlett's test of sphericity	Approx. chi-squared	146.290
	Df.	36
	Sig.	**0.000**

Source: Composed by the author.

The qualitative data were used to evaluate the validity of the quantitative results. The quantitative data were also used to define the qualitative findings, in particular, confirming the key elements of safety identified from the qualitative data (Schoonenboom and Johnson, 2017). Then, the qualitative data were used to supplement and reconcile the limitations placed on the quantitative results (Tashakkori et al., 2020). Both sets of data helped investigate the research questions in terms of personal viewpoints, dimensions, and key aspects and were selected for analysis.

3 Results and discussion

In this chapter, the main results of this thesis are summarised and discussed. The general findings from the safety interviews (RQ1–3) and results of the statistical analysis (RQ4) are described. The conceptual framework for incorporating key elements of safety into organisational performance management (PM) is presented (MRQ). The research results and their discussion explore the interaction among co-actors at different levels in OSH management.

3.1 Summary of results by research question

3.1.1 RQ1: How can employee representatives' core activities contribute to the development of occupational safety and health management?

In the first stage of the research, using the qualitative method, the researcher sought to determine how key activities related to employee representatives (WERs) in the field of OSH can contribute to productive stakeholder cooperation, improve safety performance of organisations, and, thus, support the development of OSH management (Article I).

As WERs' rights and obligations are primarily regulated by national legislation, respondents were asked to list WERs' main tasks, as well as any other activities that are related to the representation or protection of workers' interests in the field of OSH. A clear connection was identified between a particular representative's level of safety activity and the depth of their knowledge of employee representation and safety. Those WERs who were more formally elected fulfilled their legal requirements by receiving training, but in working life, they were representatives only in name and their knowledge of their rights and obligations was rather cursory. This can be explained by their failure to use the knowledge gained from the training, and over time they ceased to be relevant: "*... was elected 6 years ago, no one wanted to be authorised, I attended courses, and since then I have only signed the necessary papers*", said WER 55 (SE; 9–49 employees). During the interviews, representatives of LEs and certified SMEs indicated that they had established procedures for electing employee representatives as well as clear procedures for contacting an employer about safety issues. Among other SMEs, WERs' practices varied but mostly showed a formal approach that failed to truly represent workers' interests.

Then, the respondents were asked questions related to safety policy-making and WERs' participation in this activity. The answers on that topic were divided along the lines of each company's business philosophy, as the policy statement is the basis of the functioning of any management system. Respondents from LEs and some MEs that developed manufacturing by implementing various management systems were familiar with safety policies or quality policies, where safety activities are usually presented as important. There were different approaches to the formation and updating of these policies, such as adopting an unchanged policy from a foreign head company without the possibility of adaptation: "*...the safety policy was given by the Finnish parent company...*", said WER 34 (LE; >250 employees) or drafting it themselves with stakeholder involvement.

However, all respondents from companies that had safety policies, regardless of the approval process, recognised its value as a document when management demonstrated a real commitment to it, including through compliance with other management system procedures. WERs who previously had no contact with the safety policy statement had

no idea such a document existed: "*... we only have instructions for work safety ...*", said WER 55 (SE; 9–49 employees). Interviewees (e.g., WESs) who had previously worked in companies with systematic forms of quality, environmental, or OSH management noted those companies' greater safety culture compared to their current situation.

The next set of questions sought to determine personnel's safety training needs. By determining their safety training needs, the interviews revealed that respondents had a high level of safety awareness. None of the interviewees disagreed on the importance of safety training for safe work. The main differences in approaches were related to the quality of training (formal safety brief versus practical training), the company's funding of safety courses, and the ability to determine the need for internal training or external courses for qualification, including on safety issues. In LEs and MEs, the training process in terms of increasing knowledge and providing periodic briefings was regulated by procedures where the WER could offer suggestions through middle line managers, safety managers, or HR managers.

A certain budget was usually provided to finance training that would cover mandatory training: "*... the company conducted mandatory courses in first aid, fire safety*", said WER 53 (ME; 50–249 employees). In SEs, the practices to organise compulsory training and safety briefings were more varied. Respondents noted that their employers did not always fulfil their obligations, although all WERs in the interviews underwent mandatory OSH training (comprising 24 hours of training total) through external courses. Safety briefs were conducted without a system, and external training depended heavily on the company's financial situation and the employer's awareness.

Questions about participation in risk assessment (RA) and drafting action plans were asked. The concept of RA was familiar to all interviewees. Most of them learned about this tool and how it was used in compulsory courses, but very few WERs had been directly involved in the development of RA. Those who worked in companies that utilised management systems said: "*When ISO (9001) was being implemented, I was included in the working group for the implementation ... we also looked at the risk assessment of the work environment, supplemented it with risk factors, and indicated preventive or corrective actions*" (WER 62; ME; 50–249 employees). This was a familiar procedure for WERs from certified companies. The results of the RA were made available in the required safety materials. In addition, the management system procedures permitted reporting near misses or non-conformity claims.

The situation in non-certified SMEs was quite different; RA was not available to employees or their representatives, although the law mandates RA familiarisation. The RAs were exclusively handled by the safety manager (WES) or owner–manager. There were no formal or informal procedures for compiling, supplementing, or updating the RA: "*Perhaps the risk assessment is with the safety specialist along with the other safety documents. We only have copies of the safety instructions in the workshop*", said WER 43 (SE; 9–49 employees). Employee representatives who participated in the RA and development of the action plan considered their work a useful contribution to the development of safety because they could reflect on the risks and dangerous situations that they or their colleagues faced and that managers might not have known of because they were not always present on-site and did not understand all of the possible risky situations.

The accident situation in an enterprise is a clear indicator of OSH performance and safety culture. If the accident statistics in LEs can be generalised, then in some SMEs, there is a high probability that not all accidents are properly reported (this applies mainly

to minor injuries), and the injury investigation process is a formality that is unfavourable to the victim. Nevertheless, almost all of the WERs questioned knew that they were directly responsible to participate in the investigation of accidents. In practice, this legislative requirement had a fairly wide range of applications. In MEs, an occupational injury was perceived as an emergency event that required a comprehensive investigation, so an investigation committee was created that included specialists at various levels, including WERs: "*... when an injury occurred to ...(name), the director issued an order to set up an accident investigation committee, which included the director, the safety engineer, the head of the workshop, and myself. ... The conclusions were drawn up in a report, which I also signed*", said WER 45 (ME; 50–249 employees).

Accident investigation reports usually contained a list of preventive measures (an action plan) to prevent a recurrence of the incident. The respondents found that this approach facilitated vertical and horizontal communication about the causes of the injury and thus increased employees' level of safety knowledge. In MEs, the picture was mixed – the WER could participate in the investigation genuinely or as a formality, and the conclusions mainly consisted of the victim's guilt. Conversely, small enterprises appeared to suffer practically no injuries; these interviewees avoided specific answers or said that there were no injuries at their enterprises. This only indicates to the expert that tacit agreements in small enterprises permitted most injuries and incidents to be hidden.

The workplace social climate is shaped by management commitment and priorities, as well as organisational communication and participation, and is affected by various risk factors (such as work stress, fatigue, irregular working hours, conflict situations, poor internal communication, or discrimination). Interviews with respondents from LEs showed their fairly good awareness of various psychosocial risks (stress, the monotony of assembly line work, or colleagues' aggression). This is primarily an indicator of the EMP's preventative work, such as implementing measures to reduce these risks (risk assessment questionnaires, training seminars, psychologist consultations) or informally implementing rules to reduce work stress or interpersonal conflicts: "*Our company has completed training courses to manage stress and conflict at work. The lecturers gave us some tips on how to deal with stressful situations at work and how to resolve work conflicts*", said WER 60 (LE; >250 employees).

Questioning the SME respondents showed that they were generally uninterested in discussing psychosocial risks. Interpersonal conflicts were resolved quickly. In addition, psychosocial risks, such as busy periods and tight deadlines, were perceived as normal parts of the job. Simultaneously, the smaller the number of employees in a company, the more favourably the social climate tended to be assessed – the possibility of direct and informal communication with management and colleagues generally reduced risks in the social climate. A common remark in the interviews with WERs was that the time they had to perform their functions to ensure employees' OSH was limited – legally, only two hours a week are required, which may not be enough to address all identified OSH problems. A proposal was made for paid time off to address employee safety problems without time limits or pressure from management.

In summary, to answer RQ1: employee representatives' core activities, such as communicating and interacting with senior management (**safety communication**), engaging in the promotion of a safety policy (**safety goals or policy revision and dissemination**), and identifying hazards and risks (**involvement in risk assessment**), can contribute to the development of OSH management by ensuring that emerging issues and employee perspectives are considered in decision-making, promoting safety

policies and reporting, and identifying and mitigating potential safety risks. By working collaboratively with management, employee representatives can help create a safe and healthy workplace for all employees.

3.1.2 RQ2: How can management commitment affect the improvement of safety performance?

A commitment to safety must be shown in the visible actions of managers at various levels, as well as demonstrated not only in words but also through their beliefs, attitudes, behavioural patterns, and decisions. In these interviews, the researcher sought to examine how managerial roles and leadership's motivational influence can contribute to the development of OSH management through cooperation with WERs and WESs and, thus, improve safety performance (Article II).

A written safety policy is one of the clearest examples of commitment to safety leadership. The researcher intended to concentrate on the knowledge gained about the EMP's role in formulating and updating the safety policy and promoting its goals among personnel, subcontractors, and partners. In the absence of a written declaration or policy, the actual commitment to safety was assessed through behaviour and managerial priorities. All interviewees from certified LEs and MEs noted that their companies, as part of the implementation of management systems (per ISO standards), already had policies that target safety goals. Management participation in the preparation or revision of policies depended on the enterprise; in some companies, the policy was provided by a parent company and did not permit changes, but in most, the policy was developed locally and local management played a decisive role.

As ISO certification is currently one of the conditions for participation in tenders and procurement, the decision to develop management systems was sometimes made under pressure from business partners or supply chain requirements. In this case, the managerial motivation and commitment to safety were mainly formalities and not internal decisions to support improvement: *"...usually, we review ISO documents (e.g., policies) every three years before the arrival of external auditors for re-certification*", said EMP 59 (LE; >250 employees). If management admitted that the management system was formal, then personnel eventually began to perceive it as a bureaucratic formality as well. The situation among Estonian branches of foreign companies presented an interesting picture as safety was built into the corporate management and reporting system and they were required to accept the management philosophy of the organisation to which they belonged. Through the selection of managers and middle-level specialists, the establishment of procedures and key performance indicators, and proper reporting, the staff of such branches demonstrated a real commitment to the parent company's values.

At enterprises where employees noted a high level of safety, managerial commitment served as a positive example, WERs were involved in safety management (safety meetings, RA, accident investigations, etc.), and company policies were communicated to all employees and subcontractors: "*... we have posted quality and safety goals on the information board. Meetings on results are held quarterly. Our motto is Safety First!*", said EMP 55 (ME; 50-249 employees). SMEs' policy and management commitment to safety was generally poor. If the managers (EMPs) had not previously worked in companies where elements of a safety management system (such as policies) were implemented, then they were frequently unaware of such policies. The approach

towards OSH was rather reactive, so safety issues were usually discussed in meetings after accidents occurred or after labour inspection visits.

The next part of the interviews sought to determine management's level of knowledge about the proper functioning of a safety management system, discover the forms of cooperation between stakeholders (safety committee or regular safety meetings) and employers' participation in them, and indicate the level of real support shown by allocating resources or investing in working conditions. As the previous qualitative material revealed that management and employees from LEs demonstrated high levels of knowledge about the functioning of the OSHMS, in this subsection, more attention will be paid to the safety knowledge and practice in SMEs.

The interviews with managers and employees from SMEs demonstrated a clear difference between firms that implemented systematic OSH management according to international or corporate standards and firms that either required minimal elements or merely reacted to injuries. The respondents from certified companies were well-versed in the structure of their OSHMS. Where safety committees were formed (at enterprises with >150 employees), a management representative participated in the safety meetings: "*The production director holds safety meetings once a quarter as part of the work of the safety committee. Here, we review production incidents, if any, suggestions for improvement, as well as the status of implementation of measures to invest in working conditions, such as the installation of a ventilation system*", said WER 40 (ME; 50–249 employees). The respondents rated this management approach to solving current safety problems as very effective.

The number of accidents per calendar year was considered the most important safety performance indicator: "*There is an information board at the entrance to the enterprise, which indicates the number of days that have passed since the last serious injury. The goal set by our company is to reduce serious injuries to 0*", said WES 34 (ME; 50–249 employees). One company also kept records of the number of sick days per employee and offered employees free flu vaccinations. In SMEs that lacked systematic forms of OSH management, managers' participation was either limited (WESs or WERs performed some functions) or constrained to the minimum legally required activities, such as conducting accident investigations.

A systematic approach is expressed, among other ways, in the allocation of organisational resources, as well as in investment measures to improve working conditions. WESs' work is an important part of organisational and human resources. The WES supports the functioning of the management system, maintains safety at the workplace, and reports existing problems or opportunities for improvement. Material resources are needed to purchase personal protective equipment, equip the workplace with ergonomic work equipment, and train workers in safety or qualification, as well as larger investments in the technical systems of production buildings, especially those related to both workrooms' and non-workrooms' microclimates and lighting.

Small companies do not always have the resources to conduct all of the necessary OSH activities. Problems begin with human resources when employers cannot hire a qualified WES and perform these tasks themselves or turn to one-time OSH consultations. At the same time, the correct allocation of resources to improve safety depends directly on managers' level of safety knowledge and social responsibility: "*We have a small transport company with a small staff. Some of the employees work under permanent contracts, and some are under contract in case of additional volumes. I also work as a truck driver, if necessary. And I understand all the difficulties and risks of the*

work. But we do not have many funds to hire a safety specialist, all the money goes to salaries and maintenance of the trucks", said EMP 45 (SE; 9–49 employees).

In MEs where the volume of work is stable or growing, the management approaches the allocation of resources more systematically – an annual budget is drawn up that accounts for both the costs and investments associated with personnel and safety. In this case, the WERs can propose measures to improve OSH. A responsible employer who is focused on the sustainable development of their business (by decreasing the company's turnover) understands the need to invest in production facilities, work- and non-workrooms, as well as care for staff's development and OSH: "*At the end of each year, we draw up the next year's budget, which takes into account the cost of staff salaries, funds for protection, safety and health at work, and training, as well as possible CAPEX [capital expenditure] in business development and related infrastructure*", said EMP 55 (ME; 50–249 employees). Infrastructure refers to both workshops and workplaces and, in some cases, non-workrooms. In general, the interviews showed that for employers, workplaces and working conditions are the visible 'façade' of the company, so there is a constant need to care for the appearance of this façade to remain attractive in highly competitive markets.

The next important component of the senior management commitment is the assignment of responsibilities, tasks, and authorities in OSH management. The answers in this category can be divided into three groups: the first group includes certified companies regardless of size, the second group is medium-sized uncertified enterprises, and the third group is small enterprises. The representatives of certified companies knew what documents fixed the responsibilities of each person within the organisation. These responsibility matrices were often legally required, defined in job contract and descriptions, and reinforced by management's commands. The respondents from the first group showed that specifying management's responsibilities in the distribution of responsibilities along with other employees motivated greater responsibility on both sides, as long as the management was truly committed to the functioning of the OSH management system.

In the second group, both managers and employees confirmed that they allocated responsibility at the level of job descriptions and management orders. They noted that, in ordinary conditions, these paragraphs of instructions and orders had no significant effect as they were part of mandatory bureaucratic procedures. Responsibility was assigned if there was a violation or work injury. Then, for violation of the terms in the job description, a punishment could follow: "*When we had an injury with ...(name). The investigation found that he deliberately violated the rules of safe work. The director deprived both the employee and his supervisor of the bonus for weak internal control over subordinates*", said WER 45 (ME; 50–249 employees). The work characteristics of small enterprises confirmed that in the third group, even formal signs of distribution of responsibility were often absent both because of their limited human resources and informal management style in which managers primarily direct employees orally and prefer not to waste time on paperwork. In this case, disputes and problems are most often resolved by agreement.

Safety communication is very important from the perspective of an OSHMS. It is usually shaped by the management of a company, which, through various communication channels, can convey important information to employees. Safety communications appeared to be well developed only in LEs and MEs. Where safety committees had been established, safety issues were discussed regularly, reports on safety activities were sent

to interested parties, and employees (WERs) could make suggestions or report dangerous situations. Thus, information flowed from the bottom up. At the same time, for continuous sustainable improvement, information must flow from the top down: *"At the end of the year, at a meeting with upper management, the operational results are summed up, including in terms of achieving production and safety goals. Conclusions are drawn, and new goals for the next period are planned. Information is distributed by e-mail. Active employees who have contributed to the achievement of goals are given various gifts on the corporate holiday before Christmas*", said WES 62 (ME; 50–249 employees). This example illustrates not only the need for safety communication feedback from management but also the need to reward employees for good safety behaviours. This further motivates employees to focus on production tasks and work safely.

Among employers, especially in SMEs, there was an incomplete understanding of the safety representative's position and unclear expectations of their functions and activities. The interviews with EMPs additionally showed that finding suitable candidates for the WER position is challenging even in LEs, specifically in local companies, as managers often fail to explain to employees the practical benefits of the WER's duties and, therefore, employees are reluctant to accept additional responsibilities.

In summary, to answer RQ2: Management commitment can greatly affect the improvement of OSH performance within an organisation. When management prioritises safety and shows a strong commitment to safety practices, employees are more likely to take safety seriously and follow safety procedures in their daily work activities (**safety management commitment and leadership**). This can reduce accidents and injuries as well as improve the overall safety culture of an organisation. Additionally, management commitment can help create a safety policy (**setting safety goals, safety policy revision and dissemination**) in which safety is seen as a shared responsibility and core value. Conversely, if management does not prioritise safety or demonstrate a commitment to it, employees may not see safety as a priority and may be less likely to follow safety guidelines, which can increase the risk of injury and ill health. Management can also drive the allocation of necessary resources towards safety initiatives and programs, which can further improve safety performance (**arranging resources for safety**).

3.1.3 RQ3: How can safety professionals influence managers and employee representatives for effective cooperation in occupational safety and health management?

While the two previous research questions (RQ1 and RQ2) investigated the mandatory stakeholders or key persons in safety management, this research question (RQ3) concerns a safety professional (WES) who is not always employed by an enterprise (Article III).

Investigating the role of the OSH professional in safety management revealed that WESs were appointed and performed these functions part- or full-time at eight enterprises (four from LEs and four from MEs). In other enterprises, the employer performed these duties. To understand WESs' level of qualification, the respondents were asked about receiving adequate safety training and having enough time and other resources to ensure safety. In LE and ME, a WES usually worked full-time and organised all necessary safety activities, such as preparing safety documents, conducting risk assessments and safety training, organising medical examinations, and communicating with management and employees. All WESs from these eight companies had appropriate training, and two people even had master's degrees in the field. In certified companies,

the responsibility for maintaining a quality or OSH management system was partially or fully assigned to the WES. These safety specialists did not complain about a lack of time or resources to perform their functions.

The EMP is responsible for their employees' lives, safety, and health regardless of whether a WES is appointed or not. To perform these responsibilities correctly, the employer needs an experienced and qualified WES, but this alone is insufficient for safety activities to be fully effective. Much depends on the WES's position in the organisational structure and their authority to influence decision-making regarding safety. The respondents from LEs noted that WESs' positions were mainly equivalent to middle managers' positions, and, thus, they had a corresponding influence on decision-making about safety. In practice, this ensured that the WES could convey their perspective to upper management, participate in meetings as safety experts, and participate in the allocation of resources for OSH.

Additionally, according to the LE management representatives, there was evidence of WESs' authority over other workers if they could ask safety professionals to advise on safe working methods, provide necessary recommendations, and possessed certain powers to solve workers' and line managers' workplace problems. In those enterprises where management expressed a desire to improve safety performance, the WES is a strategic person, if they are competent and have authority and some autonomy: *"Before the implementation of the OSH management system, we had many injuries every year, even severe ones. To improve the situation with a poor safety culture, company management decided to implement OSHMS on their own and appointed me (WES) to lead the implementation. A lot of work has been done, and the knowledge of employees at all levels has increased. Targets were set to reduce the injury rate, and, thanks to motivation, we began to achieve them*," said WES 34 (ME; 50–249 employees).

In other enterprises, the WES's situation was less obvious as specialists performed WES work part-time while primarily specialising in another area (such as HR or administrative work). At the same time, the owner–managers emphasised that their companies' financial conditions did not permit them to hire a full-time safety specialist who would handle the improvement of work conditions and related problems. This formal approach was also reflected in WESs' attitudes towards this work if they perceived safety functions as additional tasks that were unsupported by management commitment. In this case, there was low interaction with senior management and WESs rarely attended management meetings or participated in important planning processes.

In addition to influencing management decision-making, a crucial part of the WES role is to influence employee safety behaviour through communication with stakeholders, i.e., the workers themselves and their representatives (WERs). To assess WESs' impact on employees and understand which forms of stakeholder cooperation are most effective to improve safety culture, the methods of communication with employees and stakeholders that the WESs used in their daily work were investigated. In interviews, respondents said that WESs usually used various communication methods and practices (verbal or written information exchange) to influence employee behaviour and increase their safety motivation. The most important aspect was direct communication, which has three main goals – promote a safety culture, prevent accidents and diseases, and prohibit dangerous working conditions or equipment. To do so, WESs applied different methods, such as verbal communication with employees (safety talks, briefs), written communication via intranet or email, visual communication (posters, safety videos, trauma pictures, etc.), regular meetings, listening to employees (including whistleblowing), etc. The WES from

an LE was also responsible for coordinating work with the WERs: "*Employee representatives are very helpful - they bring me problems that otherwise we would not hear about. With these problems, I turn to management and try to find the best solution*", said WES 62 (LE; >250 employees).

WESs, as OSH experts with authority defined by the management, can contribute to increasing an enterprise's safety culture with new ideas; therefore, it was important to understand which WES initiatives had the strongest impact on safety culture and what individual factors of WESs contributed to closer collaboration between them and stakeholders. Respondents noted that WESs' proactivity in improving safety performance generated positive feedback about stakeholder cooperation. If employees were involved in such initiatives (e.g., safety campaigns), then their participation benefited them by raising safety awareness and improving the company's OSH performance. WESs' personal characteristics were also important, e.g., good communication skills, a good understanding of human psychology (personal empathy), and the readiness to consider various issues with workers.

