PhD Thesis:


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• Declaration

I hereby declare that all work and data presented in this thesis has not been submitted for any other degree and/or professional qualification, and that it is the result of my own independent research and work.

Candidate: S20151135
Acknowledgements

At this point after reaching the top level of my academic path, I would like to thank my parents Dr. George and Maria Bachtotsis from my heart for their continuous support during all the years of my personal, social and academic life to date, and I would like to specially thank Dr. George Boustras who stood by me as a supervisor, a friend, a wave breaker whenever things got difficult and as a supporter in every single step of this magnificent, yet bouncy, trip towards my PhD completion.

Nicosia, Cyprus June 2020
Abstract

The work introduced in this thesis is an approach to investigate for the first time in the existing literature to date the safety standing and performance of Micro enterprises, the smallest sized as characterized by the number of their employees, Small- and Medium-sized Enterprises (SMEs) when it comes to the safe storing, handling, use and management in general of potentially hazardous chemical substances. This study aims to provide a better understanding of the views of the employees and the owner/managers regarding the proper handling of chemicals in their Micro SMEs working environment of daily business activities and, also to measure with the help of Labor Inspectors or dedicated professional, external Health and Safety Auditors the safety performance of the Micro enterprises’ settings in the way these companies are doing their business while using and/or producing the chemical substances they need for that in a correct and harmless way.

In this pursuit a great number of previous efforts of work was studied that was primarily focused on Small- and Medium-sized Enterprises and not on Micro enterprises per se, due to the gap in the available research to date on Micro firms compared to SMEs in general. Consequently, an extensive and exhaustive literature review is introduced in the next pages, highlighting all the important aspects that are playing a role in an Occupational Safety and Health (OSH) framework and are critical for the sector of the potential hazardous chemical substances that a wide variety of Micro enterprises are using every day. An initial simple method was implemented in order to gather genuine data from Micro SMEs from three (3) EU Member States, which after some comparative analysis, they introduced many differences in the safety behaviors of the three countries under exploration. As a further step, these newly acquired data helped with the
examination and the testing of several hypotheses, which were structured based on the theoretical background as was available through the literature. These hypotheses were tested for two countries (2), out of the three (3) that were compared on an initial level, for reasons that are described in the next pages to follow.

After the testing of the Hypotheses, the study followed a similar path to measure the safety performance of the Micro firms that participated in this research project, with some recent, yet geographically restricted research efforts to measure OSH and ergonomical issues in the environment of Micro SMEs. The philosophy was the same as far as the conception of the project was concerned, however it was adequately adapted to focus on and fully cover the aspects of chemicals’ safety. The Hierarchical Regression Analysis was adopted and performed, which gave a specific model, and the only one available to date, to measure safety performance in Micros using and/or producing chemicals as a part of their day-to-day business activities. This particular model was tested for the two EU Member States emphasizing that every country is going to show different responses when compared to any other country.

All in all, this study, as already stated, aims to capture the chemical safety status of Micro enterprises in general and to provide a way for measuring safety performance for all these enterprises that are handling chemical products within a framework of health and safety standards.
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Greece

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1. Introduction

Occupational Safety and Health (OSH) is a multidisciplinary activity focused on the prevention of accidents in the working environment as well as on the well-being of employed populations. Its main target is to prevent rather than treat or cure any accidents or diseases than may rise in the workplace. Back in 1950s a joint committee of World Health Organization and International Labor Organization (ILO/WHO) highlighted a very accurate definition regarding OSH: “the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations”. The years followed the introduction of the EU Directive regarding OSH in 1989 have been of great importance in researching new measures and policies to be implemented in order to improve the health and safety of working personnel. There has been increased interest in trying to understand how organizational factors such as managerial practices may have an impact in workplace safety (DeJoy et al., 2003). Diseases and working accidents are common all over the world and in most cases they tend to have negative consequences for the workers, their families but also for the organizations they are working for. According to Cagno et al. (2014), “the enormous economic costs, associated with poor safety and health at work, inhibit economic growth and affect the competitiveness of the country”. As a result, the importance of safety in the working environment towards avoiding harming of human capital and the economy is widely recognized.