In summary, to answer RQ3: WESs can influence EMPs and WERs for effective cooperation in OSH management by implementing the following strategies: WESs should establish good relationships with EMPs and WERs to gain their trust and respect, which will help them achieve their safety goals. Effective communication is critical for promoting OSH, so WESs should communicate the importance of OSH and its benefits clearly and concisely, be open to feedback, and actively seek it out (**safety communication**). WESs can offer training programs that help EMPs and WERs understand their roles in OSH management. This can include providing access to safety manuals and conducting safety training sessions to help them develop a shared understanding of safety goals and strategies (**training and instructing the personnel in OSH**). WESs can measure and evaluate safety performance to identify areas for improvement and track progress (**participating in risk assessment**). This can help EMPs and WERs recognise opportunities for improvement and make data-driven decisions to improve safety performance (**organising and leading meetings in OSH matters**). It can also further improve safety performance by increasing stakeholders' involvement in safety initiatives (**initiating safety campaigns**).

3.1.4 RQ4: Which safety elements support cooperation between employers, employee representatives, and safety managers?

The fourth research question is quantitative and seeks to determine the key elements of safety statistically, as these elements, with stakeholder (EMPs, WERs, and WESs) cooperation, can positively affect the improvement of OSH performance, as well as explore the possibility of integrating key elements of safety into organisational PM (Articles I–IV).

Descriptive statistics were used to analyse the data, including measures such as standard deviation and mean. Additionally, inferential statistics such as t-tests, hypothesis tests, regression analysis, multivariate analysis of variance (MANOVA) exploratory factor analysis and confirmatory factor analysis were employed (see subsection 2.5). The partial eta squared (partial η^2) values given in Tables 4–6 were computed to indicate the extent to which a specific independent variable explains the variation in the outcome variable, while considering the influence of other independent variables in the statistical model: values around 0.01 suggest a small effect size, around 0.06 suggest a medium effect size, and values of 0.14 or higher suggest a large effect size.

A significance level of *p*-value <0.05 was used for all statistical analyses, indicating that the observed results were considered statistically significant.

The survey identified key elements of safety that, through stakeholder (EMPs, WERs, and WESs) collaboration, can improve an organisation's OSH management. The statistical analysis confirmed that these were the only safety activities in which WERs significantly affected safety performance, provided that the employer contributed (Table 4). First, such safety elements were primarily connected to **safety policy-making (setting safety goals)** and **dissemination** through WER involvement. Further significant safety elements included stakeholders' participation in different planning activities, such as **engagement in the identification of safety training needs**; **involvement in risk assessment**; and **different activities for social climate improvement**. Finally, there was stakeholders' participation in evaluation activities, such as proper **participation in the investigation of accidents** and the **elaboration of the prevention plan**.

Table 4. *Safety elements affecting cooperation among employers, employee representatives, and safety managers*

Variable	Safety element	Partial η^2	*p*-value
A.	**Organisation and administration**		
A.1	***Safety policy***		
A.1.5	Involvement in the preparation of the policy (setting safety goals)	0.888	0.000
A.1.6	Initial status review	0.637	0.001
A.1.10	Informing external bodies about safety policy	0.671	0.001
B.	**Participation, communication, and training**		
B.3	***Safety training***		
B.3.1	Safety training for personnel	0.578	0.000
C.	**Working environment**		
C.3	***Hazard analysis procedures***		
C.3.1	Leading in the arrangement of workplace hazard analyses	0.737	0.000
D.	**Follow-up activities**		
D.1	***Occupational accidents and illnesses***		
D.1.2	Accident and near-miss investigation; Planning to reduce accidents	0.532	0.007
D.3	***Social environment***		
D.3.1	Implementing a system to measure the social climate	0.805	0.000

Source: Composed by the author (based on Articles I and IV).

The study also confirmed the safety activities in which EMPs had a significant influence on OSH management in an organisation (Table 5). First, **safety policy-making, revision, and dissemination** in cooperation with other stakeholders (primarily WERs) were significant. Further significant safety elements were connected with EMP participation in different planning activities, such as **distributing tasks and responsibilities in OSH management**; **arranging the resources for the improvement of safety activities**;

and **organising a system to redesign the workplace for people who struggle with their work**. If EMPs participated in evaluation activities, such as **leading meetings on OSH matters**, they positively affected safety performance.

Table 5. *Employers' influence on safety performance*

Variable	Safety element	Partial η^2	*p*-value
A.	**Organisation and administration**		
A.1	***Safety policy***		
A.1.4	Allocating tasks and responsibilities	0.885	0.000
A.1.8	Revising the safety policy	0.972	0.000
A.1.9	Dissemination of the safety policy	0.929	0.000
A.2	***Safety activities***		
A.2.8	Resources for OSH improvement	0.968	0.000
B.	**Participation, communication, and training**		
B.2	***Safety communication***		
B.2.1	General OSH communication procedures	0.549	0.006
C.	**Working environment**		
C.2	***Psychological environment***		
C.2.3	Definition of personnel's responsibilities and authorities	0.488	0.013
D.	**Follow-up activities**		
D.2	***Work ability***		
D.2.1	Redesigning workplaces	0.140	0.030

Source: Composed by the author (based on Article II).

The statistical analysis also determined the safety activities in which WESs had a significant effect on organisations' OSH management (Table 6). First, **safety policy-making, revision, and dissemination** in cooperation with other stakeholders were significant. Further significant safety elements were connected to WES participation in different planning activities, such as **advising the management about the necessity of allocating resources for safety improvements**. WES participation in implementation activities, such as **initiating safety campaigns**; **training and instructing personnel in OSH**; **arranging the system for workers' permission to work in extreme conditions**; and **being involved in the maintenance of the working area** affected safety performance. In addition, participating in evaluation activities, such as **organising meetings in OSH matters**, and improvement activities, such as **accident statistics and reporting**, improved OSH management.

Table 6. *Safety managers' influence on safety performance*

Variable	Safety element	Partial η^2	*p*-value
A.	**Organisation and administration**		
A.1	***Safety policy***		
A.1.8	Revising the safety policy	0.972	0.000
A.1.9	Disseminating the safety policy	0.929	0.000
A.2	***Safety activities***		
A.2.8	Resources for OSH improvement	0.968	0.000
B.	**Participation, communication, and training**		
B.1	***Safety participation***		
B.1.1	OSH training and instructing personnel	0.664	0.001
B.2	***Safety communication***		
B.2.1	General OSH communication procedures	0.549	0.006
B.2.4	Initiating safety campaigns	0.394	0.040
B.3.	***Safety training***		
B.3.4	Work permit system	0.574	0.004
C.	**Working environment**		
C.1	***Physical environment***		
C.1.8	Involvement in the maintenance of the working area	0.614	0.002
D.	**Follow-up activities**		
D.1	***Occupational accidents and illnesses***		
D.1.1	Accident statistics and reporting	0.929	0.000

Source: Composed by the author (based on Article III).

3.1.5 The conceptual framework for incorporating key elements of safety into organisational performance management

To answer the main research question (MRQ: How can senior management, in cooperation with employee representatives and safety professionals, integrate key elements of a safety management system into organisational performance management?) the main results collected in the first and second stages of the study must be summarised into a conceptual framework. Based on the knowledge obtained from the literature review and the expanded understanding gained from the empirical research results (Articles I–IV), the existing framework of organisational PM (see Figure 4) was further developed by incorporating the identified safety elements (Figure 7). Figure 7 visualises the safety elements that stakeholders should enact to improve organisations' safety performance (with a focus on SMEs) where there are no systematic management systems according to corporate or international standards.

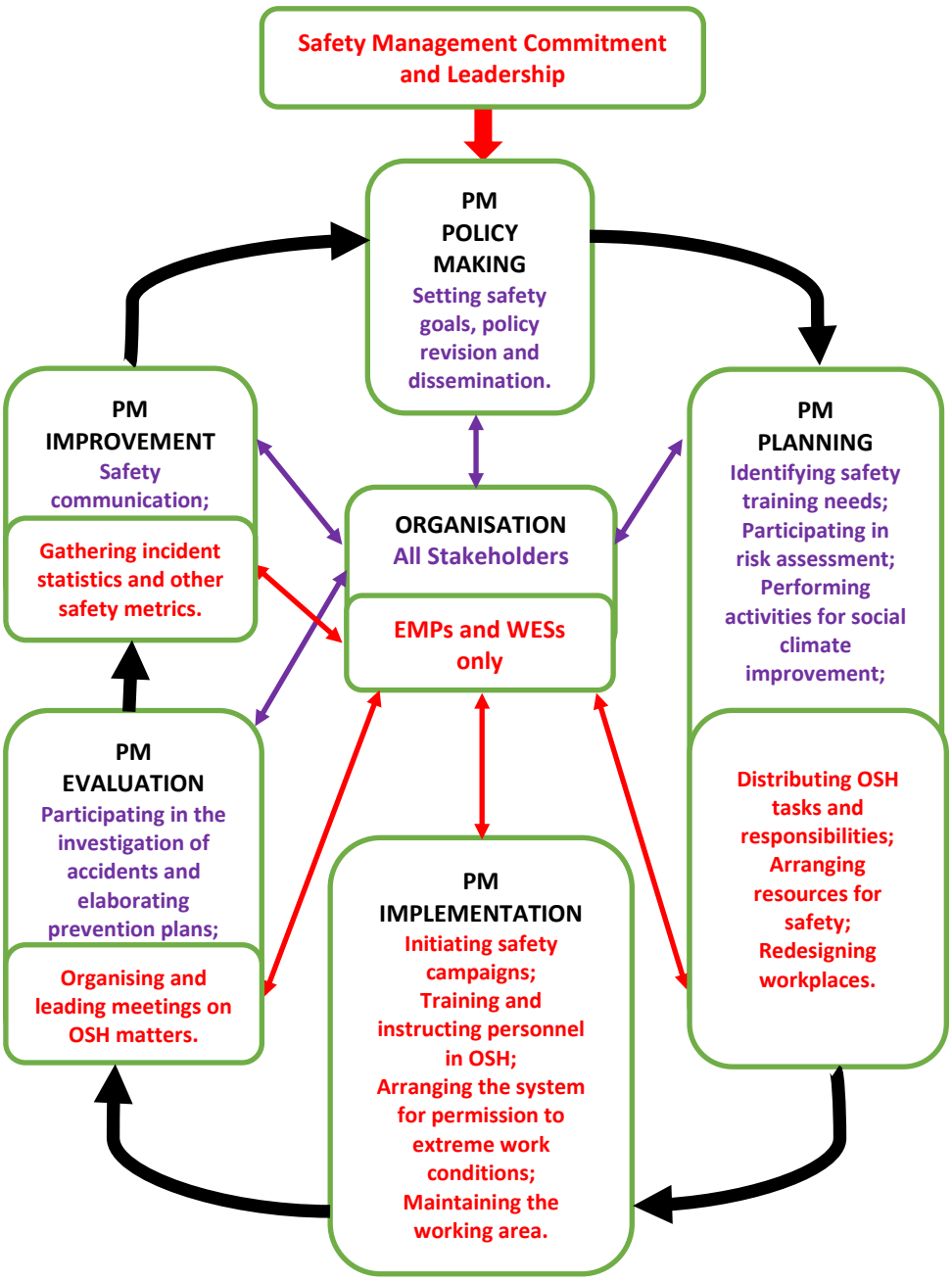

Figure 7. *Conceptual framework to incorporate the key elements of a safety management system into organisational performance management (PM).*
Source: Composed by the author (based on Articles I–IV).

3.2 Discussion

3.2.1 The role of employee representation in occupational safety and health management

The findings related to RQ1 and RQ4 will be discussed through the lenses of social exchange theory (SET) and safety leadership theory (SLT) by examining the collaborative role of safety representatives (WERs) as proponents of the elective employee voice through perceived inspirational communication and support from managers (clear safety leadership and visible senior management safety commitment).

The study findings about the role of safety representation are broadly consistent with previous studies (O'Toole, 2002; DeJoy et al., 2010; Dyreborg, 2011) and align with SET expectations (Blau, 1968; DeJoy et al., 2010; Oah et al., 2018) that top management's commitment to safety positively affects employee representatives' activity and systematic work on OSH matters (Article I). O'Toole (2002) also noted that managerial authority affects employees' understanding of the significance of the OSHMS. This understanding influences employees' judgments of risky behaviour and safety-related decisions while on the job. At the same time, the study by DeJoy et al. (2010) showed that organisational commitment influenced perceived safety at the workplace, but had no significant effect on safety performance, which the authors suggest may indicate that organisational commitment is more of a starting line than an end point for incident minimization. Meanwhile, Oah et al. (2018) showed that through leader–member social exchange, supportive leadership promotes good manager–worker relationships and enhances employees' commitment to safety.

In Estonia, WERs must be trained through the 24-hour basic training program required by state regulations. The social partners in Norway agreed that the basic course to work as a WER should encompass at least 40 hours (Hovden et al., 2008). The content and practical value of the training are more essential than the number of hours it entails, and the Estonian regulation on OSH training should be revised. In the interviews, the WERs noted the lack of time to perform their functions to ensure the safety of workers (only 2 hours per week), as well as the need for additional paid time to solve employee safety problems without pressure from management (Article I). A study in Norway (Hovden et al., 2008) reported similar results – often, OSH representatives complained about a lack of time for safety activities. Stakeholders must recognise that WERs need sufficient time to collect the relevant information about OSH, and management must recognise their actions (Article IV).

According to SET, if an employer fulfils their safety-related responsibilities, such as safety training and investment in working conditions, they signal that employees' safety and well-being at work are highly valued within the organisation. According to the reciprocity norm, the organisational priority for safety and concern for well-being presents an implied duty for employees to maintain a good safety culture and strive for good organisational performance. Bayram (2020) showed that safety motivation compliance, safety knowledge, and safety training affect workers' increased productivity of workers in the field of safety, which can produce direct economic benefits.

According to SET, management support as a mechanism for psychosocial exchange through direct communication between stakeholders helps employees solve their safety and production problems. The presence of effective communication channels in an organisation that are based on strong social relationships also allows stakeholders to

freely and productively discuss organisational performance outcomes (O'Kane et al., 2022). However, this study revealed that very few companies (mostly those with ISO certification) had formal institutions or procedures for employee representation in place (Article I; Article IV). Also, SMEs rarely had formal representation, and their informal representation and consultation practices with workers were also infrequent. Järvis et al. (2017) reported similar results about the effectiveness and frequency of workers' representation in micro- and small enterprises; it appeared to be rather nominal and inconsistent. Informal representation led managers to claim that employees could always contact their immediate managers with safety issues if they wanted to be involved.

However, the participants reported only a few examples of the informal representation of employee interests, and even fewer offered any illustration of this involvement in safety issues (Article I). These perceptions of their participation in OSH processes are related to the closeness of the social relations in SMEs, which, as is well known, encourage both workers and their employers to view formal representation as inappropriate for their circumstances (Eakin et al., 2010; Landstad et al., 2017; Hedlund et al., 2017). Gallagher (2000) and Fernández-Muñiz et al. (2012b) concluded that adequate information flow between employees and managers ensures the effectiveness of OSH management.

This study confirmed that WERs are usually elected from the line workers and, thus, may lack a strong position in the hierarchy to be heard and listened to (Article I). It emphasises the importance of articulating employees' voices through effective representative channels rather than promoting the mere formality of legally acceptable arrangements. The interviews with WERs revealed that line workers who were elected as employee representatives were reluctant to resolve hazardous situations or accidents due to conflicting expectations from their colleagues and supervisors, i.e. consciously avoided the opportunity to be safety leaders. This finding is consistent with SLT, that a visible safety commitment from senior management allows WER to be a part of clear safety leadership in improving employee safety behavior. Therefore, fostering prevention by increasing WERs' OSH information and knowledge and establishing clear guidance about their roles and responsibilities in OSH management is crucial (Article IV).

Simultaneously, when WERs adopted the increased responsibility of OSH in the workplace, they were concerned that focusing on safety might conflict with their harmonious social relationships, productivity, or managerial prerogatives (Article I). Gallagher (1997) suggested that the wider scope of WERs' duties is a crucial success factor in safety management; businesses can benefit from their active participation by moving from OSH management to more general health and safety planning, implementation, and analysis. A good social climate in the work environment and understanding between parties are essential from a social and psychological exchange perspective (Ahmad et al., 2023). In line with SET, reducing psychosocial risks and properly discussing work issues allow employees to focus more on their work tasks and responsibilities and, thus, achieve production goals (Article IV).

Line workers naturally perceive many hazards and risks as part of their work routine and do not report minor accidents or near misses (Article I; Article IV). Therefore, increasing the level of OSH knowledge is necessary to prevent dangerous situations or accidents. To do so, WERs' knowledge and active responses are beneficial. This aspect of the routinisation of the risks and benefits as worker representatives perceive them has also been considered by other researchers (Walters and Frick, 2000; Gallagher et al.,

2001). According to Walters and Frick (2000), safety participation is necessary because managers simply cannot know all aspects of the working conditions sufficiently without relying on employees' competence, experience, and motivation to determine and minimise risks. Gallagher et al. (2001) suggested that workers' knowledge could be instrumental in training and guiding other workers to perform sustainable safety management.

Employers have many ways to engage workers, such as health and safety briefs, safety courses, joint safety committees, and daily teamwork (Gallagher et al., 2003; Bohle and Quinlan, 2010; Pillay, 2012; Rostykus et al., 2016). Two important points must be highlighted from the perspective of leader–member SET: to determine and reduce hazards, managers need experience, competence, and good motivation from employees, and, in turn, to share and realise their interests in OSH, workers need representation. Workers need sufficient time to gather safety information and management must recognise their activity.

This study showed that safety representatives are sometimes formally elected but not recognised by employers as true spokespersons for employees or subcontractors (Article I). The literature (Enshassi et al., 2008; Kim and Nguyen, 2019; Daoor et al., 2020; Valluru et al., 2020) affirms that outsourcing or subcontracting work can lead to several hazardous circumstances or fatal injuries because of the impermanent nature of subcontract employment. In this case, WERs can significantly affect the identification, understanding, and analysis of the risks that subcontractors face, as well as communicate safety policies and safety knowledge (Article IV).

Research results from studies in various countries indicate that employee representatives frequently focus on operational work: those studies include some from Australia (Gaines and Biggins, 1992), the UK (Hillage et al., 2000; Martínez-Lucio and Keizer, 2015), France (Colson et al., 2015), Canada (Brun and Loiselle, 2002), Spain (Garcia et al., 2007; Munduate et al., 2015), New Zealand (Johnson and Hickey, 2008), and Sweden (Tragardh, 2008). However, WERs' focal roles vary from country to country. As an illustration, employee representatives from Australia primarily ensured that workers were acting safely by encouraging conformity with OSH rules (Gaines and Biggins, 1992), while their colleagues from New Zealand urged workers to report injuries (Johnson and Hickey, 2008). Differences in worker representatives' activities in different places may be due to differences in study focus and design or the interpretation of specific roles that is promoted by industry organisations and trade unions (Walters and Wadsworth, 2019).

3.2.2 The role of management in occupational safety and health management

The findings related to RQ2 and RQ4 will be discussed through the lenses of safety leadership theory (SLT) and social exchange theory (SET) by examining the role of managers in OSH management.

The results of the qualitative study showed that senior management and owner–managers play indispensable roles in OSH management operation and an organisation's OSH improvement (Article II). Analogous conclusions about the importance of the leadership commitment to safety have been made by other authors (Mahmoudi et al., 2014; Yorio et al., 2015; Rostykus et al., 2016; Ghahramani, 2016a; Tappura et al., 2017; Li and Guldenmund, 2018). Per SLT, leaders' influence is agreed to be reflected in safety representatives' dynamic and regular work (Kapp, 2012) and employees' participation in OSH problem-solving (Walters and Nichols, 2009; Dyreborg,

2011; Hasle et al., 2019a). Similar results were found in the safety leadership literature about the increase in OSH performance in organisations where management was committed to safety (Tappura and Nenonen, 2019). McGonagle et al. (2016) indicated that the commitment of top management is positively connected with employees' motivation and participation in safe behaviours and adherence to safety rules. Seixas et al. (2016) also noted that the OSH committee positively influenced management commitment, generating a clear improvement in workers' involvement and small companies' OSH performance.

This study reaffirmed SMEs' complex and heterogeneous situation given the scale and scope of their economic activity (Article IV). The interviews with employers showed that OSH management in many Estonian SMEs did not exceed OSH best practices – or even minimum compliance (Article II). The evidence from interviews with executives and owner–managers alongside the literature review provided a detailed picture of why this situation occurs. In addition, the research with employee representatives at SMEs showed that they commonly observe a lack of implementation, compliance, and monitoring of OSH regulations by SME managers, which is a consequence of the lack of necessary safety leadership skills (Article I; Article II), which, in turn, according to SLT, may negatively affect safety performance and organisational productivity (Tappura and Hämäläinen, 2012).

Scholars widely recognise SMEs' higher risk of accidents and ill health compared to LEs (Targoutzidis et al., 2014; Ollé-Espluga et al., 2014; Micheli et al., 2018), but psychosocial risks, mental well-being, and job satisfaction are also coming to the fore as important dimensions of problematic working conditions (Article IV). Good social relations between employees (a positive psychosocial climate) were also noted by many interviewees from small companies (Article II). Similarly, various authors have cited examples of SMEs where the psychosocial risks are lower (Sørensen et al., 2007) and overall job satisfaction is higher (Tsai et al., 2007; Edwards et al., 2009; Storey et al., 2010). This may indicate a change in the nature of work towards more intellectual jobs and a general increase in workers' well-being, in which the preservation of the achieved level becomes a priority (Article IV). Small business owners and employees also noted that they have close, friendly social connections in working life, and many managers minimise the differences in their status compared to those of their employees (Article IV). As both SET and SLT suggest, a supportive transformational leadership style helps to maintain a good psychosocial climate as support is the main component in motivating people. These statements correspond with other authors' observations (Landstad et al., 2017; Hedlund et al., 2017; Oah et al., 2018; Ahmad et al., 2023).

This research demonstrated that the application of some international management systems (such as the ISO series standards) can powerfully affect safety level improvements in enterprises (Article II). The benefits of implementing an OSHMS include not only conformity with OSH regulations and ensuring safe working conditions but also improved employee morale and increased business profits. DeJoy et al. (2004) found that safety policies and programs are important components of effective safety intervention programs. Neal et al. (2000) found a connection between the overall organisational climate and safety: when the organisational climate progresses (e.g., when the management system is well-developed), the safety climate will also improve. OSH management becomes more effective with a high level of worker representation, which also positively affects the improvement of safety performance (Walters and Nichols, 2007; Knudsen et al., 2011; Trucco et al., 2020).

In most SMEs, the manager is also the owner of the business and performs most of the company's administrative tasks, including addressing OSH issues (Article II and Article IV). In this case, the senior manager's OSH knowledge is critical (Tappura et al., 2017). Due to a lack of management resources, OSH management in SMEs is usually based on the owner–manager's general knowledge, personal characteristics, and known business practices, which requires an assessment of how they contribute to the safety performance of their business. It is important to emphasise that managers and employees have different perceptions of the enterprise's main occupational hazards (mainly physical risks), including OSH issues (Article IV). Therefore, managers tend to underestimate the risks that exist in their business (Hasle et al., 2012b; Landstad et al., 2017). Small enterprises usually have no financial ability to employ a WES; therefore, these obligations have to be held by the manager or owner himself (Article III).

Work related to OSH is integral to overall management work and the process of management development in organisations (Article II). This study found that if an accident reduction plan is developed by the employer, then it has a very strong impact on the enterprise's OSH performance (Article IV). According to SLT, when an employer acts as a transactional leader and sets up a safety policy, allocates appropriate resources, participates in safety meetings, and acts to implement their decisions, this leads to increased safety compliance and has a positive impact on safety culture (Cheung et al., 2021). Other researchers (Bohle and Quinlan, 2010; Mahmoudi et al., 2014; Rostykus et al., 2016) have noted a similar effect on safety performance. Managers are often seen as talented individuals with a variety of skills and personalities, as well as high social awareness and responsibilities (Bolden et al., 2003). This research reaffirmed that management characteristics, such as responsibility, commitment, knowledge, training, and communication, affect the organisation's safety culture (Article IV). The company management's allocation of various resources contributes to the improvement of organisational culture. These include time, knowledge, competencies, a focus on safety and health, and financial resources (Article II).

This study reconfirmed that SMEs' safety performance depends, in most cases, on the owner–managers' activities and personal qualities (Article I; Article IV). Guldenmund (2000), Vinodkumar and Bhasi (2010), and Kim et al. (2019) found that OSH training helps to reduce occupational incidents and injuries by improving employees' attitudes and proficiency. Training SME owners and managers helps them understand how a safe workplace improves productivity and quality and minimises operating costs. Managers should receive OSH knowledge and advice by participating in thematic seminars and attending courses on OSH management (Article II). According to Hadjimanolis et al. (2015), occupational safety training correlates positively with small businesses' occupational safety performance and relates closely to the influence of employee participation in safety decision-making and commitment to safety.

The study revealed possible obstacles to effective interactions among stakeholders that were identified as current management practices in several SMEs, namely the majority of SME managers appeared to show little commitment to OSH; SME owner–managers did not discuss safety matters with employees; there was an expectation that employees should solve dangerous situations themselves as this was their responsibility; the risks and hazards in the working environment were automatically accepted as inherent to the job; employers blamed employees for injuries; there was a strong authoritarian management style; resources were rarely allocated to OSH; and there was a lack of interest in safety at the management level (Article II; Article IV).

All of these employer characteristics negatively affect SMEs' overall OSH performance. These obstacles also intersect with the difficulties that employers face in managing OSH in small and middle-sized businesses, such as a lack of time to resolve OSH issues, a lack of safety knowledge and skills, the prioritisation of production activities over safety, and poor information flow to subordinates (Masi and Cagno, 2015; Nielsen et al., 2015; Nordlöf et al., 2017).

3.2.3 The role of safety professionals in occupational safety and health management

The findings related to RQ3 and RQ4 will be discussed through the lens of SET and SLT by examining the role that safety managers (WESs) play in OSH management.

The study results about safety professionals' roles reaffirmed that in manufacturing businesses, WESs are leading specialists in OSH management with sufficient safety knowledge (primarily gained via technical education and professional background) to investigate work environment risks and keep employees healthy (Article III). This agrees with the literature consensus that one of the important factors in the effectiveness of a safety professional's work is whether they have OSH knowledge and strong technical competence (Van Wassenhove et al., 2022; Madigan et al., 2022). Using their professional skills and deep knowledge of safety issues, WESs assess working conditions as they are and determine occupational health risks, but employers in working environment are less involved in safety questions and lack comparable OSH knowledge, overrating the current situation and underestimating risks (Article III; Article IV). Olsen (2014) obtained very similar results by studying safety professionals in New Zealand. He found that WESs influence company administration and other stakeholders to participate in OSH management through their involvement in safety activities. A significant part of WESs' responsibilities includes writing safety policies, documenting procedures, and planning preventative actions, which some authors perceive as one of the main obstacles to creating an effective safety culture (Dekker, 2015; Van Wassenhove et al., 2022).

The survey demonstrated that the effectiveness of WESs' work depends mostly on the management commitment to safety, and most of the WESs attributed their achievements in this field to structural support from the organisation (Article III). A common pattern was also exposed; in high-safety-culture organisations with good safety performance, WESs usually occupied positions that were equivalent to middle-level managers or higher, and in these positions, WESs had a corresponding influence on decision-making in the field of safety (Mearns and Flin, 1999). Conversely, in organisations with poor safety culture, WESs' status was also low (Bunner et al., 2021). Leitão et al. (2018) confirmed that WESs work more effectively when an organisation supports their work. Bunner et al. (2021) came to similar conclusions: organisations that support their WESs contribute to their own safety culture by providing the WES with the ability to allocate resources, which allows them to improve the safety culture. In line with SET, if a WES feels supported by the management and other stakeholders (such as trade unions, safety councils, or WERs), they tend to perform their tasks more effectively (Walters and Nichols, 2009) and more successfully address health problems and take preventative measures (Ollé-Espluga et al., 2014).

During the study, the author found evidence of WESs' formal authority over employees (Dekker and Nyce, 2014; Provan et al., 2017; Wybo and Van Wassenhove, 2015), which was expressed in advising them about safe work and providing the necessary recommendations to do so (Article III). The literature reveals a debate about

this factor, with some authors arguing that WESs' formal authority allows for strategic influence (Olsen, 2012; Daudigeos, 2013; Wybo and Van Wassenhove, 2015), while others argue that can be a constraint because it limits line managers' authority in safety matters (Provan et al., 2017). WESs are critical in ensuring employees' well-being, safety, and health at work: their main duty and the visible outcome of their activities is the prevention of occupational illnesses and injuries (Veltri et al., 2013).

WESs in manufacturing perform a wide range of tasks: they ensure that workplaces have a low level of severe health and safety hazards; review the work to ensure workers' safety; improve safety in working amenities with appropriate danger signs; indicate safety violations with clear labels; and fulfil other safety responsibilities, such as risk assessment, the investigation of occupational accidents, the registration of incidents, auditing safety, organising training, developing safety measures, etc. (Ferguson and Ramsay, 2010; Olsen, 2014; Leemann, 2014; Johnson, 2014; Manuele, 2016; Leitão et al., 2018). Safety practitioners are also seen as problem-solvers for workers and line managers at work (Hale and Guldenmund, 2006): they contribute to addressing a wide spectrum of OSH issues by spotting shortages, identifying hazards, and recommending solutions (Braunger et al., 2015). The WES is a strategic person with strategic influence if they have competence, authority, and some autonomy (Madigan et al., 2022).

The Estonian legislation is relatively flexible about WES duties and provides different options for how WES functions may be performed (OHS Act, 1999). Owner–managers can perform these duties themselves if they have OSH-related knowledge and skills (in practice, this means taking safety courses). Small businesses often employ this approach (Article II). The second option is to hire a qualified safety professional (WES) or assign these duties to an existing employee; most often, this falls to an HR specialist or administrator (after the completion of safety courses). In the absence of a skilled professional, such as a WES, the employer needs to use a qualified third party, such as an external OSH consultant, for risk assessment or the mandatory investigation of injury. The appointment to the office of the WES or contracting with a third-party consultant does not relieve the employer of its health and safety responsibilities. However, due to SMEs' limited resources, their owner–managers tend to resolve OSH issues themselves or delegate them to other specialised employees as additional work (Article IV).

This study found that training (safety courses for acting as the WES) creates the illusion of compliance with legislation but does not assist employers and other specialists to deepen their awareness of OSH improvement needs (Article III). There is very convincing evidence from SME representatives that the managing director's OSH management obligations if they are acting as the WES are formal and superficial in practice (Article IV). Directors' safety knowledge is minimal, even though employers are solely answerable for workers' safety and health. Similarly, a formal approach occurs when a specialist in another field acts as a WES if their functions are not accompanied by obligations and commitment from the management. As a result, the level of interaction with senior management is low, and WESs did not attend management meetings or participate in important planning processes (Article III). According to SET, organisations that do not recognise WESs' activity as beneficial to their safety culture cannot fully rely on the obligation of reciprocity to keep them interested in enhancing the safety culture (Bunner et al., 2021).

Considering the study results from WERs (Article I) and EMPs (Article II) compared with those from WESs, it was concluded that WESs usually have the most in-depth safety knowledge (Article III and Article IV). Other stakeholders in safety management (employers

and employee representatives) may lack knowledge of some issues, especially how to include more employees in developing OSH policy (Article IV). Business owners also indicated that the main role of a safety practitioner is to deliver the necessary guidance and advice on safe working practices and increase OSH performance (Veltri et al., 2013). In the literature, some authors also argue that safety knowledge not only entails employing safety professionals but also an understanding of the organisational context (enterprise structure, production process, and planning and implementation of activities) (Hasle and Sørensen, 2011; Reiman and Pietikäinen, 2014; Madigan et al., 2021). This study broadly supports the assertion that senior management supports safety professionals in their activities if the management knows business processes and can demonstrate comprehensive system thinking that includes both operational goals and safety objectives (Article III).

This research showed that WESs' activities to improve safety performance (e.g., safety campaigns) positively affect collaboration among stakeholders (Article IV). Thus, according to SLT, if WES is an authentic safety leader (Cavazotte et al., 2021) due to its job functions and personal characteristics, it encourages employees to participate in safety activities in order to improve safety performance. Dyreborg (2011) showed that safety campaigns, safety training, and safety monitoring systems that are initiated and sustained by management and supported by worker representatives improved worker safety and led to a significant reduction in occupational accidents. The effectiveness of these objectives most often depends on WESs' enthusiasm, motivation, and competence (Borys, 2014; Reiman and Pietikainen, 2014), which, in turn, means that prevention effectiveness is very person-centred (Article IV).

Such personal characteristics as good communication skills, personal empathy, and knowledge of psychology were observed in WESs in this study (Swuste and Arnoldy, 2003), but the most important feature was their willingness to discuss safety-related problems with employees (Article IV). According to SET, psychosocial exchange mechanism, through open and direct communication with employees, helps to identify hidden problems, find a joint solution, improve the social climate, and thus strive to improve the safety and organisation outcomes. Borys (2014, p. 32) noted that safety professionals "who lack the personal skills to engage senior managers may be missing out on the opportunity to add value, irrespective of their knowledge and skills".

Interviews with WESs revealed evidence that they experience several difficulties related to the duties and responsibilities assigned to them as their professional activities, such as employers' and employees' lack of awareness of the field of OSH management, employees' unwillingness to participate in preventative measures or safety campaigns, and a lack of organisational resources (Article IV). These problems, combined with the organisational problems associated with SMEs, make the position of safety manager very difficult and interfere with the fulfilment of their mission.

4 Conclusion

In this chapter, the main research findings are outlined, along with its theoretical and practical contributions, possible implications, practical recommendations, limitations, and some suggestions for further research.

The central aim of this doctoral thesis was to produce a conceptual framework based on cooperation between key persons for the integration of key elements of a safety management system into organisational performance management (PM) to improve OSH performance in different organisations, especially SMEs (MRQ). The author has drawn these conclusions from the scientific literature review and empirical research findings gathered via qualitative semi-structured interviews and quantitative questionnaires. This thesis argues that integrating safety elements into PM will improve safety performance and business sustainability in small and medium-sized enterprises (SMEs).

This research presents a multilevel exploratory survey of a complex phenomenon, OSH management and its practices, in different types, sizes, and scopes of Estonian manufacturing enterprises. This study answered all four research sub-questions (RQ1–4). Organisational PM, as a process necessary to achieve organisation's goals, is fundamentally determined by top management's commitment and is based on constant communication between managers and employees (through employee representation), and the continuity and sustainability of business processes also mean that PM is how organisations, especially SMEs, can survive in times of increasing crisis. To transform organisational PM into a more competitive structure through sustainable development, activities (or key elements) related to workers' safety, health, and well-being are essential as the main value of an organisation derives from its human capital. Based on the qualitative and quantitative findings of this study, a conceptual framework was developed (Figure 7) for organisational PM that incorporates safety elements as a tool to improve OSH performance.

The **broad conclusions** of this doctoral thesis are:

- The study found an incomplete understanding of the position of work environment representatives (WERs) in SMEs and unclear expectations for their functions and activities;
- Typically, WERs are selected from among the line workers, which means they may not hold influential roles within the organisational hierarchy, resulting in challenges to being heard and acknowledged. Although they may be elected through formal processes, employers and subcontractors do not fully acknowledge them as representatives of workers' interests;
- The research reaffirmed that employers' commitment to safety policy procedures stimulates the active involvement of employee representatives in this field, preventing their role from being a mere formality;
- The crucial role of owner–managers (EMPs) in managing OSH in SMEs cannot be overstated. Typically, the safety performance of these enterprises hinges on the actions and personal qualities of their owner–managers. Factors like responsibility, commitment, knowledge, training, and communication, which are inherent to the managers' attributes, directly affect the level of safety culture prevalent within SMEs;
- The research explored that working environment specialists (WESs) possess extensive expertise in managing OSH and are well-versed in ensuring the safety of workers, assessing risks in the workplace, and safeguarding their health and well-being.

Additionally, they are regarded as valuable problem-solvers in the workplace, actively engaged in identifying non-compliant practices and hazards, and proposing practical safety measures to address them;

- Usually, a WES has a more comprehensive understanding of OSH management compared to other workers, such as EMPs and WERs, who may have gaps in their safety knowledge. WES is an adviser, with the employer being the final responsible person for safety management, but the safety manager's knowledge, skills, personal abilities, and organisation influence OSH management;
- A higher level of authority may require the WES to assume more responsibilities, leading to a more significant role in OSH management. Ultimately, a qualified WES is a strategic person for sustainable business management and better safety performance in SMEs.

4.1 Thesis contributions

This subsection summarises the contribution this thesis makes to the field's body of knowledge. Management commitment and safety leadership are the most important drivers of organisational performance and OSH management, and this thesis contributes to increasing the level of safety knowledge. The study's **novelty** lies in its contextualisation of the key elements of a safety management system, development of a conceptual framework for their integration into organisational PM, and the detailed description of the impact that key persons (such as EMPs, WERs, and WESs) exert (through their beliefs, attitudes, influence tactics, and behavioural patterns) on safety performance in the context of manufacturing SMEs.

This study attempts to address the research problem, fill identified research gaps, and make original **scientific and theoretical contributions** as follows: First, this thesis's main scientific contribution is the construction of a research-based conceptual framework (Figure 7) for incorporating key elements of a safety management system into organisational PM (to fulfil RG1 and RG2). This novel conceptual framework creates support for organisations, especially SMEs, to manage OSH via low-cost and simplified methods by using a well-known organisational PM framework based on the PDSA cycle (Figure 4), which the author has expanded to include the key elements of safety that influence the improvement of safety performance (Articles I–IV). This concept offers a useful management tool for addressing safety issues and improving safety performance (Arocena and Núñez, 2010; Legg et al., 2015; Hagqvist et al., 2020). Furthermore, the proposed framework considers the dynamic relationships between OSH performance and OSH management, safety leadership, management commitment to safety, and employee representation in the context of organisational performance (see Figure 1) to create, enhance, and maintain organisational PM (Article I and Article II).

Second, this study expands on the importance of using safety leadership theory (SLT) to ground the theoretical perspectives of the multilevel manifestation of organisational leadership, as well as to present empirical results on this topic in the context of manufacturing LEs and SMEs (Article I–Article III). Most scholars used SLT to explain managers' roles (middle or line managers, senior managers, etc.) as role models in OSH management (Tappura and Nenonen, 2019; Xue et al., 2020; Cheung et al., 2021; Rahlin et al., 2022). In this thesis, the safety leadership concept was used to investigate the dynamics (drivers and barriers, safety behaviour, management commitment, and safety participation) of relationships between multilevel key actors in OSH management as safety leaders at different organisational levels and with different responsibilities (from

voluntary to professionally contracted) through various impacts including motivational inspiration, influence, goal-setting, and performance monitoring, which is a complex issue that has received little attention in the scientific literature (Article IV).

Third, this research contributes to the development of social exchange theory (SET) in the context of OSH management by illuminating the regular and informal processes of social exchange among all stakeholders (Article I–Article III), which should promote interpersonal relationships and multilevel cooperation through reciprocity and commitment to safety goals (Huang et al., 2016; Saleem and Malik, 2022; O'Kane et al., 2022). This thesis also demonstrated how SET can offer a useful lens for studying organisation's PM as it focuses on creating effective interactions and developing social relationships among key persons whose effective relationships are necessary, to fully develop and understand the issue of value exchange between leaders and members (key persons and employees). Additionally, this thesis extended SET by showing the need for organisational support, working communication channels, and a positive social climate as vital parts of the social exchange mechanism in which parties make psychosocial transactions (Article IV). Positive exchanges lead to positive relations and may, thus, improve safety and organisational performance. Negative exchanges worsen relations and can harm safety outcomes.

This thesis also contributes to SET theory by revealing future research opportunities in the OSH and HR management fields in SMEs, especially regarding OSH promotion within small enterprises, by focusing on the incorporation of safety management key elements into organisational management systems (integrated management systems) to enhance overall organisational safety.

This thesis makes several **practical and empirical contributions**: First, it contributes to achieving the sustainable economy goals (UN SDG 3 and 8) and the development of OSH in the EU by supporting the OSH framework that considers SMEs' unique needs as these enterprises represent the core of the EU economic model (Article IV). The proposed conceptual framework (Figure 7) is intended to support cooperation among EMPs, WERs, and WESs to manage OSH. The framework was constructed to highlight the key elements of OSH management that directly help stakeholders improve SMEs' safety and health performance through organisational performance measures. Thus, this thesis moves theoretical study into practice by presenting empirical findings in a practical form.

Second, by responding to Hasle et al.'s (2021) and Johanson et al.'s (2022) calls to explore the possibilities of integrating OSH management with organisational PM through mechanisms that foster more effective cooperation among stakeholders in OSH and organisational PM (Article IV), this thesis contributes to HR management literature on OSH and PM by investigating the under-researched roles of key persons in OSH management (such as management and employee representatives) and their beliefs, attitudes, behavioural patterns, influence tactics, decision-making, and impact on safety performance (Hofmann et al., 2003; Michael et al., 2006; Ahmad et al., 2023). This thesis presents new practical knowledge about OSH management from a broad multilevel perspective that includes key persons within manufacturing organisations of many sizes, discusses their contributions to OSH performance, and provides information on effective collaboration among stakeholders in the working environment (Balfe et al., 2017; Kontogiannis et al., 2017; Hasle et al., 2021; Yao and Johanson, 2022).

Third, this thesis provides new empirical knowledge about OSH management from a broad multilevel perspective that shows how it is part of overall organisational management, emphasises stakeholders' leadership in improving OSH, and highlights the

impact of OSH on organisational performance (Article I–Article IV). This information can be used to develop EMP, WES, and WER competencies in vocational and managerial education, such as by identifying development needs, encouraging personal development, assessing their competence, and tracking their progress (Tappura, 2017).

Fourth, this study aimed to achieve a multilevel and nested form of OSH management with the active participation of all stakeholders (WERs, WESs, and EMPs) (Article I–Article IV). Thus, it presents a framework that differs from single-level management by offering a more dynamic approach that determines the strategy for the development of OSH management at all levels. This highlights that OSH management is an important element of management tasks at different levels and should be supported accordingly.

4.2 Implications and recommendations

This subsection summarises the author's implications and recommendations. This thesis presents practical implications regarding improving OSH management in the private sector with a focus on small and medium-sized manufacturing enterprises and, thus, helps smooth the path to sustainable business growth and competitiveness. The author developed a set of recommendations to transform the study results into practical dimensions that allow legislators, public authorities, education institutions, business owners, managers, safety professionals, and employees to interact, collaborate, and learn from safety practices and experiences.

First, for **legislators** (the Ministry of Social Affairs, the Government, and Parliament), in the context of national OSH policy, the results of this study demonstrate that the current legal status of workers' representation in Estonia (WERs and OSH committee members and employees' trustees) is weak. More legislative protection from pressure or discrimination to ensure the positive impact of workers' involvement in working environment issues and increase enterprises' safety performance is needed.

Second, for **legislators**, the 24 hours of mandatory training for OSH representatives and OSH committee members should be expanded to at least 40 hours (see Hovden et al., 2008) and made more in-depth, including more specific topics such as motivating and influencing skills, communication and listening skills, conflict- and problem-resolution skills, to encourage representatives to use their abilities and tacit safety knowledge to affect OSH outcomes. Additionally, educating employee representatives on preventative measures in the working environment can improve OSH performance by changing workers' unsafe behaviours rather than imposing restrictive or punitive measures.

Third, for **public authorities** (the Labour Inspectorate) that handle OSH policies and exercise practical supervision in this area, this study showed that SMEs and their owner–managers are the target groups that state programs for the intensive monitoring of working conditions and expanding awareness of OSH should prioritise. Given increasing digitalisation, there is a great need for video conferencing both for thematic seminars (lectures and courses) and virtual consultations of labour inspectors (especially in remote places that lack Labour Inspectorate offices).

Fourth, for **educational institutions** at the vocational education school, college, or university levels, there is a need to include courses related to sustainable (development) management, OSH, and ergonomics as mandatory or general studies for all specialities. These courses should increase students' awareness of the importance of sustainability and occupational safety in organisations' activities to increase their efficiency, as well as develop their practical skills for integrating sustainable development into the processes

of managing organisations and achieving operational efficiency. Additionally, OSH management issues could be integrated into start-up training for entrepreneurs to help them understand how a safe workplace improves productivity and quality and minimises operating costs.

Fifth, for **managers** (employers, operations managers, HR managers, OSH professionals and occupational health specialists), there is a need to practically incorporate the identified key elements of safety into organisational management by applying the proposed conceptual model (Figure 7) to ensure increased company productivity, sustainable development, social responsibility, and flexible process management, and to meet consumers' changing requirements.