According to the European Commission, Small and Medium Enterprises (SMEs = less than 250 persons employed) are the backbone of the European economy and in 2015 92,8% of all European Companies were Micro-SMEs (<10 employees) (Eurostat, 2018). The SMEs have a particular definition, which is based on the headcount as well as on their balance sheet total or on their turnover. Following the “User guide to the SME definition” (European Commission, 2006) the
category that includes Micro-, Small- and Medium-sized Enterprises consists of such enterprises, which have i) fewer than 250 employees and ii) have either an annual turn-over not exceeding EUR 50million or an annual balance sheet total not exceeding EUR 43million. As this piece of research will be focusing on the Micro enterprises, these are defined according to the European Union Law (EUR-Lex), by a maximum headcount of up to ten (10) people and their annual turnover should be up to and not exceed EUR 2million. Moreover, Small enterprises must have less than 50 employees along with an annual turn-over or balance sheet below EUR 10million, while Medium enterprises shall have fewer than 250 employees and show an turn-over of less than EUR 50million or an annual balance sheet of up-to EUR 43million (eur-lex.europa.eu). Small enterprises, part of which are Micro firms, represent the vast majority of the registered companies in most European Member States. Hasle and Limborg (2006) describe that in Denmark a total of 98% of the companies employ less than 50 people that ranks them in the Small enterprise category. Hadjimanolis and Boustras (2013) underline the fact that SMEs in Cyprus tend to form the dominant majority, 99.6 %, of the firms in the local economy. According to Cagno et al. (2014) OSH conditions in SMEs are often poorer than in larger enterprises, as the implementation of policies and managerial schemes vary significantly from the larger enterprises. It is usually very difficult to convince smaller firms’ manager to proceed with long-term investments on health and safety towards a better safety performance. In many cases of micro companies, it is evident that owners/managers might be unaware of their shortage of health and safety knowledge; they often perceive health and safety as an area dictated by external auditing and punishment (Rigby and Lawlor, 2001). As the SMEs are key players in the European Union, there is an immediate need to investigate how Micro enterprises are standing with regards to several safety issues of their companies. When owning a micro company, the owner is very often – if not always – acting as the
manager as well. Cagno et al. (2011) emphasizes that in the case of an owner/manager there is usually no team to deal with all the activities of the company, in which safety is only one of many activities to closely follow. This fact enhances and solidifies the importance of the managerial activities towards any safety issues that may come up within the working environment and how to address to them in the most appropriate way. Employees’ reactions to the management decisions are also very significant in order to establish a better understanding of the safety dangers or hazards, which may rise in the business setting and can find the personnel unprepared for them.

As far as literature is concerned, there are still major gaps in the field of micro enterprises in general. Masi and Cagno (2015) underscore that “existing studies have neglected the differences existing between a micro and a medium/large enterprise”, for instance. Based on the above, the literature that is available to date, in terms of OSH and safety issues in the micro enterprises, can be characterized as limited if not scarce. Legg et al. (2015) stress this element by arguing that “to date, research on OSH and the work environment in SMEs has been relatively limited”. Considering the great importance of the SMEs for the European economy and the fact that many member states of the European Union are based for their economic development on Micro enterprises, the outcome of this proposed research will not just play an integral part towards improving the business environment of Micro enterprises, but it will also help them realize that through a better understanding of safety issues within their business settings they have the opportunity to “un-lock” the full potential of the company in the economic environment. The research parts of this work are going to provide (i) a comparison in the perception of employees and of owner/managers regarding the management of chemical substances in the business environment, introducing newly acquired, genuine date from Micro-SMEs from Cyprus, Greece and Romania, followed by (ii) the effort to measure for the first time the safety performance in
Cyprus and Greece and compare the findings, using a newly designed dedicated model. Safety performance *per se* is a quite important factor for the health and safety in any company environment; it is widely acknowledged as the “safety-related work” within a company that helps an organization to increase its safety culture and lower the potential risks of occupational accidents. The primary target when measuring “*health and safety performance is to provide information on the progress and current status of the strategies, processes and activities used by an organization to control risks to health and safety*” (HSE, 2001).
2. Aims & Objectives

In this research project, the focus is on the safe management, use and storage of chemicals in the micro company. The roles of the employees and of the owner/manager of the micro enterprises is being investigated in terms of the safety issues arising for these companies. The main aim of this study will be:

- To develop a specific framework (questionnaire) in order to try and measure/capture the role of manager with regards to working environment safety related issues of the micro enterprises.