Sixth, for **managers**, the research findings show that the psychological climate at work is central to employees' increased attention. Therefore, it is important to understand that promoting mental health in the workplace is an ongoing process that needs to be managed well. Enterprises should pay significant attention to actions that improve workers' psychological welfare and increase their knowledge of how to decrease psychosocial hazards and should implement a convenient system to periodically measure the social climate in the work environment.

Seventh, for **managers**, employee representatives indicated their lack of time to perform their functions to ensure the safety of workers (often only 2 hours per week), as well as the need for additional paid time to solve employee safety problems without pressure from management. All stakeholders should be mindful of WERs' need for sufficient time to collect relevant OSH information, and management must recognise their actions.

4.3 Study limitations and future research avenues

This subsection summarises the study limitations and future research directions that the author recommends. The **limitations of the study** include that the nature of the manufacturing industry is changing very rapidly due to the heterogeneous nature of the SME sector, and, thus, the results of this cross-sectional study are time-dependent and may not be comparable to the results of a similar study conducted in the new, changed business environment. As both qualitative and quantitative research methods were used in this study simultaneously, the number of enterprises included was limited (under 20). This sample may not be sufficient to draw conclusions about the manufacturing industry overall. Nevertheless, this study identified broad directions to improve OSH in SMEs.

The second limitation is that as all of the data for this research were obtained from enterprises located in Estonia, a developed EU country with a high-income advanced economy and an emerging safety culture, there are certain limitations on the generalisability of the results. However, they can be extended to some extent to other countries, such as the neighbouring Baltic states of Latvia and Lithuania or other post-communist Eastern European countries that have recently joined the European Union. As this study is cross-sectional and not longitudinal, changes in the results over time are not evident.

The third limitation is connected to the MISHA tool. The MISHA was developed before 2000 (Kuusisto, 2000), then modified by Paas (2015c), and further developed by the author of this thesis, and was mainly designed to investigate the influence of safety policy on safety level development. Other components, such as emerging occupational hazards like digitalisation and teleworking (privacy at work, artificial intelligence, biological factors/pandemics, etc.), are poorly addressed in the original MISHA. The MISHA

also has other limitations: too little attention is paid to the measurement of occupational health hazards, psychosocial factors at work, etc. As mentioned previously, the tool's main emphasis is on safety policy, which may bias its results.

The fourth limitation involves the interpretation of results. As both qualitative and quantitative research methods were used simultaneously, the use of the face-to-face interview method introduces the possibility of interview bias because the interviewer could influence the interviewees' judgment. Similarly, the self-reported quantitative data may be influenced by information bias and recall bias, particularly in reporting absenteeism, injuries, and accidents.

Several **future research** areas are suggested by this research. Although cross-sectional studies can be conducted quickly and require relatively few resources, a longitudinal study is essential to gain a better and deeper understanding of OSH issues in SMEs. As SMEs' economic success largely depends on the competencies of employers, specialists, and workers, the development of these people's competencies and their awareness of safety activities will support the sustainable development of OSH management. Additionally, case studies are necessary to integrate OSH management into SMEs' organisational management.

SMEs are present in various forms of industry, which logically translates into significant differences in working conditions. Those enterprises are more vulnerable to various 'external' causes, such as ownership structure. Safety prioritisation may differ according to whether a small organisation belongs to an LE and whether it is public or private. This question about the differences between the public and private sectors requires further research. The challenges and difficulties facing SMEs in OSH must be thoroughly delineated.

Stressful situations in workplaces are not decreasing as the demands in everyday life change, particularly for the very young and older people who are approaching retirement. These aspects require significant attention to safety and health management from managers. It is challenging to predict how an enterprise will perform in 10 years, but its managers must be ready to control the new risks that may occur and will manifest every day throughout the world. Future studies could focus on specific industries, e.g., construction and mining. The MISHA can also be developed to address automatisation, digitalisation, pandemic issues, crises, etc. These new hazards should be investigated thoroughly and their impact on work life should be determined.

List of figures

List of tables

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Abstract

Conceptual Framework for Integrating Key Elements of a Safety Management System into Organisational Performance Management

In immediate crises (whether medical, financial, or political), each organisation should systematically monitor the overall business environment and forecast potential losses due to employees' unsafe behaviour at work, especially in small and middle-sized enterprises (SMEs). A high level of protection for workers' occupational safety and health (OSH) is not only a preference but a fundamental right, according to the International Labour Organization (ILO, 2008) and the European Pillar of Social Rights (2017).

Therefore, this thesis is an attempt to provide new knowledge about OSH management from the perspectives of employers, OSH managers, and employee representatives in an organisational context that focuses on SMEs. With this knowledge, the research proposes how SMEs' key persons in safety areas can develop organisational performance management by incorporating key elements of the OSH management system to increase organisations' safety performance efficiency.

Focusing on the research aim, the main research question (MRQ) was defined as follows: How can senior management, in cooperation with employee representatives and safety professionals, integrate key elements of a safety management system into organisational performance management? Because the author is examining a complex phenomenon, the q was divided into more specific objectives that are defined as a group of research questions (RQs) to make the study process more manageable and understandable. The research questions are:

RQ1: How can employee representatives' core activities contribute to the development of occupational safety and health management?

RQ2: How can management commitment affect the improvement of safety performance?

RQ3: How can safety professionals influence managers and employee representatives for effective cooperation in occupational safety and health management?

RQ4: Which safety elements support cooperation among employers, employee representatives, and safety managers?

To answer these research questions and achieve the study aims, research was conducted from 2015–2022 with fifteen Estonian enterprises from different manufacturing branches. The study was conducted in three steps. During the first stage, qualitative research was performed, including a literature review and semi-structured interviews with employers, safety managers, and employee representatives. In the second stage, quantitative research was conducted, including questionnaire surveys with the same target groups and the statistical analysis of the collected data via computational techniques. The third stage included the elaboration of results and construction of the conceptual framework for OSH management in SMEs (the research output). The study findings were presented in four scientific publications (Articles I–IV). All four publications related to the MRQ are interlinked and provide information to answer the research questions and achieve the research goal.

The study results describe the influence of different stakeholders (employers, working environment representatives, and working environment specialists) on OSH management in companies. The study confirmed the complex and inconsistent situation

in SMEs given the scope and scale of their economic activities. However, OSH management in many Estonian SMEs did not exceed OSH best practices – or even minimum compliance. Evidence from interviews with employers and owner–managers, together with a literature review, provided a detailed picture of why this situation exists.

The research revealed that formal employee representation in OSH issues is mostly incomplete and the practices of informal representation and consultation with employees were also inconsistent. For management, informal representation was often described as permitting employees to directly contact their immediate managers in the case of safety problems and, thus, to be involved. However, the interviewed employees cited only a few examples of the informal representation of their interests, and even fewer of these were related to safety concerns. The research found that the management of a company plays an important role in involving working environment representatives and motivating them to actively and systematically pass on and solve OSH-related problems. In most SMEs, the manager is also the owner of the company and is responsible for most of the company's administrative tasks, including compliance with OSH requirements.

Due to SMEs' limited resources, their OSH management usually depends on the manager's or owner's general knowledge, personal characteristics, and overall business practices. The success of OSH management depends on commitment from all levels of the organisation, especially top managers. As a result of the study, a new conceptual framework for improving OSH management was proposed based on the key elements of safety important to stakeholders and integrated with organisational performance management based on the Deming circle to enhance cooperation between the managers and employees of organisations.

The broad conclusions of this doctoral thesis are:

• Employers' commitment to safety policy procedures triggers the practical activity of employee representatives in this area and does not allow this position to be merely a formality;

• The owner–managers of SMEs have an irreplaceable role in OSH management. In most cases, safety management performance depends on owner–managers' actions and personal characteristics. Managers' characteristics, such as responsibility, commitment, knowledge, training, and communication, influence the level of safety culture in SMEs;

• The working environment specialist is a leading specialist in OSH management with sufficient knowledge of work safety, risk assessment in the work environment, and workers' health and well-being protection. The working environment specialist is also seen as a problem-solver at the workplace: they are involved in practical safety activities by identifying non-conformities and dangers and recommending safety measures;

• A working environment specialist usually has a better understanding of OSH management than other employees. Other participants in OSH management (employers and working environment representatives) may lack certain safety knowledge;

• Work environment representatives are usually chosen from among the line workers and, therefore, lack strong positions in the organisational hierarchy to ensure that they are heard and listened to. They are sometimes formally elected but not fully recognised by employers and subcontractors as representatives of workers' interests.

The results of this study support the statement that effective OSH management in SMEs depends on management's commitment to safety, employees' participation in safety activities, the safety information flow between employees and managers, safety knowledge management, and learning.

This study's main contribution is the new knowledge it presents about the facilitators and barriers that different manufacturing SMEs face in managing OSH, especially regarding the cooperation among key players. The conceptual framework created during this study includes employers or owner–managers, working environment specialists, and working environment representatives in issues related to OSH management and its systematic development. To consistently increase stakeholders' positive attitudes towards OSH, strong support from the top management of companies is needed. Top management's commitment to OSH is also important for occupational health professionals to motivate employees to participate in occupational safety and comply with safety regulations, thereby improving an organisation's safety performance. Developing management support, sharing resources to improve working conditions, and understanding OSH issues can significantly improve both employee well-being and organisational safety performance.

Lühikokkuvõte

Kontseptuaalne raamistik ohutuse juhtimissüsteemi põhielementide integreerimiseks organisatsiooni tulemusjuhtimisse

Vahetutes kriisides (olgu see tervishoiu, finants- või poliitiline kriis) peaks iga organisatsioon süstemaatiliselt jälgima üldist ärikeskkonda ja prognoosima võimalikke kahjusid, mida võib põhjustada töötajate ohtlik käitumine tööl, eriti väikestes ja keskmise suurusega ettevõtetes (VKEd). Rahvusvahelise Tööorganisatsiooni (ILO, 2008) ja Euroopa Sotsiaalõiguste Samba (2017) kohaselt ei ole töötajate töötervishoid ja tööohutus (TTO) mitte ainult eelistus, vaid ka üks nende põhiõigusi.

Käesoleva doktoritöö eesmärk on pakkuda uudseid teadmisi TTO juhtimisest tööandjate, töökeskkonnaspetsialistide ja töötajate esindajate (töökeskkonnavolinike) vaatenurgast ning organisatsioonilises kontekstis, keskendudes VKEdele. Uuring võimaldab teha ettepanekuid edukamaks jätkusuutlikuks TTO juhtimiseks suurendades omavahelist võtmeisikute koostööd, mis omakorda parandab ettevõtte ohutustaset ja tõhusust.

Eesmärgist lähtuvalt püstitati uurimisküsimus järgmiselt: Kuidas saab tippjuhtkond koostöös töötajate esindajate ja töökeskkonnaspetsialistidega integreerida ohutuse juhtimissüsteemi põhielemendid organisatsiooni tulemusjuhtimisse? Kuna käsitletakse kompleksset ja keerukat TTO juhtimise fenomeni, siis on autor püstitanud täpsustavad uurimise alaküsimused:

UK1: Kuidas saavad töötajate esindajate põhitegevused kaasa aidata tööohutuse ja töötervishoiu juhtimise arendamisele?

UK2: Kuidas saab juhtkonna pühendumus mõjutada ohutuse tulemuslikkuse parandamist?

UK3: Kuidas saavad töökeskkonnaspetsialistid mõjutada juhte ja töötajate esindajaid, et nad tagaksid tõhusa koostöö tööohutuse ja töötervishoiu juhtimisel?

UK4: Millised ohutuse põhielemendid toetavad koostööd tööandja, töökeskkonnaspetsialisti ja töötajate esindaja vahel?

Nimetatud uurimisküsimustele vastamiseks ja uuringu eesmärgi saavutamiseks teostati uuring aastatel 2015–2022 viieteistkümnes Eesti ettevõttes. Ettevõtted esindasid erinevaid toomisharusid. Uuring viidi läbi kolmes etapis. Esimene etapp koosnes kvalitatiivsest uuringust, mis hõlmas olemasoleva kirjanduse ülevaate koostamist ja poolstruktureeritud intervjuude läbiviimist tööandjate, töökeskkonnaspetsialistide ja töökeskkonnavolinikega. Teine etapp koosnes kvantitatiivsest uuringust, mis hõlmas sama valimiga ankeetküsitlust ja andmete statistilist analüüsi. Kolmas etapp hõlmas tulemuste formuleerimist ja VKEde TTO elementidega organisatsiooni tulemusjuhtimise kontseptuaalse raamistiku loomist. Uuringutulemused esitati neljas eraldi teaduspublikatsioonis (Artiklid I…IV). Kõik neli peamise uurimisküsimusega seotud publikatsiooni on omavahel seotud ja esitavad asjakohased tulemused uurimisküsimustele vastamiseks ja uurimiseesmärgi saavutamiseks.

Uuringu tulemused kirjeldavad erinevate osapoolte (töökeskkonnavolinikud, tööandjad, ja töökeskkonnaspetsialistid) mõju TTO juhtimisele ettevõtetes. Uuring kinnitas VKEde keerulist ja ebaühtlast olukorda, arvestades nende majandustegevuse ulatust ja mastaapi. Siiski on selgunud, et TTO haldamine ei lähe paljudes VKEdes kaugemale sellest, mida võiks pidada parimaks tavaks või isegi minimaalseks eeskirjade

järgimiseks. Tööandjate ja omanike/juhtidega tehtud intervjuudest saadud tõendid koos kirjanduse ülevaatega andsid üksikasjaliku pildi, miks see nii on.

Uuringust selgus, et töötajate formaalne esindatus TTO küsimustes on enamasti puudulik, kuid ka mitteformaalse esindamise ja töötajatega konsulteerimise praktikad olid väga juhuslikud. Mitteformaalne esindus tähendas juhtkonna jaoks tihti võimalust, et töötaja saab ohutusalaste probleemide korral otse kontakteeruda oma vahetu juhiga ja on seeläbi kaasatud. Samas oli küsitletud töötajate hulgas vaid üksikuid näiteid oma huvide mitteformaalsest esindamisest ja veelgi vähem olid need seotud ohutusalaste muredega. Uuringust selgus, et ettevõtte juhtkonnal on oluline roll töökeskkonnavolinike kaasamises ning nende motiveerituses edasi anda ja lahendada aktiivselt ja süstemaatiliselt TTO alaseid probleeme. Enamikus VKEdes on juht tavaliselt ka ettevõtte omanik ja vastutab enamiku ettevõtte haldusülesannete, sealhulgas ka TTO nõuetele vastavuse eest.

Ressursi puudumise tõttu sõltub TTO juhtimine VKEdes tavaliselt juhi või omanikust juhi üldistel teadmistel, isikuomadustel ja praktiseeritavatel äritavadel. TTO juhtimise edukus sõltub organisatsiooni kõigi tasandite, aga eriti tippjuhtide pühendumisest. Uuringu tulemusel pakuti välja TTO juhtimise parandamiseks uus kontseptuaalne raamistik, mis põhineb sidusrühmadele oluliste ohutuse võtmeelementidel, mis on integreeritud Demingi ringi loogikal organisatsiooni tulemusjuhtumisse, et tõhustada organisatsiooni juhtide ja töötajate koostööd.

Doktoritöö peamised järeldused:

• Tööandjate pühendumine ohutuspoliitika protseduuridele käivitab töökeskkonnavolinike praktilise tegevuse selles valdkonnas ega võimalda sellel positsioonil olla formaalne;

• VKEde omanik-juhtidel on TTO juhtimise toimimises asendamatu roll. Ohutustulemused sõltuvad enamikul juhtudel omanik-juhtide tegevusest ja isikuomadustest. Juhi isikuomadused, nagu vastutus, pühendumus, teadmised, koolitus ja suhtlemine mõjutavad VKEde ohutuskultuuri taset;

• Töökeskkonnaspetsialist on juhtiv TTO haldamise spetsialist, kellel on piisavad teadmised tööohutusest, et hinnata töökeskkonna riske, et kaitsta töötajate tervist ja heaolu. Töökeskkonnaspetsialisti nähakse ka töökohal probleemide lahendajana: ta on kaasatud praktilisse ohutusalasesse tegevusse tuvastades puudusi ja ohte, soovitades ohutusmeetmeid;

• Töökeskkonnaspetsialist mõistab tavaliselt TTO haldust paremini. Teistel TTO juhtimise kaasosalistel (tööandjad ja töökeskkonnavolinikud) võivad mõnedes küsimustes puududa ohutusealased teadmised;

• Töökeskkonnavolinikud valitakse tavaliselt liinitöötajate seast ja seega ei saa neil olla organisatsiooni hierarhias tugevat positsiooni, et neid kuulda võetaks ja ära kuulataks. Neid valitakse mõnikord ametlikult, kuid tööandjad ja alltöövõtjad ei tunnusta neid päriselt töötajate huvide esindajateks.

Uuringu tulemused toetavad väidet, et tõhus TTO juhtimine VKEdes sõltub juhtkonna pühendumisest ohutusele, töötajate osalemisest ohutustegevuses, ohutusteabe liikumisest töötajate ja juhtide vahel, ohutusteadmiste juhtimisest ja õppimisest.

Käesoleva uuringu peamine panus seisneb uutel teadmistel abistavate tegurite ja takistuste kohta, millega erinevad tootmis-VKEd TTO juhtimisel kokku puutuvad, eriti, mis puudutab võtmeisikute vahelist koostööd. Uuringu käigus loodud kontseptuaalne raamistik hõlmab tööandjaid või omanik-juhte, töökeskkonnaspetsialiste ja töökeskkonnavolinikke TTO juhtimise ja selle süstemaatilise arendamisega seotud küsimustes. Selleks, et sidusrühmade seas järjepidevalt tõsta positiivset suhtumist

TTOsse, on vaja ettevõtete tippjuhtkonna tugevat toetust. Tippjuhtkonna pühendumus TTOle on oluline ka töökeskkonnaspetsialistidele, et motiveerida töötajaid osalema tööohutuses ja järgima ohutusnõudeid, parandades seeläbi ohutuse taset. Juhtkonna toetuse arendamine, töötingimuste parandamiseks ressursside jagamine ja TTO küsimuste mõistmine võib oluliselt parandada nii töötajate heaolu kui ka organisatsiooni ohutuse tulemuslikkust.

Appendix I

Article I

Hrenov, G., Paas, Õ., Tint, P., & Reinhold, K. (2016). Workers' representation in OHS activities: Example of Estonian industrial sector. *Agronomy Research*, 14(2), 377–391. https://agronomy.emu.ee/wp-content/uploads/2016/05/Vol14-_nr2_Hrenov.pdf

Agronomy Research **14**(2), 377–391, 2016

Workers' representation in OHS activities: Example of Estonian industrial sector

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Abstract. The safety level in 11 Estonian enterprises was investigated. Some of them have implemented OHSAS 18001 or belong to foreign corporations. These enterprises have generally good or very good safety level. The larger the enterprise is, the better are the possibilities to give regular training for the work environment representative (WER) in occupational health and safety. The study includes quantitative and qualitative study. The MISHA method is used as the tool for quantitative study. The parts from the interviews with the enterprises representatives' (management and employees) concerning the role of the WER in the safety performance (qualitative study) are included. The clarification and appropriate application of the WER's role and position are the key elements to raise the safety level at enterprises. Two hypothesis: 1) on the connections between the real and formal safety elements concerning WERs and 2) OHSAS 18001 implementation effectiveness on safety activities (including WERs' role improvement) were proved with statistics: Factor analysis were carried out with *KMO and Barlett's* test, *ANOVA and T-square test with Wilks' Lambda row*. Additionally, knowledge management in safety may enhance the activities among WERs and thus, increase the safety performance in enterprises.

Key words: work environment, safety and health management, management responsibilities in safety and health, work environment representative, safety activities at small and medium-sized enterprises.

INTRODUCTION

Work environment is a broad term and means all surroundings when worker is engaged in the work process. The physical work environment contains work tools, inconvenient indoor air, noise, insufficient lighting, vibration, electromagnetic fields, but also chemicals and biological agents. Furthermore, the work environment includes the psychological aspects such as work organization and the worker's wellbeing at work.

The previous study for improvement of safety and health at workplace (Paas et al., 2015a, b, c) determined the nature of real, formal and combined safety elements and the importance and possibilities to harmonize the safety level in advanced companies (e.g. enterprises which possess OHSAS 18001) and companies without any systematic work in occupational health and safety (OHS). In an enterprise where safety is a priority and safety activities are regular and systematic, usually three levels of management line in OHS exist: the top or product manager, the work environment specialist (WES) or safety manager and the work environment representative (WER). The latter may be the weakest link in the chain, especially because of lack of time to devote oneself on safety and health matters. The legislation (Occupational Health and Safety Act of Estonia (OHS Act),

1999) allows the WER to perform OHS duties for two hours per week. Often, this seems not to be enough.

The activities of WER often depend on company's type: either locally owned small or medium-size enterprise or belonging to a bigger corporation. The implementation of OHSAS 18001, due to systematic audits, improves the knowledge of all the key employees in the safety and health management chain. The previous research has also suggested possibilities of offering safety training through MISHA questionnaire, used as the tool for assessment of safety level in both OHSAS 18001 implemented and non-implemented Estonian enterprises (Paas et al., 2016).

Work environment representatives shall safeguard the interests of staff in matters relating to the working environment (WE) and ensure that the regulations on OHS are followed. The WER is elected by the employees of the company and his/her main role is to represent the employees in issues related to OHS. Additionally, if the company's size exceeds 50 workers, a working environment council must be formed. This is an internal association where OHS-related issues are discussed and possibly resolved. Employer and employee representatives are members of the council in equal part. The WER has the duty, among other things, to represent the workers in work environment-related issues. OHS Act (1999) states that the employer and the employee should co-operate and work together managing working environment. As the WERs know the best the workers and workplace connected health and safety problems, it is important to involve them in positive progress of safety level in the company. It is also clear that employee's behaviour is one of the greatest determinants in workplace safety that can be influenced by WER's good examples.

By the Occupational Health and Safety Act (1999), WER has been guaranteed with a number of rights. The WER has, among other things, the authorisation to: a) receive training, b) be a part of actions that concern the relationships in the WE and c) participate during the planning of new premises as well as changes in the premises (OHS Act, 1999).

Special attention is needed for enterprises who belong to small-sized enterprises, with 10-49 employees who tend to see less practical value in WER activities and often excuse with other priorities (Sorensen et al., 2007; Paas et al., 2015a).

The research question is the following: is it possible to raise the safety level in a small and medium-scale enterprise prioritizing the role of the work environment representative?

Hypothesis H1. The firm type has a significant impact on real safety performance?

Hypothesis H2. Implementation of OHSAS 18001 helps effectively to organise OHS activities in the companies?

THEORETICAL APPROACH

Organizational culture is a concept that is often used to describe the values that influence members' attitudes and behaviours. Safety culture is a sub-facet of organizational culture (Cooper, 2000). There are three components in the organization that it is necessary to follow: focusing on physical workplace, focusing on people, focusing on management issues (Makin & Winder, 2008).

The work accidents in industrial enterprises continue to happen. The decrease of accidents could be foreseeable with the change of safety culture. Safety culture has been identified as a critical factor that sets the tone for importance of safety within an

organization (O'Toole, 2002). Different levels of safety culture can be distinguished: pathological, reactive, calculative, proactive and generative (Parker et al., 2006). Creating the better safety culture requires not only stronger surveillance from the side of Labour Inspectorate (state surveillance), but also a mental change and an authentic commitment from firms, where everyone participates and commits themselves to OSH (Fernandez-Muniz et al., 2007; 2009).

To the development of a good safety management system positively influences the employees' involvement and participation in safety activities. Safety researchers have become increasingly interested in understanding how social exchange processes help to shape the safety-related perceptions and behaviours of employees (DeJoy et al., 2010). Various theories have been used to explain the exchange relationship between organizations and employees, but theories involving organizational support have been most common (DeJoy et al., 2010).

A major incident is generally the result of a number of interacting human, technological, environmental and organisational factors all influenced by the prevailing safety culture. However, extensive time and resources are often required to undertake a detailed assessment. Factor analysis was used to structure eight underlying dimensions: management commitment, leadership, learning, risk, communication, competence, processes and procedures, and engagement. In order to help an organisation diagnose the extent of behavioural failures, the factor structures were grouped to assess learning, compliance, intervention, reporting and progressive (cultural sustainability) sub-cultures (Fernandez-Muniz et al., 2007; 2009). It is an advanced approach for analyse the accidents' possible mechanism scientifically.

In DeJoy et al. (2004), the employees were asked about the extent to which their organization has specific policies and programs related to such matters as safety training, hazard communication, and personal protective equipment. The safety level at enterprise was improved. Employee behaviour is arguably one of the greatest determinants in workplace safety, especially as employees interact with varying issues. Nevertheless, every person's behaviour is unique, and even one particular person's behaviour can change from day to day. No employee can think about safety continuously.

According to Wachter & Yorio (2013), the most important tools for improvement of employee's behaviour are improvement of communication, the leadership commitment to health and safety, working and solving problems in teams, adequate training, risk assessments with practical value, reporting of near-accidents, quality-based improvement processes.

In the ageing society, beside workers' safety, also health and well-being of workers have become important topics at the workplaces (Danna & Griffin, 1999). First, health and well-being can refer to the actual physical health of workers; second, health and well-being can refer to the psychological and emotional aspects of workers as nowadays trends in illnesses structure (Danna & Griffin, 1999).

The paper of Hovden et al. (2008) examines the role of WERs in the modern working environment. The data from Norwegian offshore oil and gas sector showed that employers rely more on the capacity of the formal health and safety management systems, than do the WER put more emphasis on the need for daily and continuous health and safety consultations. The study also revealed that the climate of participation and

collaboration is assessed by the safety representatives as being less conductive to the overall objectives of the health and safety regulations than perceived by the managers. The results of the study also demonstrate a lack of consistency between identified problems in the role of WERs and proposed measures of improvements in their role and functions.

There is a need for safety climate measurement instruments (Hall et al., 2013). Measurement of safety climate requires an instrument to record employees' self-reported perceptions on safety issues. The safety climate instrument has to be theory-based. The method worked out by Hall et al. (2013) consists of the following parts: 1) manager and supervisor attitude toward safety, 2) risk, 3) group norms, 4) workplace pressure, 5) competence, 6) safety system. They all are directed to intention to follow safety procedures. Testing the Hall model among managers, supervisors and other employees, the result showed that managers and supervisors self-reported a significantly higher safety climate than other participating employees.

There is a strong connection between worker representation and participation and the establishment of an effective preventive OHS system at the workplace (Walters et al., 2005). Working in small enterprises, there is a bigger risk to get into accident or get injury than in big enterprises (Sorensen et al., 2007; Kongtip et al., 2008). In small enterprises:

1) there is a higher risk of severe and fatal accidents;
2) there is a higher risk of minor accidents if all accidents are reported;
3) OHS management system is less common;
4) there is only scattered data about other hazards.

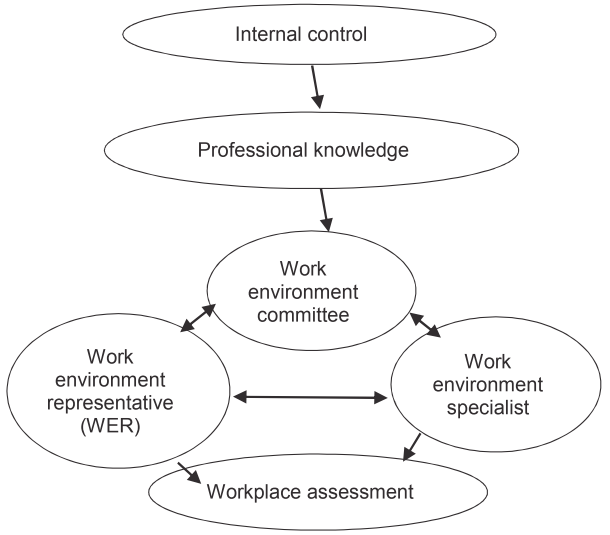

Figure 1. The arrangement of OHS command at workplace.

The OHS activities in the Nordic countries are organized (Karlsen & Lindoe, 2006), combining a top-down and a bottom-up approach to the organizing of health and safety activities to be effectuated as a part of the line organization (Fig. 1), where everyone at his/her level has a particular responsibility to improve the OHS quality of the workplace. The overall responsibility rests with the employer, who will seek the support both from his professional staff and from the participants in the OHS organization of the company. The same model applies to Estonia as well; nowadays Labour Inspectorate offers free consultancy in OHS expertize for those enterprises where professional knowledge is lacking.

OHS experts are not available in small enterprises in Estonia, therefore the professional knowledge has to be ordered outside.

Four areas in MISHA: A) organization and administration (including safety activities in practice (**A2,** the numbering in Kuusisto, 2000)), including in turn WER activities (**A2.6**), B) participation, communication, and training; C) work environment, D) follow-up.

Formal safety elements include (in parenthesis given the influence of OHSAS 18001 implementation in Estonian enterprises to the safety key element, correlated to the total safety level (score)): safety documents, contents of the safety policy (R = 0.895), revising the safety policy (R = 0.972), written policy (R = 0.964), assignment of tasks and responsibilities (R=0.885), safety policy's connections to the company's other activities (R = 0.964) and follow-up of accidents statistics (R = 0.929) (Paas, 2015a). These were the most correlated safety key elements that influenced on the total safety level positively.

Real safety elements include the safety key elements from the part **A2** as follows: top management's, line management's and supervisor safety knowledge; resources**.** From this part, OHSAS 18001 implementation in the enterprise influences only on resources (Paas, 2015a, p.30).

Combined safety elements include the safety key elements from the part **A2** as follows: 1) safety committee/ and or other cooperative teams, safety manager, safety representatives (WER) and/ or other cooperative teams (**A2.6**). The results (Paas, 2015a) show that all these elements have no correlation with the total safety score at the enterprise.

The safety activities in practice (**A2**) include (MISHA, Kuusisto, 2000): 1) top management's safety knowledge, 2) line management's safety knowledge, 3) supervisor's safety knowledge, 4) safety committee and/ or other safety team, 5) safety manager, 6) **safety representative (WER)** and/or other personnel representative(s) (**A2.6**), 7) occupational health services and 8) resources.

MATERIAL AND METHOD

Eleven Estonian manufacturing enterprises (Table 1) were examined with modified MISHA method (Kuusisto, 2000) for clarifying the role of the WER in OHS matters as well as for studying the perspectives to improve the safety level of the enterprise through more effective WER activities.

The qualitative study was carried out in these 11 companies in the form of interviews of before given persons. The interviewing of employer or WER both give the

information about the present and possible role of WER. The interviews were assessed independently by all the authors of the current paper. The interviews were also taken as the basis for the quantitative study.

For assessment to the MISHA questionnaire, the Likert scale (1 – poor, 2 – average, 3 – good, 4 – very good, 5 – excellent) was used.

The safety key elements connected with the WER activities at enterprises are presented in Table 3. The questions from the MISHA questionnaire that concern the WER activities in enterprises and analysed in the current study, are as follows:

A1.5. Participation in the preparation of the policy: the participation of employers, WER and other workers' representatives is very important as so the information motion inside the enterprise is achieved.

A1.6. Initial status review: contains the first description of the work environment situation included into the safety policy.

A1.10. Informing external bodies about the policy: it is suggested that somebody outside (e.g. the inspector from the Labour Inspectorate or from the accreditation authorities) has examined the content of the policy. This part also includes how the temporary workers, sub-contractors and clients can access the safety policy of the current enterprise.

A2.4. Safety committee: if the enterprise has the safety committee, containing from the workers 'representatives (WERs) and the representatives of the employers, the safety and health questions at work are better dealt with and improvements in the field of OHS are possible.

A2.5. Safety manager: if the enterprise has the occupation as safety manager, the questions of safety certainly are in the foreground and the safety level could be improved. Usually, in Estonia, the enterprises are small-scale or medium-sized and they cannot afford the occupation 'safety manager'. The responsibilities are usually taken by the production manager or even by the manager of human resources.

A2.6. Safety representative: (or called working environment representative) is the workers' delegate in the safety committee. His (her) possibilities to improve the safety level at enterprises are very large. Enough time to deal with the safety matters has to be given to WER. He (she) has to be trained and the employer and safety manager have to be in good relations with the WER.

A3.3. Selection of the line management: the candidates have to be able to evaluate how the personnel copes with the work, to motivate the personnel, to be able to identify the health and safety hazards and handle the problems related to the human relations.

B3.1. Safety training needs: it has to be insured that the employees can to participate in the evaluation of the safety trainings. The safety training has to cover all the personnel groups.

D1.2. Accident investigation: the question concerns if there in the company, a person who investigates the accidents, is defined. If the corrective actions have been identified in the safety policy how to prevent similar accidents to occur, this gives the extra points to the safety level.

D3.1. Assessment of the social environment: does the company have a system for measuring social climate (e.g. climate surveys)? Are the corrective actions done immediately when problems to social relations have been observed?

In some of these companies, employees from three different level in the line of the safety management system were interviewed: the employer, the work environment

specialist and the work environment representative. In locally owned companies, where the safety level is rather low, the managers did not recommend to have interviews with WER as their knowledge in OHS tends to be low. This presented the quantitative study.

The possibilities to improve and subsequently to use the knowledge of the WER in OHS are different in corporated or OHSAS 18001 implemented companies compared with small and medium- sized locally owned companies.

The statistics used in the paper involved IBM SPSS Statistics 22.0 and R.2.15.2. The following statistical methods were used: correlation, MANOVA, factor analysis, principal component method, independent T-test (Field, 2013).

RESULTS

The results of the quantitative analysis are given in Table 1. In the first columns the characterization of the investigated enterprises is given. The interviews with the enterprises' representatives (column 5) carried out and recorded, were afterwards listened and analysed by the four authors of the paper independently. The total average score (column 6) is derived with MISHA method.

Table 1. The characterization and results of quantitative study by the MISHA method in the investigated enterprises (N = 11)

1	2	3	4	5	6
Id. of the company	The activity area	Size, employees	OHSAS company /corporated company	The person interviewed: position, age	Total average score (100 max)
I	Plastic industry	50–249	+/	Quality manager, 41 Safety manager, 62WER, 25	78 76 78
II	Electronics	> 250	/+	Quality manager, 35 Safety specialist, 42 WER, 53	84 90 80
III	Food industry	> 250	/+	Safety manager, 62 WER I, 34 WER II, 39	75 80 58
IV	Electronics	> 250	+/	Quality manager, 59 Safety manager, 39 WER, 66	92 88 78
V	Textile industry	50–249	-/-	Production manager, 38	47
VI	Printing industry	< 50	-/-	Production manager, 36	29
VII	Glass industry	< 50	-/-	Production manager, 41	41
VIII	Chemical industry	50–249	+/	Management's representative, 55 WER, 62 External auditor, 34	88 85 78
IX	Chemical industry	50–249	+/	Management's representative, 45 WER, 40 External auditor, 34	87 87 78

Table 1 (continued)

X	Metal industry	50–249	-/-	Management's representative, 40	61
				WER, 53	55
				External auditor, 53	50
XI	Metal industry	> 250	-/+	Safety manager, 35	89
				Trade union representative, 60	86

Quantitative study:

The total scores given on the safety level, derived with the MISHA method (Paas et al., 2015a) from employer, WES and WER were compared. In the corporated companies and OHSAS 18001 companies, the total scores are high (80–85 from 100 possible). In locally owned companies, the scores are lower (below 50 from 100 possible). There is no significant difference between the scores given by three employees involved in safety in the same company in the corporated or OHSAS 18001 implemented companies. In some companies, only a slight decrease in the case of WER compared to employer representative was observed. The situation varies in locally owned companies. The scores do not differ significantly, but the knowledge of WER in these companies about safety matters was negligible and was clearly seen and heard in the interviews carried out by the safety experts.

The difference between the meanings of the assessors (employer, auditor or WES and WER) was until 24.7% in some of the subareas, like A) organization and administration (including safety activities in practice, including in turn WER activities), B) participation, communication, and training; C) work environment, D) follow-up) containing in the MISHA method.

The correlation analysis connected with safety activities areas (including WER)

The most correlated safety key elements in the studied enterprises were: top management commitment to the safety policy & resources (R = 0.99); revising the safety policy & resources (R = 0.96); written safety policy & resources (R = 0.95); safety policy's connections to company's other activities & resources (R = 0.95); assignment of tasks and responsibilities & resources (R = 0.93); dissemination of the policy & resources (R = 0.93); follow-up of accidents and illnesses & resources (R = 0.93); participation in the preparation of the policy & resources (R = 0.92); contents of the policy & resources (R = 0.91); resources & assessment of the social work environment (R = 0.9); WER & the content of the policy (R = 0.9).

The results can be interpreted as follows: a) the safety overall safety level depends on the resources given to the OHS activities by the employer in the enterprise; 2) the psychosocial work environment is getting gradually more attention by the employees; 3) the workers are not involved on practical issues of safety policy development, yet.

Among OHSAS 18001 implemented enterprises, there is a strong correlation between safety activities in practice **A2** & personnel management (R = 0.7); safety activities in practice **A2** & personnel safety training (p = 0.05). Among non-OHSAS the correlation between safety activities in practice **A2** & personnel management is 0.94

(p = 0.1); safety policy & safety activities in practice **A2** R is 0.90; safety activities in practice **A2** & hazard analysis procedures has correlation coefficient R = 0.88.

Safety activities in practice **A2** (MISHA) has good correlation in all non-OHSAS companies in Estonia (Fig. 2).

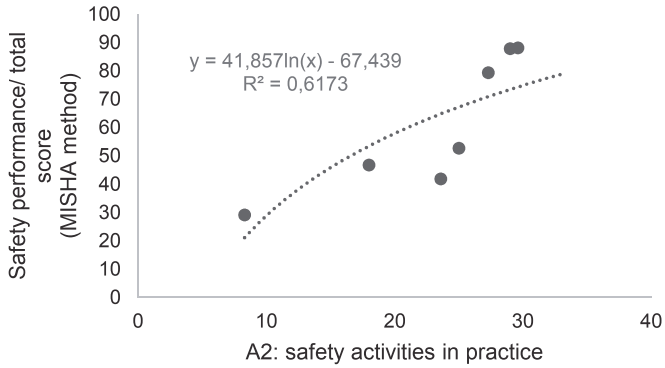

Figure 2. The influence of safety activities (including WER) on the total safety score in non-OHSAS companies.

Hypothesis H1

Factor analysis were carried out with KMO and Barlett's test (Field, 2013). The alpha correction (ANOVAs with Tukey's HSD post-hoc tests) was implemented and so the **H1** and **H2** were confirmed.

From **A2,** the following key elements were taken into the statistical analysis: top management, line management and supervisor safety knowledge, safety manager, WER, occupational health services activities and resources for these activities (Table 2).

The result showed that there was a statistically significant difference in real safety performance based on a firm type (OHSAS or non-OHSAS), F (26.2) = 17.311, $p < 0.1$. Wilk's $\Lambda = 0.000$, partial $\eta^2 = 0.996$. Power to detect the effect was 0.854.

It can be concluded from the Table 2 that at the present time, the firm type influences the safety policy part in the OHSAS implemented and non-OHSAS companies (p = 0.000), but only concerning the safety activities in practice on the top management's safety knowledge (p = 0.039). The role of WER is not significant (p = 0.350). At the same time, the firm's type is significant on the supervisor/employee communication (p = 0.001) and on general communication procedures (p = 0.006).

Table 2. Correlation between the safety key elements **H1**

Safety key element	Sum of squares (KMO and Barlett's test)	p-value
A1.2.Top management commitment to the safety policy	22.250	0.000
A1.9.Dissemination of the policy	21.007	0.000
A2.1. Top management's safety knowledge	3.005	0.039
A2.2. Line management safety knowledge	0.854	0.383
A2.3. Supervisor's safety knowledge	0.410	0.412
A2.5.Safety manager	0.540	0.450
A2.6. Safety representative	**0.250**	**0.350**
A2.7. Occupational health services	2.410	0.193
A2.8. Resources	22.688	0.000
A3.4. Promotion, rewards and career planning	4.264	0.006
B1.1. Supervisor/employee communication	**5.672**	**0.001**
B2.1. General communication procedures	**2.896**	**0.006**
B2.3. Suggestions for improvements	5.500	0.027
B2.4. Campaigns	9.797	0.039
C1.2. Chemical hazards	3.563	0.021
C1.8. Maintenance	4.500	0.002

Hypothesis H2

There was a statistically significant difference in both formal and real safety performance based on a firms type (OHSAS and non-OHSAS), F (26.2) = 11.472, $p < 0.1$; Wilk's $\Lambda = 0.000$, partial $\eta^2 = 0.993$. Power to detect the effect was 0.730.

The type of the firm (Table 3) influences on the policy section (A1, p = 0.000-0.001). We can see from the Table 3 that the safety committee's (p = 0.214), safety manager's (p = 0.220) or WER's (p = 0.282) position in Estonian enterprises is very low. At the same time, the significance of selection of a safety manager (personnel policy), safety training needs (p = 0.000), assessment of social environment (0.000) were very high. These are the areas in the enterprise, where WER can influence in case her/his position is supported by the regulations and the employer.

Table 3. Correlation between the safety key elements **H2**

Safety key element	Sum of squares (KMO and Barlett's test)	p-value
A1.5. Participation in the preparation of the policy	21.250	0.000
A1.6. Initial status review	13.375	0.001
A1.10. Informing external bodies about the policy	17.241	0.001
A2.4. Safety committee	**3.200**	**0.214**
A2.5. Safety manager	**1.194**	**0.220**
A2.6. Safety representative	**1.521**	**0.282**
A3.3.Selection of the line management	3.063	0.017
B3.1. Safety training needs	8.491	0.000
D1.2.Accident investigation	4.125	0.007
D3.1. Assessment of the social work environment	19.125	0.000

Qualitative study:

Case A: a company, belonging to the foreign concern with a high safety level has 16 WERs per 250 workers, one in each department. The safety committee meetings are carried out regularly; all the WERs are included in the mailing list of the meetings. Written reports of the meetings are distributed to the WERs after the meeting, the distribution of information in the company is very good. Even when WERs are informed well, they are not involved in decision-making processes concerning OSH such as preparing safety policy, conducting risk assessments etc.

The question (**1**) to the work environment specialist (WES): '*Are the WERs as the representatives of workers allowed to make changes in the safety policy?'*

The answer: '*No, the safety policy is given in the written form to the subsidiary company (in Estonia) from the owner of the corporation (in Finland)' (Company A, Int 1)*

Case B: a small locally owned company (15 employees), where OHS matters are not a priority and no systematic OSH work is visible. A production manager (PM) has shortly signed to fulfil the responsibilities of WES, on labour inspector's request. The risk levels of occupational hazards in manufacturing department are high. Before the visit of the labour inspector, the responsibilities in OHS were delegated to the accountant. At present, she represents workers as WER, however no formal elections have been organized and her knowledge in OSH is questionable. There are several areas where WER can be involved; however, the PM and WES do not see the potential in her. Many safety shortages were identified during the interview, for example how to maintain the protective clothing or educate experienced workers in safety matters or how to involve the workers to risk assessment process.

The question (**2**): '*How do you carry out the protective clothing maintenance? Is there a washing machine in the enterprise or is it performed by the subcontracting firm?'*

The answer of the PM: '*We have the washing machine, but we do not use it, as the workers wash the work clothes at home together with the other everyday clothes*.' *(Company B, Int 2)*

Additionally, the PM confessed that the workers have not been told about the danger of the sharp particles that can be found in the work clothes and the work clothes are not allowed to wash together with the everyday ones. No WER is involved in this problem.

The question (**3**): '*Has the car driver educated in slippery road driving (the courses are available in Estonia) or has he provided with sunglasses for creating the better driving conditions*?'

The answer of the PM: *'The driver has worked already 40 years without sunglasses and he knows how to drive the car in winter. Training is not necessary*.' *(Company B, Int 2)*

The question (**4**): '*Is the risk analysis carried out and improved according to the changes in the industrial process regularly? Is the action plan to reduce the risk level compiled in the enterprise?'*

The answer of the PM: '*We have carried out measurements of noise and conducted risk analysis after the visit of labour inspector, but as the noise level was not over the norm, we have not had time to compile the action plan.' (Company B, Int 2)*

The PM of the company pointed out that template for work descriptions would be useful from the side of Labour Inspectorate to support the overall improvement of the OHS level in small and medium-sized enterprises in Estonia.

Case C: a locally owned company with 40 workers. The production manager (PM) was questioned. A lot of OSH shortages were identified; no systematic work and no representation of workers in OSH matters were detected. No clear answer was given about safety policy and it is quite clear that workers are not informed about it.