- To investigate and access the difficulty, demanding and challenging environment of Micro enterprises to be able to gather genuine data and add them to the very limited, available literature on Micro-SMEs to date.

- To collect in order to analyze and compare data from three difference EU Member States that are based in the Eastern Europe and they base their economies on SMEs and most importantly on Micro firms.

- To investigate whether the employees are receiving the training, skills and equipment they need to perform their daily duties within a framework of safety; this should be compared amongst the 3 countries. Same comparison will take place for the owner/managers.

- In addition, as it is very thought-provoking let alone very crucial for the overall safety of the company, providing a model that could successfully measure the safety performance of the Micro SME will highlight and emphasize which are these variables that have an important impact on the safety performance of a Micro firm; consequently, there will be a
causal explanation regarding the explanatory power of specific characteristics in the company setting, when it comes to the total safety performance of the enterprise.
3. Research Hypotheses

After the design of a thorough and lengthy questionnaire, that is able to investigate the perceptions of employees and employers with regards to the use, storage, labeling of and training on chemicals, the knowledge of the legislation and the adaptation with the regulations, there are two parts of the main research hypotheses that are going to be investigated. The first part is focused on the perception and the perspectives of the employee and the owner/manager in terms of the safety procedures and perceptions in their company. Thereafter, part two will follow, which will be covering the ways to measure the total safety performance of any Micro enterprise that is using and handling chemicals. The Null Hypotheses below have been structured based on the existing literature on Small- and Medium-sized Enterprises (SMEs), but not on the Micro SMEs, hence it is evolutionary to check and control for them in the Micro firm environment. Their acceptance or rejection will be crucial and vital findings that will help the author construct a first-time ever dedicated model in order to measure the total safety performance. In order for a more detailed feedback from the newly gathered data from the countries of interest, the Null Hypotheses have been initially divided into a group of strictly safety performance focused hypotheses and into a second, smaller group of legislative compliance. This idea is innovative in the sense that it is spreading around the variables to be tested as an initial step, followed by a second step that consists of a construction of the total safety performance of the Micro firm that is making use of the accepted Null Hypotheses and combines the two groups of Safety Performance and Legislation Compliance respectively, into a common dependent variable the Total Safety Performance of the Micro enterprise. This way to approach precisely the wider picture of Safety Performance of chemicals in the Micro SME environment is totally new in the literature, and hopefully it will play an important role in future research efforts and studies to follow.
Group One: Safety Performance

Safety Performance is not correlated with:

H1: the willingness of the employees to use the
H2: the participation of employees in the decision-making process
H3: the use of personal protective equipment (PPE) against chemicals
H4: the level of organizational commitment of employees
H5: the level of perceived (by employees) employer interest in safety
H6: the perceived (by employees) safety conditions
H7: the participation of employees in safety information
Group Two: Legislation Compliance

Legislation Compliance of the Company is not related to:

**H9:** the appropriate labelling of the Chemicals

**H10:** the safety environment

Legislation Compliance of the Company is not affected by:

**H11:** the appropriate labelling/information of the Chemicals
4. Literature Review

Occupational Health and Safety (OHS) is the interdisciplinary field that aims to protect the safety, health and well-being of people in their workplace, by improving working conditions and reducing occupational accidents and of occupational diseases (Burton, 2010). Achieving a safe and healthy working environment is a key feature of socio-economic prosperity and progress in a modern and well-off society, while contributing decisively to promoting economic growth and employment by ensuring quality and productivity at work (European Agency for Safety and Health at Work, 2013).

Ensuring a safe working environment for more than 217 million employees in the EU is a strategic objective for the European Commission, in close cooperation with Member States, the social partners and other EU institutions and bodies. Given that the risks to the health and safety of workers are similar throughout in the EU, the Union can help Member States deal with them more effectively, while ensuring an equivalent level across the its boarders. Improvements have been made in terms of the performance of the Union in the field of relevant protective organizations. According to Masi and Cagno (2015), over the last 25 years, these improvements can be largely attributed to the overall legislation and policy actions initiated and implemented by the Union, Member States and stakeholders.