The question **(5)**: '*Do you have the safety policy at the enterprise? Who has compiled it?'*

The answer of the PM: '*We had something when the ISO (?) was implemented; something has still remained from it. We have no WES, also no WERs. Everything is explained during the production process. If a new machine is obtained, then the providers train the workers in safety matters.' (Company C, Int 4)*

The question (**6**): '*Have you visited the occupational health doctor lately? Do you have the plan for medical examinations of workers?'*

The answer of PM*: 'No, we have not the plan, but I visited the doctor over 5 years ago.' (Company C, Int 4)*

Case D: a corporated enterprise with 25 employees. The production manager (PM) was questioned. The safety level in the company is high. WERs have been elected, no WE committee needed, but two workers in the production area are continuously following the hazards in the work environment (using measurement devices). Safety as seen as an investment and not as an expense by the management. Line and top managers possess high knowledge in safety matters. Recently, a special meeting concentrating on safety matters, was organized internationally, were all 10 subcontractors from different countries participated. However, some shortages were identified during the interview, mainly about safety policy and dissemination of the document among workers – where WER can be involved. The management had an attitude that workers do not need to know the general policy about safety, they should concentrate on their workplace safety only.

The question (**7**): '*Do you have the safety policy? Are workers aware of this policy?'*

The answer of the PM: '*The policy has been worked out by the foreign owner (some corrections from Estonian side were possible). The workers need not know about the details of the policy.' (Company D, Int 6)*

DISCUSSION

Our study revealed that management plays an essential role in WER's systematic and active work and workers' participation on workplace health and safety matters. In O'Toole (2002), it is also postulated that management leadership is influencing the employee perceptions of the safety management system. Those perceptions appear to influence employee decisions that relate to at-risk behaviours and decisions on the job. Organizational commitment did affect perceived safety at work, but not on work accidents (DeJoy et al., 2010). According to our study, management commitment to safety policy forms a positive starting point for regular activities of WERs. Studies of occupational safety program effectiveness have also highlighted safety policies and programs as important ingredients of effective programs (DeJoy et al., 2004). Neal et al.

(2000) also found a relationship between general organizational climate and safety climate: when the organizational climate improves (the standards are implemented), the safety climate also will be better.

Our study examined three different types of companies: OHSAS certified companies, corporated companies and small and medium-sized locally owned companies. It turned out that the definition of 'small enterprises' is not sufficiently specific. Small enterprises cover many types of work activities, which naturally lead to large differences in the work environment. Small enterprises are more susceptible to influence from various 'external' sources e.g., though the ownership structure. It might be important whether the small enterprise is part of a larger organization and whether it is publicly or privately owned (Sorensen et al., 2007). This problem remains for the future research.

Compared to Estonian OHS system in companies, Nordic OHS regime contains three different collaborating arenas or structures within the company: 1) a work environment or safety committee with balanced representation from the parties; 2) safety representatives elected by the employees; 3) in-house or external health and safety experts employed by and representing the management (Lindoe et al., 2001). According to the OHS Act (1999), based on EU Framework Directive 89/91, the employer and employees have to co-operate and there have to be opportunities for both parties to consult on the relevant OHS matters. The ensuring right of worker participation is stated in mandatory forms of industrial health and safety national legislation and in the EU Framework Directive 89/391. In Estonia, WER has to be trained following the 24-h training programme provided in the regulation. In Norway, the social partners agree that a 40-h course covers the basic training necessary to function as a WER (Hovden et al., 2008).

In our qualitative study, we concluded that WERs assessed the time for dealing with OHS matters unsatisfactory. The results in Nordic countries (Hovden et al., 2008) show similar pattern – often WERs complained about lack of time. The examples of the best experiences of the Nordic countries should be used in order to increase workers' participation and representation in health and safety matters.

CONCLUSIONS

The answer to the *hypothesis H1*: the firm type (OHSAS-implemented and non-OHSAS enterprises) has an impact on real safety performance.

The answer to the *hypothesis H2*: the type of the firm has a significant impact both on formal and real safety performance.

The general conclusions are following:

1. The position of safety representative has often a low status in the company.
2. WERs do not have enough time to fulfil their safety functions to keep employees safe.
3. There is a limited understanding among employers about the role of WER. The study showed that in small enterprises, the WER has a formal position, although required by the law. In that case, employers do not understand the need of the WER and while electing them only formally, there is no practical value and often, employees are unaware of the position. The interviews also revealed that it is complicated to find the candidates to the WER position even in larger companies, especially in locally owned companies

as managers do not know how to motivate workers on taking an additional responsibility. Safety management system plays a role in effective work of WERs. If the management does not give enough priorities to OHS, the employees will follow the example of the employer. WER should be elected among the peers rather than using WERs from other departments.

4. The WER of the organization is not well known or acknowledged by all the employers and subcontractors. The subcontracting work may cause several accident and near-accident situations. The importance of the person (WER), who knows how to deal with the problems in OHS, becomes evident only after the accident has occurred or some of the workers are already seriously ill with occupational disease, such as musculoskeletal disease. The MSD is, at the present time, the number one occupational illness in almost every European country (Kaergaard & Andersen, 2000).

5. Doing WER work successfully is difficult due to conflicting expectations from employer and colleagues. The interviews revealed that nobody in the enterprise wants to be the resolver of a risky situation or even accident. Therefore, it is particularly important to prevent these situations by increasing the knowledge on OHS. For this occasion, WER and his/her knowledge and activities are a very good solution. It is important to mention that he/she needs enough time to gather the information on OHS and his/her activity has to be acknowledged by the employer.

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Appendix II

Article II

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Employers' Role in the Improvement of Safety Level in Estonian Enterprises

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Abstract. ***The key persons in safety activities at enterprises are: top manager, his(her) representatives, working environment specialist, all acting for the employer; and working environment representatives, selected by the workers and holding the workers' rights in safety and health area. The main possibilities to improve the safety level in the firm have the working environment specialists, as they are usually educated and supported by the employer and the law. The current paper is looking for the possibilities to raise the employers' interest for improvement of their knowledge in safety and through this also the safety level in the workplace. Safety level in 12 Estonian enterprises was investigated using MISHA method (based on standard OHSAS 18001). Some of the firms have implemented OHSAS 18001 or belong to the foreign companies. The investigated enterprises were from different industries and agriculture firms. The safety level is very much depended on the owner of the firm. The larger the enterprise is the better are the possibilities to educate the employers and employees. One of the ideas to improve the safety level at enterprise is the method "learning through the interviews". The interview is worked out basing on MISHA method. The latter is a tool of quantitative study. The safety performance key elements were divided into three parts: formal, real, combined ones. Three hypothesis were formulated and the area in which they are proved concerning employer's activities were as follows: H1) Standard OHSAS 18001 has an impact on Formal safety performance in companies (p value< 0.013) – if OHSAS 18001 has been implemented, then: the assignment of tasks and responsibilities in OHS is committed to the top management, the employer is revising the safety policy, and the personnel's responsibilities in OHS are clearly defined. H2) Standard OHSAS 18001 has an impact on Real safety performance. (p< 0.013) - if OHSAS 18001 is implemented, then: the top manager promotes dissemination of safety policy: the policy is made available to all of the personnel; resources for improvement are arranged by the top management; the top manager arranges meetings in OHS; there is a system for redesigning the workplaces for the persons who have difficulties in coping with the work. H3) Standard OHSAS 18001 has an impact on Combined safety performance (p< 0.007) - if OHSAS 18001 implemented, then: the top management is participating in the preparation of safety policy, top manager is reviewing the safety policy, is it operating effectively? He is informing the external bodies about the company's safety policy's effectiveness; the top manager arranges safety training for all of the personnel; there is a plan for reduction of accidents; it has been elaborated by the top manager; the company has a system for measuring the social climate in the company.***

Keywords: employer's responsibilities in safety and health, occupational health and safety (OHS), safety and health management, safety in small and medium-sized enterprises, work environment.

I. INTRODUCTION AND THEORETICAL PART

The work environment is a large term and it occupies not only the physical work environment, but also the psychological and psychosocial elements that are depended on the people's character and attitudes. There are different key persons in the enterprise who have to take care of occupational health and safety (OHS): the employer, the working environment specialist (safety engineer) and working environment representatives. All these people have the possibility to improve the safety and health at workplaces. The roles of these key-actors in different countries are different [1], [2].

A safety management system in the standard OHSAS 18001 [3] is designed in order to deal with occupational health and safety (OHS) in a systematic way by the following activities: setting company's safety targets and objectives; designating roles and responsibilities for safety personnel; planning and performing the hazards mitigations; monitoring, measuring and improving the on-going system and its effectiveness [4]. Although the implementation of safety standards, particularly OHSAS 18001 usually declines the number of accidents and occupational diseases in the enterprises, it has not leaded to larger interest to use the OHS systems in some countries [5].

In the previous studies, the authors of the current paper have carried out the investigations in different workplaces [1], [2], [6], [7] and determined the nature of the *real*, *formal* and *combined* safety elements. The importance and possibilities to use the safety progress derived by the successful in OHS companies (e.g. enterprises which possess OHSAS 18001) for the companies without any systematic work in OHS was determined. The role of the workers' representation in OHS activities has been investigated [2]. The conclusion was: the position of safety representative has often a low status in the company; working

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environment specialists do not have enough time to fulfil their safety functions to keep employees safe. It was also postulated that the employers had limited understanding about the role of working environment representatives (WER). The WER are elected formally, there is no practical value of them. From this investigation arise the research questions of the current paper: how it is possible to enhance the interest of the employers towards safety matters and what role plays in this process OHSAS 18001 implementation? What are the main obstacles for the employers to show more interest against health and safety in managed by them companies?

There are different new models and methods for investigating the safety level at enterprises [8] - 10]. Gautam et al. [10] present a new scheme for measurement of safety performance in work systems using segmented point process models that can capture the points of changes in the working conditions as well as changes in safety activities. The findings of the case study application showed that the injury occurrences data fit the models for all accidents and first aid cases.

The risk assessment is one of the main areas, where the investigations are carried out and it is also very important and the basis for the development of safety and health improvements in the enterprises. Risk evaluation depends on the exposure limits established in the country [11] and also the international rules have to be followed [12]. In the study of Isik and Atasoylu [11], the main objectives were to determine the employer's awareness of the OHS law and to find out to what extent the employers fulfil their obligations to conduct risk assessments. This was possible through the interviews and written surveys of employers of small and medium-sized enterprises. One of the hypothesis in the paper [11] postulated that risk assessments are ineffective. The hypothesis was not approved: on the contrary, the risk assessment are always effective if reasonable limitations are settled.

New tool for risk assessment (RA) of psychological risks is presented recently. This area has been always the hardest area in RA. A novel approach is presented by Kyaw-Myint et al. [13] to identify critical exposure levels or health-based benchmarks of job control using the benchmark dose (BMD) method, which enables to determine the critical exposure levels for job control.

The current study is mainly dedicated to small and medium-sized enterprises, where there are fewer resources to improve the safety and health [14].

The OHS activities in the Nordic countries are organized [15], combining a top-down and bottom-up approach to the organization of OHS activities. The overall responsibilities rests with the employer, who seeks for the support both from the professional staff and from the participants in the OHS organization of the company.

The MISHA method [16] has four areas: A) organization and administration, B) participation, communication, and training; C) work environment, D) follow-up (accidents investigation etc.).

The safety key elements in MISHA method are divided into three parts: *formal* safety elements, like safety documents, content of the policy (R=0.895: the correlation between the safety activities and the implementation or non-implementation of OHSAS 18001), revising the safety policy (R=0.972), written safety policy (R=0.964), assignment of tasks and responsibilities (R=0.885).

The *real* safety elements include the top management's, line management's and supervisor safety knowledge, their commitment to the safety policy, communication, participation in workplace design etc. In this part of the key elements, OHSAS 18001 implementation influences on the resources (R=0.968), top management's commitment to the safety policy (R=0.964), and the dissemination of the safety policy (R=0.929).

In the part of *combined* safety, OHSAS 18001 has the strongest influence on the safety policy (R=0.888), workplace hazard analysis (R=0.737) and assessment of the work environment (R=0.805) [1].

Very often the enterprises implement integrated management system: ISO 9000, ISO 14000 and OHAS 18001 [17] are all taken into consideration.

II. MATERIAL AND METHODS

Twelve Estonian enterprises (Table 1) were examined with modified MISHA method [16] for clarifying the role of the employers in OHS matters as well as for studying the perspectives to improve the safety level of the enterprise through more effective employers' activities.

The enterprises were from the manufacturing industry (chemical, plastic, food and metal), construction, agriculture and transport. These enterprises agreed to carry out the MISHA-questionnaire-based investigation (the length of the questioning is over 2 hours).

Four (4) of the enterprises (group 1) had implemented OHSAS 18001, three (3) were belonging to the foreign corporations (group 2), in the last their own rules on safety were compulsory and implemented and five (5) enterprises represented the locally owned companies who had not implemented OHSAS 18001 (group 3, some of them even did not have knowledge about existing OHSAS 18001).

The qualitative study was carried out in these 12 companies in the form of interviews of employers (active managers, production managers). The interviewing of the employers gives the information about the present and possible role of the managers. The interviews were assessed by the first author of the paper. The interviews were taken as the basis for the quantitative study.

For assessment to the MISHA questionnaire, the Likert scale (1- poor, 2- average, 3- good, 4- very good, 5- excellent) was used.

The questions from the MISHA questionnaire that concern the employers' activities, analysed in the current study, are as follows:

A1.2. Top management commitment to the safety policy: has company's top management (factory manager, managing director) committed itself to the goals of the policy? Is the commitment visible in the management's everyday activities?

A1.4. Assignment of tasks and responsibilities: are the tasks and responsibilities assigned to the top management?

A1.5. Participation in the preparation of the policy: has the top management participated in the preparation of the safety policy?

A1.6. Initial status review: is the current safety management system operating effectively?

A1.7. Safety documents: the employer is responsible? Are the responsibilities shared by the employer?

A1.8. Revising the safety policy: has the employer defined, how often the policy is revised?

A1.9. Dissemination of the policy: has the company defined how the policy is made available to the personnel? How the revised versions of the policy are distributed?

A1.10. Informing external bodies about the company's safety policy (how the temporary workers, sub-contractors, clients can have access to the company's safety policy)?

A1.11. Safety policy's connections to the company's other activities (to the company's quality and environmental policy).

A2.1. The top management's safety knowledge (is the top management aware of OHS implementation in the company, what are the indicators of OHS in the company?)

A2.4. Does the company has a safety committee or some other cooperative safety teams? Does the employer is included to the safety committee and does he take part in the meetings?

A2.8. Resources: does the company has the resources for OHS improvement?

B2.1. Does the manager arrange the information meetings on OHS?

B3.1. Does the employer affords the safety training for all the personnel on a regular basis?

C2.3. Does the personnel's responsibilities and authorities are clearly defined?

C3.1. Are the workplace risk analysis carried out on a regular basis? Are the results looked through by the manager? Are the reduction means financed by the manager?

C3.2. Does the top manager enters into a contract with the occupational health services? Does he reviews the results of the medical examinations?

C3.3. Does the activities of the safety organization are discussed with the top management?

D1.1. Does the top manager is aware of the statistics on work accidents and occupational diseases?

D1.2. The reduction of accidents: has the plan been elaborated and presented to the top manager?

D1.3. Does the company make statistics on absenteeism rates and summaries on absenteeism causes? Are the statistics available to the top management?

D2.1. Does the company has the system for redesigning the work or workplace of a person who has difficulties in coping with the work?

D2.2. Does the company measure the employees' mental work ability on a regular basis? Is the manager aware of the results?

D3.1. Does the company have a system for measuring the social climate (social relations between the workers if some problems have observed)?

The statistics used in the paper involved IBM SPSS Statistics 22.0 and R.2.15.2. The following statistical methods were used: correlation, MANOVA, factor analysis, principal component method, independent T-test [18].

III RESULTS

The results of the quantitative analysis are given in Table 1. In the second column the characterization of the investigated enterprises is given. The interviews in the companies were carried out with the employer (if it was possible), but mainly with the production manager, who was mainly present in the workplace from the top management representatives (column 5). The total average score by MISHA method is presented in column 6.

The total MISHA score for the companies of group 1 was 78-92; for the group 2 it was 75-86; for the group 3 the total score was 46-65 from the 100 possible. It shows that the implementation of OHSAS 18001 helps to upgrade the safety level at enterprises. The corporated companies also have their own rules to keep the safety and health matter on a comparatively high level.

The safety key elements mostly correlated with the employers' activities at enterprises in the safety and health area are presented in Table 2, 3, 4 (column 1). The results of the statistics between these connections in the *real, formal* and *combined* safety area (sum of squares by KMO and Barlett's test and *p* value are presented in the columns 2 and 3).

A. Hypothesis H1

Factor analysis were carried out with KMO and Bartlett's test [18]. *The alpha correction (ANOVAs with Tukey's HSD post-hoc tests) was implemented and so the H1, H2, and H3 were confirmed.* Three hypothesis were formulated and the area in which they are proved concerning employer's activities were as follows:

H1) Standard *OHSAS 18001* has an impact on f*ormal* safety performance in the companies. If OHSAS 18001 is implemented, then: the assignment of tasks and responsibilities in OHS is committed to the top management (p=0.000), the employer is revising the safety policy (p=0.000), the personnel's responsibilities and authorities in OHS are clearly defined (p=0.013). The lower p-value (p=0.072) have the following activities, which are dependent on the top manager's activities: the top manager is aware about the statistics of accidents and occupational health diseases and the rates of absenteeism are not directly committed to the manager. These obligations are usually more directed to the safety manager in the company, if the company has the job of safety engineer or working environment specialist. The small enterprises have no resources to hire the safety manager, therefore these obligations have to be held by the manager him(her)self. The lowest score (p=0.241) have the safety documents responsibility, these documents are usually hold also by the safety manager, particularly in medium-sized companies.

Table 1
The Characterization and Results of Quantitative Study by MISHA Method in Investigated Enterprises (N=12)

Id.of the company	The activity area	Size, employees	OHSAS company /corporated company	The person interviewed	Total score (100 max)
1	2	3	4	***5***	6
I	Chemical industry	50-249	+/	Management's representative, 45; External auditor, 34	87 78
II	Chemical industry	50-249	+/	Management's representative, 55 External auditor, 34	88 78
III	Metal industry	50-249	-/-	Management's representative, 40 External auditor, 53	61 50
IV	Metal industry	>250	-/+	Trade union representative, 60	86
V	Agriculture farm (milk production)	<50	-/-	Employer, 50	46
VI	Agriculture farm (grain production)	<50	-/-	Employer, 56	60
VII	Construction	<50	-/-	Active manager, 40	50
VIII	Transport	50-249	-/-	Personnel manager, 45	65
IX	Plastic industry	50-249	+/	Quality manager, 41	78
X	Electronics	>250	/+	Quality manager, 35	84
XI	Electronics	>250	+/	Quality manager, 59	92
XII	Food industry	>250	/+	Safety manager, 62	75

Table 2
Correlation Between the Formal Safety Key Elements Hypothesis H1

Safety key element	SUM of squares (KMO) and Barlett's test	p-value
A1.4. Assignment of tasks and responsibilities to the top management	13.375	.000
A1.7. Safety documents: the employer is responsible?	1.299	.241
A1.8. Revising the safety policy: has the employer defined how often the policy is revised?	25.688	.000
C2.3. Does the personnel's responsibilities and authorities are clearly defined?	4.576	.013
D1.1. Does the top manager is aware of the statistics on the work accidents and occupational diseases?	21.007	.072
D1.3. Does the company make statistics on absenteeism rates and they are available to the top management?	5.458	.072

Table 3
Correlation Between the Real Safety Key Elements Hypothesis H2

Safety key element	SUM of squares (KMO) and Barlett's test	p-value
A1.9. Dissemination of the policy: has the employer defined how the policy is made available to the personnel?	21.007	.000
A2.1. Top management's safety knowledge	3.005	.039
A2.8. Resources: does the company has the resources for OHS improvement?	22.688	.000
B2.1. Does the manager arrange the information meetings to the employers on OHS?	2.896	.006
D2.1. Does the company has the system for redesigning the work or workplaces of a person with disabilities?	0.047	.013
D2.2. Does the company measure the employees' mental work ability on a regular basis? Is he aware of the results?	1.188	.148

Table 4
Correlation Between the Combined Safety Key Elements Hypothesis H3

Safety key element	SUM of squares (KMO) and Barlett's test	*p*-value
A1.6. Dissemination of the policy: has the employer defined how the policy is made available to the personnel?	13.375	.001
A1.10. Informing external bodies about the company's safety policy	17.241	.001
A2.4. Does the company has a safety committee or some other cooperative safety teams?	3.200	.214
B3.1. Does the employer affords the safety training for all the personnel on a regular basis?	2.854	.004
C3.2. Does the top manager enter into a contract with the occupational health services?	0.611	.340
C3.3. Does the activities of the safety organization are discussed with the top management?	1.965	.143
D1.2. The reduction of accidents: has the plan elaborated and presented to the top manager?	4.125	.007
D3.1. Does the company have a system for measuring social climate?	19.125	.000

B. Hypothesis H2

H2) Standard *OHSAS 18001* has an impact on r*eal* safety performance in companies. If OHSAS 18001 is implemented, then: the top manager promotes dissemination of the safety policy: the policy is made available to all the personnel *(p*=0.001); the resources for improvement of OHS activities are arranged by the top management (*p*=0.000); the top manager arranges meetings in OHS (*p*=0.006); in the company there is a system for redesigning the workplaces for the persons who have difficulties in coping with the work (*p*=0.013). The top management's safety knowledge has to be advanced continuously. The employees' mental work ability is not measured even in OHSAS 18001 implemented companies (*p*=0.39). This standard OHSAS 18001 has to be modified in this area.

C. Hypothesis H3

H3) Standard *OHSAS 18001* has an impact on c*ombined* safety performance. If OHSAS 18001 has been implemented, then: top management is participating in the dissemination of the safety policy (0.001), top manager is reviewing the safety policy, is it operating effectively? He is informing of the external bodies about the company's safety policy (*p*=0.001); the top manager arranges safety training for all the personnel (*p*=0.004); there is a plan for the reduction of accidents: it has been elaborated by the top manager (*p*=007); the company has a system for measuring the social climate in the company (*p*=0.000). OHSAS 18001 does not influence on the organizing the safety committee work (*p*=0.214) and the top manager is not making the contract with the occupational health services influenced by OHSAS 18001 (*p*=0.340); not all activities in the safety area are consulted with the top management (*p*=0.143).

D. Comments to top management's activities in OHS

Usually the incorporation to the foreign firms influences positively to the management's attitudes to the safety activities. In one of the investigated firms, after the incorporation, the management started to implement the corporation-based safety system and first, the safety audit was conducted.

The result was: safety did not came important at once. Safety took the first priority only 10 year after the incorporation. After that, quality was emphasized even more. Now it could be said that "safety comes first".

The working environment representative's comments:

1. "*The management's attitude to safety has not reached the ordinary workers yet. We have not really understood that safety is the priority in our department. Often we feel we have to rush in order to meet the production deadlines. Yes, we know that management declares safety is very important, but in practice, there are some safety flaws occurring. I personally work with an out-dated equipment and there is no hope to receive new one in near future".*

2. The other WER from the same company, however, presents a slightly different opinion: *"I think the safety level in our company is very good compared to my first employer. Here, everything concerning safety, is documented."*

So, there are different perceptions on safety, concerning industrial workers. In OHSAS 18011 implemented companies they have more knowledge on safety matters compared for example with small enterprises were even the manager does not know that the Occupational Health and Safety act [19] exists in Estonia.

IV. DISCUSSION

Our study revealed that management plays an essential role in OHS improvement in the company. By O'Toole [21], it is also postulated that the leadership's position is influencing the employee's perceptions of the safety management systems. Those perceptions appear to influence on the employee's decisions that relate to at-risk behaviours and decisions on the job. Organizational commitment did affect the perceived safety at work, but not on work accidents [21].

In the current study, it was declared that the plan for reduction of accidents if it is worked out by the employer, has very strong influence on the combined safety at enterprises. If the Standards (OHSAS 18001 etc.) are implemented then the organizational climate will also be better [22].

In the current study the implementation of OHSAS 18001 has a strong impact on the improvement of safety level at enterprises.

V. CONCLUSIONS

The hypothesis H1, H2, H3 on the influence of the firm type (OHSAS-implemented or non-implemented) has an impact on the employer's activities in occupational safety and health area.

The general conclusion is: if the standard OHSAS 18 001 is implemented, then then the OHS tasks and responsibilities are under the surveillance of the top manager. The employer is always revising the safety policy, the safety policy is available to every worker, the top manager arranges the OHS meetings if needed and the top manager is participating in the work-out of the safety policy, he(she) is continuously reviewing the policy, policy is effective and training in OHS is available to every worker.

The employer is in the key position in the enterprise in occupational safety and health improvement means and also it is positive if he has the resources to perform the changes. The three investigated small enterprises (the number of the workers under 50), the safety knowledge of the active manager is extremely important.

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Appendix III

Article III

Hrenov, G., Reinhold, K., & Tint, P. (2017). Working Environment Specialist's role in the Improvement of Safety Level in Estonian Enterprises. *In: Proceedings of 16th International Scientific Conference Engineering for rural development*, Volume 16, pp. 832–840. DOI:10.22616/ERDev2017.16.N170

WORKING ENVIRONMENT SPECIALIST'S ROLE IN IMPROVEMENT OF SAFETY LEVEL IN ESTONIAN ENTERPRISES

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Abstract. The active persons in safety and health activities in enterprises in Estonia are: the working environment specialists (WES), hired by the employer, and working environment representatives, selected by the workers. The number of small and medium-sized enterprises (SMEs) in Estonia is over 5000. Not all these enterprises can allow themselves the job with the designation of WES (or safety engineer). Therefore, these SMEs need very good descriptions of safety and health activities at the workplace and the information for the possibilities for improvement the safety level at these enterprises. The inspectors from the National Labour Inspectorate of Estonia never reach the SMEs unless an accident happens. In SMEs, the employer has to deal with the safety questions himself or these obligations are delegated to some of the top management's representative as an extra work. The main possibilities to influence on the safety level in the firm have the working environment specialists, as they are more educated and supported by the law in the work safety and health (OHS) area. The current paper is looking for the possibilities to raise the interest to the improvement of the safety level at enterprises through the strengthening of the knowledge of WES in OHS, particularly the knowledge on the main standard in OHS: OHSAS 18001. The safety level in 15 Estonian enterprises (metal, wood, construction, agriculture) was investigated through the MISHA method (based on OHSAS 18001). The latter version of the MISHA method was modified by the authors of the current paper (some of the important hazardous factors, like vibration etc. were added into the MISHA method). This modified MISHA questionnaire is an educational tool for the WES: this is the mode of learning through interviews. The influence of the implementation of OHSAS 18001 on *real*, *formal* and *combined* safety elements is determined. The connections were proved with statistics: factor analyses were carried out with Barlett's test, ANOVA and T-square test with Wilks' Lambda row.

Keywords: working environment specialist, safety engineer, real, formal and combined safety elements, improvement of safety level at enterprises.

Introduction

Health and safety management system can be characterized as a set of institutionalised interrelated and interacting strategic elements designed to establish and achieve occupational health and safety (OHS) goals and objectives [1]. In small and medium-sized enterprises, it is difficult to implement comprehensive safety management systems (SMSs) [2]. There is no knowledge and not enough workforce to deepen into the safety and health management details.

There are many methods suggested for evaluating the SMSs in the enterprise [3-5]. The conceptual model for OHS management system differentiates between its strategy and implementation [1]. The model suggests that the top management is responsible for strategically developing, articulating, recording, and communicating the strategic organizational OHS system. Based on a review of the strategic management literature, we identified three distinct theoretical constructs that can moderate or mediate the relationship between the organizational OHS system, its implementation and overall success: workgroup leadership, organizational values, and worker perceptions and interpretations of the OHS systems [1].

Thus, consistent with the strategic management literature [5], the OHS system may be studied within organizations as two district constructs: the strategically developed OHS system and OHS system implementation. The strategically developed OHS system represents the decreed and codified practice content designed by the strategic leaders and top managers for the organization. By Zohar and Tenne-Gazit [6]: "…assessment of OHS policies, procedures, and practices can be quite complex, requiring the establishment of differences between formally declared policies and procedures and their enforced counterparts. Formal policy is explicit, relating to overt statements and formal procedures, while enforced or enacted practices are tacit…".

The method for assessment of the safety management system in the enterprise, worked out by Kuusisto [7], is used by the authors of the current study in the previous investigations: the MISHA method that bases on the OHS standard OHSAS18001 [8-11]. Spear [12] refers to process indicators when describing key performance indicators such as safety audits, behavior-based safety, safety

perception surveys, safety training, and corrective action measurements. Leading indicators are not so much the opposite of lagging indicators, but are instead a facet of safety likely to be present prior to an undesirable event [13; 14]. Podgorski [3] provides key performance indicators (KPIs) for measuring OHS management systems operational performance. The final set of KPIs contains 20 sub-sets (like OHS policy, evaluation and improvement of OHS training programmes, OHS goals and improvement plans, risk assessment process, management of change, management system audit, management review; actions for improvement: preventive and corrective actions, continual improvement etc.).

In the Estonian enterprises the manager is responsible for safety and health, but if there are resources and if the manager is educated in safety and health matters, then he hires a safety manager and gives him a comprehensive training in OHS. The safety mangers five top responsibilities are: 1) provide a workplace that is free from serious safety and health hazards; 2) monitor the workplace to ensure employees follow safety in manufacturing, 3) get the safety responsibilities done, 4) improve safety in manufacturing facilities with good signage, 5) note safety violations with clear tags [15].

The safety key elements in the current study are divided to *real*, *formal* and *combined* safety elements according to their content and possibilities to be in the improvement process [16]. The MISHA method has four areas: A) organization and administration, B) participation, C) work environment, D) follow-up (accidents etc.). Paas [16] divides the safety key elements in the MISHA method into three parts: *formal* safety elements, like safety documents, content of the policy ($R = 0.895$, the correlation between the safety activities and the implementation or non-implementation of OHSAS 18001), *real* safety elements, like top management commitment to the safety policy ($R = 0.964$) and *combined* safety elements, like participation in preparation of the safety policy ($R = 0.888$).

The working environment specialist (WES) is the key person in the enterprise in the occupational health and safety area and in the investigating the workers' health status. The aim of the study is to give the possibilities to small and medium-sized enterprises (SMEs) to improve the safety using the suitable questionnaires. The results of the questioning of WES (safety manager) are considered as the basic data for determination of the safety level.

Materials and methods

Fifteen Estonian companies (Table 1) were examined with the modified MISHA method, presented in [7]. Five (5) enterprises had implemented OHSAS 18001, three (3) enterprises were incorporated to the foreign firms and seven (6) enterprises had not implemented OHSAS 18001 neither incorporated to the foreign firms. For assessment of the MISHA questionnaire, the Likert scale (1 – poor, 2 – average, 3 – good, 4 – very good, 5 – excellent) was used. The Likert scale [17] is based on subjective assessments.

The MISHA questionnaire was modified taking into account some of the workplace hazards that were not included into the original MISHA questionnaire [7]. For example, vibration and electromagnetic fields influence on the workers was asked in the course of the interview [18]. The MISHA questionnaire was also shortened because very long questionnaires (lasting over 2 hours) are not appreciated by the answerers (work environment specialist). The interviews with the learning aims consist of the questionnaire that includes "whether" and "how" questions. In the original questionnaires compiled for the assessment of safety, activities at enterprises can be used as a tool for learning and obtaining more information on safety in companies. Learning is likely to be more effective when participants are actively involved in dialogue in which they are co-constructors of the meaning [19].

The questions from the MISHA questionnaire that concern the safety manager's activities, analysed in the current study, are as follows (numeration from [8]):

A1.1. Does the company has a written policy?
A1.3. Contents of the policy: a description of the safety tasks and responsibilities?
A1.4. Are the tasks and responsibilities assigned to the safety and health personnel?
A1.5. Have the safety and health personnel participated in preparation of the safety policy?
A1.6. Initial status review: current safety level, typical hazards in the company?

A1.7. Does the policy list the following documents: work instructions, instructions for safety training, organization safety activity program?
A1.8. Revising the safety policy, who are responsible?
A1.9. Dissemination of the policy: is safety personnel involved?
A2.5. Safety manager: does the company have the safety manager? Has the safety manager received adequate safety training? Does the safety manager have adequate time and other resources for the safety activities?
A2.8. Does the company seek advice in resources to health and safety from safety personnel?
B1.1. Does the safety manager instruct the personnel?
B1.3. Has the safety manager established small groups with workers to discuss the safety matters?
B2.1. Has the safety manager arranged the hazards management system in the workplace?
B2.4. Does the safety manager arrange the safety campaigns?
B3.1. Safety training needs, are they determined to the personnel?
B3.4. Has the safety manager defined, which work permits are necessary, e.g. permit to do fire hazardous work?
C1.2. Does the safety manager inform the workers about the chemical hazards in the workplace?
C1.6. Has the safety manager provided the suitable clothing to the employees in extreme thermal conditions?
C1.7. Has the safety manager informed the workers about the accident hazards?
C1.8. Has the safety manager involved in cleaning of the plant area?
C1.9. Are the workers informed about the major accident hazards?
C2.3. Definition of the personnel responsibilities: are the persons responsible for health and safety trained for their responsibilities?
C3.1. Has the safety manager carried out the workplace hazard analysis?
C3.3. Tasks of the safety organization: does the safety organization participate in safety analysis?
D1.1. Does the company make statistics on accident rates, and summaries on accident causes?
D1.2. Accident investigation: are the near accidents investigated?
D2.2. Is the safety manager aware about the persons working under extreme mental stress?

The statistics used in the paper, involved IBM SPSS Statistics 22.0 and R.2.15.2. The following statistical methods were used: correlation, MANOVA, factor analysis, principal component method, independent T-test [20].

Results of quantitative analysis

The results of the quantitative analysis are given in Table 1 (column 6). The interviews by the MISHA method were carried out mainly with the safety manager, but if he (she) was not available, then with another employer's representative. The standard deviation (SD), if questioned three persons in the same enterprise (for example: manager, safety engineer and workers' representative) in the individual questions (like D2.2, C1.7 or B3.4) in the Likert scale (0…4) was 0.81…2.81; for the total score (max 100) SD was 2.01..2.45. So, the workers on different positions at the enterprise and with different meanings about safety and health gave rather similar answers assessing the safety and health level at health.

There are not much questions in the MISHA questionnaire that are directly showing the activities of the safety managers towards *real, formal* and *combined* safety key elements (Tables 2, 3, 4). Usually, if there is a safety manager in the company, he/she is responsible for all the activities in the safety area. If the safety management system is implemented, then the results of the safety activities in the company are reported continuously to the top manager.

Table 2 represents the results of the statistics between the connections of the safety manager's activities and *formal* safety elements. There is a good correlation between the *formal* safety elements and the written safety policy (in which composition the safety manager is certainly involved), $p = 0.000$; between the contents of the policy: a description of the safety tasks and responsibilities (the safety manager involved in the distribution of the responsibilities in safety area), $p = 0.000$; if OHSAS 18001 is implemented, then the tasks and responsibilities of safety and health personnel are clearly determined, $p = 0.000$ (question A1.4. in Table 2).

Table 1

Characterization and results of the quantitative study using MISHA method (N = 15)

ID	The activity area	Size, employees	OHSAS company/corporated company	The person interviewed	Total score (100max)
1	2	3	4	5	6
I	Chemical industry	50-249	+/-	Management's representative, 45; External auditor, 34	87 78
II	Chemical industry	50-249	+/-	Management's representative, 55 External auditor, 34	88 78
III	Metal industry	50-249	-/-	Safety manager, 64	62
IV	Metal industry	>250	-/+	Safety manager, 35	85
V	Agriculture farm (milk production)	<50	-/-	Employer, 50	46
VI	Agriculture farm (grain production)	<50	-/-	Employer, 56	60
VII	Construction	<50	-/-	Active manager, 40	50
VIII	Transport	50-249	-/-	Personnel manager, 45	65
IX	Plastic industry	50-249	+/-	Safety manager, 62	78
X	Electronics	>250	-/+	Safety manager, 42	82
XI	Electronics	>250	+/-	Safety manager, 39	90
XII	Food industry	>250	-/+	Safety manager, 37	78
XIII	Food industry	>250	+/-	Safety chief specialist, 68	80
XIV	Textile industry	>250	-/-	Safety and health manager, 67	53
XV	Printing industry	<50	-/-	Production manager, 41	30

The situation is another in the list of the existing safety-connected documents comparing the OHSAS 18001 implemented companies with the companies non-implemented OHSAS 18001: work instructions, instructions for safety training, organization safety activity program exists anyway, $p = 0.241$. The revising of the safety policy is determined more clearly in OHSAS 18001 implemented companies compared with the non-implemented companies, $p = 0.000$. The safety and health personnel have slightly better training possibilities and knowledge in OHS in OHSAS 18001-implemented companies than in non-implemented companies (C2.3, $p = 0.013$). The accident investigation and statistics on it is usually made by the safety managers in the enterprises: these activities have much better quality in OHSAS 18001-implemented companies, $p = 0.000$.

Table 3 represents the influence of OHSAS 18001 implementation on *real* safety elements in the enterprises. There is a good correlation between the safety manager's activities in the OHSAS 18001-implemented companies and non-implemented companies: dissemination of the safety policy to the workers is carried out usually by the safety managers, $p = 0.000$; the safety personnel is advising the top management about the necessity of allocate resources for safety improvements, $p = 0.000$ (A2.8, Table 3); the safety manager instructs the personnel preliminary in OHS, $p = 0.001$; the system for permission of workers to extreme work conditions is arranged, $p = 0.004$.

In OHSAS 18001-implemented companies, the safety manager has arranged the hazard management system, $p = 0.006$; arranges the safety campaigns, $p = 0.006$; he (she) is involved in the maintenance of the working area, $p = 0.002$. The influence of OHSAS 18001 implementation is less on the following safety manager's activities: the group discussion on safety matters (organized by the

safety manager), the suitable clothing is usually provided by the safety manager for the work in hot and cold climate both, in OHSAS–implemented and non-implemented companies, the same on the information about the chemical hazards, ($p = 0.120$) and major accident hazards ($p = 0.138$).

Table 2

Influence of the implementation of OHSAS 18001 in enterprises on real safety elements

Formal safety element	Sum of squares (KMO and Barlett's test)	*p*-value
A1.1. Does the company have a written policy?	22.250	0.000
A1.3. Contents of the policy: a description of the safety tasks	19.285	0.000
A1.4. Are the tasks assigned to the safety and health personnel?	13.375	0.000
A1.7. Has safety manager made an initial OHS review in company?	1.299	0.241
A1.8. Revising the safety policy, who are responsible?	25.688	0.000
C2.3. Definition of the personnel responsibilities: are the persons responsible for health and safety trained for their responsibilities?	4.576	0.013
D1.1 Does the company make statistics on accident rates and summaries on accident causes?	21.000	0.000

Table 3

Influence of the implementation of OHSAS 18001 in enterprises on real safety elements

Real safety element	Sum of squares (KMO and Barlett's test)	*p*-value
A1.9. Dissemination of the policy: is safety personnel involved?	21.007	0.000
A2.8. Does the company seek advice in resources to health and safety from safety personnel?	22.688	0.000
B1.1. Does the safety manager instruct the personnel?	5.672	0.001
B1.3. Has the safety manager established small groups with workers to discuss the safety matters?	3.236	0.339
B2.1. Has the safety manager arranged the hazard management system in the workplace?	2.896	0.006
B2.4. Does the safety manager arrange the safety campaigns?	9.797	0.006
B3.4. Has the safety manager defined which work permits are necessary (e.g., permit to do fire hazardous work?)	6.750	0.004
C1.2. Does the safety manager inform the workers about the chemical hazards in the workplace?	2.410	0.120
C1.6. Has the safety manager provided the suitable clothing to the employees in extreme thermal conditions?	1.451	0.139
C1.7. Has safety manager informed workers on accident hazards?	2.714	0.017
C1.8. Has safety manager involved in cleaning of the plant area?	4.500	0.002
C1.9. Are the workers informed about the major accident hazards?	1.299	0.138
D2.2. Is the safety manager aware about the persons working under extreme mental stress?	1.188	0.148

Table 4 presents the statistically approved results of the influence of OHSAS 18001 to the *combined* safety elements (like participation in preparation of the safety policy, workplace hazard analysis etc.). The safety managers are taking part in preparation of the safety policy ($p = 0.000$), they give the initial safety status review ($p = 0.001$), safety training needs for the personnel are determined by the safety manager, workplace hazard analyses are organized by the safety manager ($p = 0.000$), near accidents are investigated in OHSAS-implemented companies ($p = 0.007$).

OHSAS 18001-implementation has less influence on safety training of the safety manager (they are trained also in OHSAS non-implemented companies, $p = 0.220$), the safety manager takes part in the top management meetings also in non-implemented companies ($p = 0.143$).

Table 4

Influence of the implementation of OHSAS 18001 in firms on combined safety elements

Combined safety element	Sum of squares (KMO and Barlett's test)	*p*-value
A1.5. Participation in preparation of the safety policy	21.500	0.000
A1.6. Initial status review	13.375	0.001
A2.5. Safety training of the safety manager?	1.194	0.220
B3.1. Safety training needs, are they determined to the personnel?	2.854	0.004
C3.1. Workplace hazard analysis: has safety manager carried out?	8.491	0.000
C3.3. Does the safety manager take part in the discussions on the top management level?	1.965	0.143
D1.2. Accident investigation: are the near accidents investigated?	4.125	0.007

Results of qualitative analysis

In the qualitative analysis the enterprises with OHSAS 18001–implemented, corporated and non-implemented firms are compared in safety and health activities area.

Case 1 – *OHSAS-implemented enterprise (N < 50)*

OHSAS 18001 is implemented. The work for its implementation took altogether six months. There is a written safety policy, the management is committed to the safety matters. The implementation of OHSAS 18001 rises the competitiveness of the firm, it helps get more clients (abroad), the imago of the enterprise, the safety questions are discussed during the top management meetings, and it decreases the number of accidents and occupational and work-related diseases.

For example: "there was an evacuation training, which had not very good results exactly" (the words of the member of the work environment committee). After that, there was a meeting on this matter and the owner of the firm was actively taking part in the discussion that lasted for 2.5 hours.

Case 2 *– corporated, OHSAS 18001 non-implemented enterprise (N = 450)*

A large enterprise, corporated with Swedish and Finnish firms. They have implemented their own inside the corporate applied standard (not OHSAS, but similar), the foreign auditors on safety matters visit the enterprise 3 times per year. The enterprise has the written safety policy.

The question to the safety manager: Has the safety policy made noted to every worker?

"Yes, they have read it and signed".

The near-accidents are not always registered and made known to the safety manager. Why not? The workers answered to the safety manager: "You will announce about the hazardous situations to the top management!" The workers' awareness of safety matters is inadequate.

Case 3 *– OHSAS 18001 non-implemented enterprise (N < 50)*

The questions of the interviewer to the manager (who also has the WES responsibilities):

Has the enterprise a written safety policy?

"No, there is not, but we have the main principles for managing safety as much it is possible using the available resources".

Have you the work instructions (not safety instructions) for carrying out different jobs?

"No, we do not have. It is impossible to make a manual for every movement".

Have you carried out the risk assessment (RA) in the workplace and the action plan for reducing the risks?

"The risk assessment was carried out 6 years ago, but we have not yet had time to compile the action plan".

Good action: all the workers are insured. The workers are provided with the personal protective equipment. The primary safety requirements are fulfilled, if the worker goes to work in the morning, then he returns home in the evening without injuries.

Case 4 *– **OHSAS** 18001 non-implemented enterprise (N < 50)*

The questions to the active manager (who is also responsible for the safety matters):

Is it difficult to stay competitive?

"It is difficult everywhere nowadays: The workers are not complaining".

The activities of the firm: they do not go to the safety training, but undergo medical examinations. The Labour inspectorate is continuously checking the firm. After the inspectorate's visit, the firm will be active in safety in the frames that are needed, but not more.

Have you carried out the risk assessment in your firm?

"At the beginning the demands of the labour inspector for making the RA were horrific (for example, there was a question: are the floors slippery?!), but then the labour inspector softened the demands and the firm carried out the RA".

The situation in the firms is very different as the people are all individuals, they want to show themselves good, but the resources for safety level improvements are different. The corporated and OHSAS-implemented firms have better possibilities to implement the safety policy and other documents, but the smaller firms also are eager to keep at least the minimum to care workers safe and healthy.