The EU strategy for relevant protective organizations provided a common framework for coordination and a common sense of direction. The 27 Member States now have a national strategy for the EU, which is adapted to national conditions and national priority areas. During the period 2007-2011 it was marked in the EU, a 27.9% reduction in the percentage of accidents resulting in absences longer than three days from work. Awareness raising initiatives, both at EU and national level, have contributed to the development of a risk prevention culture (European Commission,
2014). According to the central motto of the EU-OSHA campaigns, "... effective management of health and safety in the workplace is beneficial to both workers and businesses, but also to society as a whole" (Kongtip and Yoosook, 2007).

4.1.1. Basic concepts of Occupational Safety and Health (OSH) in Small and Medium Enterprises (SMEs)

Some basic concepts in OHS issues, which are defined by the ILO about the Decision of the Ministry of Labor, Social Security and Social Solidarity for SMEs in Europe and the Adoption of National Strategy for Health and Safety at Work 2016-2020, are highlighted by Cagno et al. (2014) as follows:

➢ **Source of Risk (or Risk Factor):** It is the situation or the action that is likely to cause harm in its view human injury or illness, or a combination thereof, that is, anything that exists in the workplace that is capable of causing injury or harm to the health of workers (respectively, an occupational accident or occupational disease).

➢ **Danger:** It is the combination of the likelihood of a hazardous event (or exposure to a risk factor) and the seriousness of the injury or damage to the health of workers that may be caused by that event or exposure.

After all, risk is defined according to the following mathematical relation: (Masi and Cagno, 2015)

\[
\text{Danger} = \text{Probability} \times \text{Consistency}
\]

➢ **Risk Assessment:** It is the process of assessing the health and safety risks of employees in the workplace. This is a systematic review / study of all aspects of the work that examines:

a. what could cause injury or damage and to whom,
b. whether the risks can be eliminated and, if not,

c. what precautions should be taken to control risks

➢ **Security:** It is a condition in which one feels completely free from the threat of some risk, which can cause injury or some health damage. In practice this is impossible to achieve. Therefore, safety should be regarded as an assessment of the level of risk of injury or injury considered acceptable.

➢ **Health (in relation to work):** The state of complete physical, mental and social well-being and not only the absence of illness or disability (WHO Statute, 1946)

➢ **Prevention:** All steps or measures taken or to be implemented at all stages of work within the business to eliminate or reduce occupational risks.

4.1.2. Occupational Illness and Accident at Work

According to the European Agency for Safety and Health at Work (2013), the *occupational illness* is defined in two different ways, namely:

i. According to the definition given by the medical science, *occupational disease* is the disease associated with the type of risks to which the sufferer is exposed because of his work. It is any disease that has been proven, on the basis of medical criteria, to be attributed to the type of work and the risks to which the worker has been exposed due to the work.

ii. According to the definition based on the reality of insurance, which applies in any country, *occupational disease* is a disease recognized as such by the current insurance system, with the conditions and restrictions that it places every time.
There is no precise definition of an accident at work in the European law. According to the insurance legislation, an accident at work is defined: "The death or incapacity of the employee for work caused by a violent incident that occurred during or because of the work" (Burton, 2010).

In order for an incidence to be eligible to qualify as an accident at work, the following conditions must be met cumulatively (Wilthagen and Tros, 2004):

- The incident is violent
- The incident occurred during or towards the performance of the work (e.g. transfer of workers to the workplace)
- There is a causal link, that is, a link between the particular event and the work
- The cause of the violent incident is not due to the employee's intention
- The event causes the employee to be unable to work for more than three (3) days

In the event of an accident at work, the employer is obliged to notify about each employee’s accident (Cagno, et al., 2014):