Discussion

Taking into account the results of the previous studies of the current papers authors [9; 23], where the safety and health level on the enterprise measured with the MISHA method was carried out from the viewpoint of the working environment representative (WER) [9] and the employers [23], it could be said that the safety engineers have the best knowledge of the safety system.

The other key persons (WER, employer) are hesitant in some questions, concerning, for example, the safety policy expanding to the workers in the firm. The working environment specialist assesses the situation as it really is, but the WER and employer who have in the real work-life not so much connected to the safety questions, and also not have so much knowledge in safety, are overestimating the situation.

The MISHA method is not the only method for assessment and showing the improvement points in safety and health at enterprises [21; 22]. By Arghami et al. [24], the safety climate questionnaire is built up on another basis than in the MISHA method. It contains seven (7) different factors: management commitment to safety and personnel collaboration: the influence of total safety level ($R = 0.954$), safety communication ($R = 0.830$), supportive environment ($R = 0.793$), work environment ($R = 0.803$), formal training ($R = 0.774$), priority of safety ($R = 0.740$), personal priorities and the need for safety ($R = 0.547$).

So, the results are comparable with the results in the current paper: the safety policy might be worked out very properly and on a high level, but the safety policy usually does not reach the personnel, from up to down, there are difficulties as in OHSAS-implemented as in non-implemented enterprises. One of the lowest scores ($R = 0.431$) is given to the question: "my line manager/supervisor does not always inform me of current concern and issues" [24].

In the investigation of the safety level by the authors of the current paper, the scores of correlation in different questions are even lower (*real, formal* and *combined* safety). The starting point for the research is also different (the comparison of the firms with implemented OHSAS18001 and non-implemented ones). So, different questionnaires are useful for investigations in the safety level in enterprises and the result will be total.

Conclusions

1. OHSAS 18001 implementation helps improve the following formal safety elements where safety manager is involved: to write the safety policy, the description of tasks of the personnel in safety area, the responsibilities of the safety personnel are clearly determined.
2. OHSAS 18001 implementation helps improve the following real safety elements: dissemination of the safety policy, the safety personnel is advising the top management in safety and health questions, the safety manager instructs thoroughly the personnel in safety matters, the safety personnel is advising the top management how to allocate the resources.

3. OHSAS 18001 implementation in the firm helps improve the following combined safety elements: safety manager compiles the initial safety review, the safety training needs of the personnel are determined, workplace hazard analyses are carried out.
4. The qualitative analysis shows the difference between the firms and safety knowledge of people responsible for safety.

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Appendix IV

Article IV

Conceptual Model for the Development of OHS Management in SMEs. *In: Leva, M.C., Patelli, E., Podofillini, L., & Wilson, S. (Eds.). Understanding and Managing Risk and Reliability for a Sustainable Future: Proceedings of the 32nd European Safety and Reliability Conference,* August 28-September 1, 2022, Dublin, Ireland. Published by Research Publishing, Singapore. DOI:10.3850/978-981-18-5183-4_S18-05-625-cd

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Conceptual Model for the Development of OHS Management in SMEs

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Eleven Estonian small and medium-sized enterprises were investigated to identify critical key elements of safety activities using the Method for Industrial Safety and Health Activity Assessment. The study was first conducted through an interviews to explain the role of key actors (such as employers, safety professionals, and safety representatives) in the administration of OHS and to explore perspectives on how to improve safety performance in SMEs. In the second phase, qualitative findings were adopted and taken for further study in the form of a questionnaire. Statistical analysis was performed using ANOVA, principal component method, and independent T-test. In organizations where management does not put safety in the first place, employees do so in practice and also do not try to follow safety policies. SME managers know little about the role of the employee representative and about the benefits of their activities. When safety representatives are elected only formally, this is practically irrelevant to OHS management, and often other employees are not informed of their rights and opportunities to hold office. For the employer and safety manager, the importance of the safety representative, who are aware of the problems in the work environment, only becomes apparent in the event of an employee's injury or serious illness.

Keywords: occupational health and safety, OHS, work environment, health and safety management, improvement of safety level at SMEs, management responsibilities, safety activities, safety representatives, safety managers, safety management system, occupational health and safety management.

1. Introduction

In times of increasing crises (whether pandemic, financial or political), every organization, regardless of size and type, should systematically monitor the overall business environment and anticipate potential losses, that may result from unsafe employee behavior at work, especially in small businesses. The outbreak of COVID-19 has shown, in particular, the need for additional safety rules and protective measures. According to the International Labor Organization („Seoul Declaration…") a top level of protection for workers' occupational health and safety (OHS) is not only a priority but also one of their fundamental rights. The paper aims to provide new knowledge on OHS management from the employers', safety professionals, and employee representatives' viewpoints and in the organizational context focusing on SMEs. With this knowledge, the research can suggest ways how safety actors at different levels can collaborate more systematically for successful OHS management, and thus, increase safety and organizational efficiency.

The large-scale presence, and thus, the importance of small and medium-sized enterprises (SMEs) for Europe and the rest of the world is well known. However, compared to large companies (LEs) that have demonstrated increasing interest in operational risk prevention, the implementation of OHS is more difficult for SMEs due to several reasons such as market pressures and resource constraints (Lima et al., 2020). Company size plays a key role in the effectiveness of OHS implementation (Li and Guldenmund, 2018) because LEs have the structure and financial capacity that is often lacking in SMEs in committing and developing a safety program within the organization.

At the same time, indicators are showing that SMEs are more likely to suffer fatal and non-fatal injuries at work in proportion to LEs and are therefore more likely to suffer severe consequences (Tremblay and Badri, 2018). In addition, most of the existing tools and methods for managing OHS are available for LEs. The scholars argue that the tools and methods used by SMEs are not sufficiently developed (Tremblay

and Badri, 2018) and therefore cannot be simply followed. Additionally, because SMEs have limited access to the necessary resources, it is a challenge to apply OHS tools and methods properly (Micheli et al., 2019). The strategy to reduce this enormous burden of the inadequate work environment has shifted from comprehensive legal requirements toward proactive prevention through various OHS management systems (OHSMSs) or systematic OHS management (Schreyer et al., 2021).

There is a knowledge gap in safety literature where OHS management activities are rarely investigated in a broader organizational context (Veltri et al., 2013) with various actors such as employer (EMP), safety professional (PRO), and safety representative (REP). Therefore, the factors and barriers faced by SME management and employee representatives, as well as critical elements of safety management, need to be thoroughly investigated. Thus, the aim of the paper is to provide a conceptual model for developing systematic OHS management in SMEs. This study explores the following research question: Which important safety key elements have forced effective collaboration between the employer, safety professional, and safety representative?

2. Theoretical Framework

According to Fernández-Muñiz et al. (2009), the OHSMS is considered as a systematic approach to safety management and defines "as an integrated mechanism in organizations designed to control the risks that can affect employees' health and safety, and at the same time to ensure the firm can easily comply with the relevant legislation". OHS management is the planned and systematic top-level management-driven process, that includes the necessary organizational structure, social, technical, responsibilities, policies and procedures, management functions, and administrative abilities (Frick and Kempa, 2011).

OHS is concerned with protecting the safety, health, and well-being of working people. This means that the working environment must be adapted to workers in all workplaces to promote and maintain the highest degree of physical, mental, and social welfare. The development of OHS management is one of the key drivers for all types and sizes of organizations to promote the well-being of both employees and employers, safe lives, increase productivity and reduce costs (Wahlström and Rollenhagen, 2014).

An essential part of OHS management is risk control in the workplaces, which includes assessing risks and their potential effects, applying preventive measures, and successfully implementing safety policies to reduce the number of accidents and illnesses at work (Niciejewska and Kiriliuk, 2020). There is a consensus today on the basic principles of OHS that OHS management must be an integral part of the overall management system of an organization and not a separate formal process (Gallagher et al., 2001).

2.1. Small and Medium-sized Enterprises

SMEs can be defined differently. As regards the quantitative method, the definition used by the European Union to classify SMEs as micro, small or medium-sized enterprises in terms of the number of employees and annual turnover or an overall balance sheet can be used. An SME is defined as an enterprise that employs fewer than 250 persons. More specifically, with less than 10 employees being a very small company, with 10-49 employees being a small company and 50-249 employees being a medium-sized company. This type of enterprise is the backbone of the EU economy and is seen as an engine for employment, growth, social inclusion and innovation (Landstad et al., 2022). In 2020, SMEs represented 99.8% of all non-financial companies in the EU-27, corresponding to 21 million business units. They employ around two-thirds (65%) of total EU employment and generate 53% of the total gross value added (Annual report on European SMEs, 2021).

However, their working conditions are often poorly managed compared to LEs (>250 employees), which is confirmed by a review of publications by Micheli et al. (2019), representing higher accident rates and worse consequences. Despite the predominance of SMEs, they have fewer resources and structural features, resulting in greater risk exposure.

Given this wide range, it is quite difficult to compare different subtypes of SMEs. For example, given the larger number of employees in medium-sized companies, more formal methods

and systems are used to manage the business (Çakar and Ertürk, 2010). Thus, it is important to consider the issue of heterogeneity when studying SMEs (Curran and Blackburn, 2001) as this makes it difficult to compare these companies. A small business is shaped by the personality of an entrepreneur who is the manager and very often the owner of the company. In addition, in many smaller businesses, the entrepreneur has a network of personal connections with customers, suppliers, and other stakeholders. Furthermore, companies produce customized products and services; exchanges between management and personnel are close and informal; they are less formalized and time-consuming and can respond quickly to changes in their environment (Mugler, 1998).

2.2. OHS Management in SMEs

The safety activities are fixed as a combination of descending and ascending approaches (Lindoe et al., 2001) to the organization of OHS activities to be carried out within the framework of a line organization, where everyone has special responsibility for improving the level of OHS in the workplace. The responsibility generally lies with the EMP, who is seeking the support of the company's staff; PRO, who performs practical tasks, such as risk assessment; and REP, who represents employee voice in the OHS organization (see Figure 1).

Fig. 1. Actors in OHS management of SMEs.

Poor OHS management in SMEs in some parts of the world is widely acknowledged by the academic community, but there have been only a few attempts to propose new models for OHS assessment and management exist (De Merich et al., 2020). Cunningham et al. (2015) indicate that scientific knowledge on OHS in SMEs is at the very initial stage.

OHS is not a priority for SMEs as they tend to focus more on the economic activities of their business, and ignore safety issues (De Merich et al., 2018). In SMEs, especially in small and microenterprises (<50 employees), there is a lack of knowledge of manager-owners and understanding that OHS management provides many benefits (Klimecka-Tatar and Niciejewska, 2016). The main factors influencing OHS management in SMEs were identified: level of managerial and training skills, lack of financial resources and management support, compliance burden with regulations, poor relationship with regulators, high cost of using OHS consultants, dependence on LEs, and difficulties in implementing and understanding good safety practices (Masi and Cagno, 2015).

Other aspects that contribute to OHS management differences between SMEs and LEs have also been identified, such as a weaker commitment to safety by top management, especially when the owner-manager also acts as PRO (Wang et al., 2018); insufficient attention to risk assessment, safety auditing and workplace monitoring (Reinhold et al., 2015); and the tendency of SME owners to adopt non-systemic OHSMS and informal human resource practices (Arocena and Núñez, 2010).

Informal and less effective OHS management means that SMEs have less preference for health and safety than larger companies (Cagno et al., 2011). Due to the lack of formalized routines, safety behaviors are often at a lower level (Holte and Kjestvelt, 2012). Safety issues are communicated informally orally and are not systematic (Hasle et al., 2012), making employees less committed to safety. Management structure can be described as simple and focuses more on economic results-oriented, and is highly dependent on commercial pressures. Therefore, disregarding OHS due to a lack of resources, time, and knowledge is commonplace (De Merich et al., 2018).

In addition, due to a lack of time and employees' multiple functions, knowledge of the context of OHS legislation may be limited (Olsen et al., 2012). As regulatory agencies maintain

deeper, longer, and more frequent links with larger companies, it may be difficult for smaller companies to communicate in-depth with e.g., an inspection of works. According to Hasle et al. (2012), small businesses feel pressure from labor inspectors rather than mutually beneficial collaboration. However, the only mechanism to promote occupational safety solutions for small businesses is external, e.g., labor inspectorates. Finally, good safety practices are difficult for SMEs to implement and understand due to the lack of systematic risk assessment and because of most good practice examples can be used and followed in LEs (De Merich et al., 2018).

3. Material and methods

This study focuses on Estonian small and medium-sized enterprises (SMEs), which are defined in this study as organizations with more than 9 up to 249 employees. The modified Method for Industrial Safety and Health Activity Assessment or MISHAA (Kuusisto, 2000; Paas, 2015) was chosen as the main investigation technique of OHS management in eleven various manufacturing SMEs (see Table 1). The MISHAA provides a comprehensive opportunity to evaluate OHSMS in the modern-day work environment: the focus is on the integration of psychosocial risk and personnel management, among other activities related to management commitment and safety knowledge. The MISHAA allows both qualitative and quantitative approaches (Kuusisto, 2000).

Table 1. Characteristics of investigated enterprises.

ID	Manufacturing area	Size, employees	Person interviewed
I	Plastic industry	50-249	EMP, PRO, REP
II	Chemical industry	50-249	EMP, PRO, REP
III	Textile industry	50-249	EMP, PRO, REP
IV	Chemical industry	50-249	EMP, PRO, REP
V	Metal industry	50-249	EMP, PRO, REP
VI	Printing industry	9-49	EMP, REP
VII	Agriculture	9-49	EMP, REP
VIII	Glass industry	9-49	EMP, REP
IX	Agriculture	9-49	EMP, REP
X	Construction	9-49	EMP, REP
XI	Transport	9-49	EMP, REP

In the first phase, semi-structured face-to-face expert interviews were conducted in eleven SMEs with eleven EMPs, five PROs, and eleven REPs to explain their factual role in OHS administration. Interviews are considered to be the best method to describe the safety management phenomenon and supplement the data obtained in the first phase of the study. The themes addressed throughout the interviews were assembled according to the structure of MISHAA into four main topics: I. Organization and administration (subtopics: safety policy and activities in practice, personnel management); II. Participation, communication, and safety training; III. Working environment (subtopics: physical and psychological work environment, hazard analysis procedures); and IV. Follow-up activities (subtopics: accidents and illness at work, the working capacity of workers, social working environment).

The qualitative findings were taken for further questionnaire surveys in the form of a modified MISHAA questionnaire (Kuusisto, 2000; Paas, 2015) in the same SMEs with EMPs, PROs, and REPs (27 questionnaires were received back) to assess and describe various critical aspects of OHS management. A mixed-methods approach was used for data analysis to gain a deeper understanding of the level of safety, with a particular focus on OHS management. Interviews were initially analyzed using qualitative methods (content analysis, averages, thematic categorization, two-step coding), while for a quantitative approach, the numerical data (MISHAA questionnaire results) were analyzed using the Statistical Package of the Social Science (SPSS Statistics 22.0 and R.2.15.2.). The following statistical methods were used: ANOVA, principal component method, and independent T-test.

4. Results

The results of the study explore the interaction of different actors in OHSMS (EMPs, PROs, and REPs). This research reaffirmed the difficult and heterogeneous situation in SMEs, given the scale

and scope of their economic activity. However, it has become clear that OHS administration in many SMEs does not go beyond what could be considered best practice or even minimum compliance. It is a well-known fact that SMEs are businesses with a high risk of injury and ill health, but also their working conditions remain more difficult in terms of psychosocial risks and job satisfaction (Ollé-Espluga et al., 2014).

The study revealed a lack of formal employee representation. The practice of informal representation and consultation with employees was also found very sporadic. Informal representation meant management assertion that employees could always contact their manager directly for safety matters if they wished to participate. However, there were only a few examples of informal representation of one's interests among the employees interviewed and even fewer examples of such involvement in safety matters. This perception of their involvement in OHS processes is linked to the closeness of social relations in SMEs, which is well known to encourage both employees and their employers to consider formal representation inappropriate for their circumstances (Eakin et al., 2010).

This survey revealed that the company's management plays a key role in REP's systematic and active work on OHS issues. In most SMEs, the manager is usually the owner of the company and is responsible for most of the company's administrative tasks, including safety issues. Due to the lack of management resources, OHS management in SMEs is usually based on the general knowledge, personal qualities, and well-known business practices of the manager or owner, so it is necessary to assess how they contribute to the safety performance of their company. The success of OHS management depends on the commitment of all levels of the organization, especially top management.

Quantitative data analysis was performed to identify statistically safety key elements for the improvement of safety performance. In ANOVA, the Sum of Squares (SS) was used to test the hypothesis. Type III SS is calculated by adjusting all terms simultaneously (including interacting/nested terms). The following rules of thumb are used to interpret Partial eta squared (Partial η^2) values: .01 - small effect size; .06 - Medium effect size; and .14 or higher - large effect size.

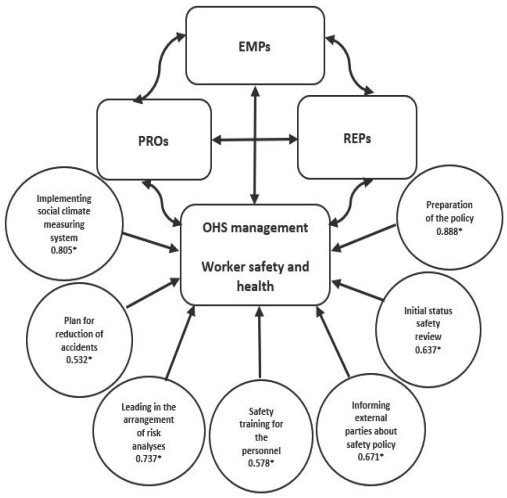
Based on the results of the quantitative analysis, safety key elements have been identified for better collaboration between management and organizational staff in improving OHS management (see Table 2).

Table 2. Joint safety key elements of collaboration between EMPs, PROs, and REPs.

Safety key element	Type III SS	Sig.	Partial η^2
Preparation of the policy	21.25	0.000	0,888
Initial status safety review	13.375	0.001	0,637
Informing external parties about safety policy	17.241	0.001	0,671
Safety training for the personnel	8.491	0.000	0,578
Leading in the arrangement of risk analyses	9.491	0.000	0,737
Plan for reduction of accidents	4.125	0.007	0,532
Implementing social climate measuring system	19.125	0.000	0,805

Quantitative analysis of the data showed that respondents with different positions in the same organization and having different attitudes towards OHS gave fairly similar assessments of the OHS level at work. This study confirmed that most SME owners and employees do not have sufficient knowledge of OHS. In this study, it was noted that the common tendency is to overestimate safety knowledge and underestimate occupational risks. One way to raise awareness and knowledge at the national level could be better integration of OHS into the sector, vocational and academic education (e.g., in vocational training centers, colleges, and universities), and labor market courses for the unemployed.

On this basis, a new conceptual model has been developed to improve OHS management for SMEs (see Figure 2).



*Correlation is significant at p<0.01

Fig. 2. Conceptual model of safety key elements for the development of OHS management in SMEs.

5. Discussion

This study reaffirmed the findings of the previous study by Mullen et al. (2017) that management commitment to safety plays a key role in REP's systematic and proactive work on OHS issues. Some REPs have indicated that they do not want to address the OHS problems. A study by Hovden et al. (2008) showed similar results - REPs often complained about a lack of time for safety activities. Interviews revealed that line staff elected as REPs are reluctant to deal with dangerous situations or even accidents due to conflicting expectations of colleagues and the manager. A study by Gallagher (2001) found that the broader position of REP is a key factor in the success of safety management; businesses can benefit from active participation in the transition from OHS management to more general health and safety planning, implementation, and analysis. It is very important to raise the level of safety knowledge and thus prevent dangerous situations or even accidents. In this case, REP's knowledge and involvement in safety activities are a very good solution.

The aspect of the routinization of risks and benefits associated with employee participation has also been discussed by other researchers (Gallagher et al., 2001). According to Walters and Frick (2000), involvement in safety is necessary because managers simply cannot know enough about all aspects of working conditions without the competence, experience, and motivation of employees to identify and reduce risk. Gallagher et al. (2001) suggested that employee knowledge could be a training tool and advice for other employees to perform auxiliary roles in OHS management. It was reaffirmed the statement that owner-managers play an indispensable role in the functioning of OHS management and the improvement of the organization.

Different authors have drawn similar conclusions about the importance of managers' commitment to safety (Li and Guldenmund, 2018). It was acknowledged that the influence of EMPs is reflected in the dynamic and regular work of REPs, and employee participation in OHS problem-solving (Hasle et al., 2019). Similar results were found in the literature on OHS improvement in organizations whose management is committed to safety (Seixas et al., 2016). This study reaffirms that the safety performance of SMEs in many cases depends on the performance and personal characteristics of their managers and that growing safety awareness affects the safety performance of their organizations.

6. Conclusions

Study results support the argument that effective OHS management in SMEs depends on the commitment to safety, employee involvement in safety activities, the flow of information between employees and managers, safety knowledge management and learning. The employer and the employees must work together to create a safe working environment and have the opportunity to be consulted on issues related to the improvement of OHS in the workplace. Where possible, the employer should consider employee suggestions and involve them in the safety process.

Based on the research results, the following key elements influencing successful OHS management collaboration were summarized:

- A real commitment from managers to safety and employee involvement means that OHS objectives must be integrated into the management of the organization, together with the safety objectives required at the management level, which should be included in the schedule of all meetings with employees;
- Good safety knowledge of SME managers and

safety representatives. External mandatory courses for SME owners and OHS representatives (now 24 hours in Estonia) should be expanded and deepened over time to include more safety topics that promote and use their skills and influence OHS results;

• Active and systemized communication flow between management, safety professionals, and employee representatives (direct communication, intranet or e-mail, regular meetings, etc.) and communication between different REPs in order to exchange knowledge and skills;

• Sufficient time for REP's activities with representation and legal protection against dismissal or discrimination by direct management or employer;

• Availability of OHS experts (internal or external safety professionals) who can advise on how to solve an existing problem in the work environment;

• Personal characteristics of REPs, namely good communication skills, good conflict resolving skills, empathy, fortitude to solve unpleasant problems, willingness to make suggestions, activity, and diligence;

• Personal qualities of EMPs and PROs, such as good communication skills, a good understanding of human psychology, personal empathy, and willingness to discuss various issues with employees.

This conceptual model of safety key elements (see Figure 2) aims to provide a research-based framework and practical examples of organizational measures for developing systematic OHS management in SMEs. The model was developed from the EMP's, PRO's, and REP's point of view to emphasize their effective collaboration to improve safety performance.

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