- The nearest Police Authority without delay and by the fastest means (if the accident is critical)
- The relevant Labor Inspection within 24 hours. Where there is no Labor Inspectorate, notification should be made to the relevant Police Authority.
- In order for the accident to be recognized by any insurance body, whether it is an employee or a non-employee, it is necessary to notify the agency within a timely manner. The deadline for reporting an accident, is a period of 5 days since the day of the accident. However, the occupational doctor and every employee have to report the accident within 24 hours of witnessing it or being notified about it. (Wilthagen and Tros, 2004)
4.1.3. Employment Obligation for Welfare

As the employment relationship is not only economic but also personal, it is the employer's general obligation to ensure the protection of the employee. This duty is referred to as the employer's welfare obligation as described by Kongtip and Yoosook (2007). The welfare obligation could be defined as the employer's responsibility to take the necessary measures so as to safeguard the work interests and the personality of the employees while at the same time avoiding any action which unduly damages the interests of the workers.

This general responsibility is specified by the specific employer obligations to respect every aspect of the employee's personality (professional and personal value, privacy etc.), to take appropriate measures to prevent accidents at work, to protect workers' health, but also more generally the exercise of managerial rights to the limits of legality. In the above context the following are provided by Cagno, et al. (2014):

- Employees in businesses employing more than 50 people (150 under a transitional arrangement) have the right to form Health and Safety Committees, composed of elected representatives in the business. If the company has a staff council, the council appoints the members of the committee.
- In businesses employing from 20 to 50 people, an elected employee representative is appointed for health and safety at work.
- In businesses employing an average of more than 50 employees annually, the employer is required to use the services of technical safety and occupational therapists.
- Finally, it should be noted that, in the event of breach of the hygiene and safety provisions of the undertaking, administrative and criminal sanctions are imposed on employers.

Since the above points are mainly focused on SMEs, and there is no provision for Micro enterprises.
with up to 10 people being employed, all the provisions should be taken care of by the employer or the owner/manager of the Micro firm. Additionally, the employer is the person responsible for the implementation and the control of these provisions for the safety of employees.

4.1.4. Cost Discrimination and Motives for Employees’ Accidents

The cost of accidents at work, it is broken down into a variety of categories. However, an initial and very basic cost distinction is made between economic and non-economic costs of accidents at work. The financial cost, by its definition, is one that can be calculated numerically and expressed in terms of money. It involves the loss of goods or services that either have a market value or can be approximated. The financial cost includes the financial costs of suffering, the loss of home services, the losses in the company and the lost capacity of society.

When calculating the cost, it is important to avoid the 'double count'. For example, if an insurance company pays the medical expenses of injured workers while the employer pays premiums, this cost should only be reimbursed to one of the two parties, usually the latter, and in this case to the business (Dekker, 2010).

On the other hand, non-economic costs are very important and difficult to calculate as they cannot be clearly calculated in economic terms. More specifically, non-financial costs include immediate physical and mental costs for the sufferer, emotional costs for the family and community, and loss of social value, such as justice and solidarity. Attempts have been made to give some of them some money (something that is necessarily done in the courts when awarding damages), nevertheless, no number can express non-monetary losses.

Lastly, it is not entirely correct to consider that all economic costs represent direct or short-term
production losses. Based on Picket (2010) this happens because accidents at work cause a general reduction in productive human resources, both at the company level and at the national economy level. Thus, the total cost will be presented gradually in the future in the form of reduced yield.

4.1.5. Fixed and Variable Costs

Another important cost distinction is between fixed costs and variable costs. The fixed cost is independent of the type of injury or illness caused. For example, the general cost of insurance contributions is a fixed cost, as it is usually independent of the number of accidents or illnesses occurring in a business. On the contrary, variable costs increase according to the number of accidents, and at the same time depends on each individual incident (Masi and Cagno, 2015). The costs that are taken into consideration, when making a decision, are only variable costs, as the constant is unavoidable (Dekker, 2010).

4.1.6. Direct and Indirect Costs

An important reason as why companies do not invest in the prevention of accidents at work and/or occupational diseases, and therefore of their end cost in an unlikely event, is the fact that they do not fully understand and identify these costs. The nature of the various cost elements makes it difficult to identify them and makes it even harder to calculate them. Thus, the costs of accidents at work and occupational diseases are also directly and indirectly distinguished. The obvious costs of an occupational accident or occupational disease are immediate and relate, for example, to first aid costs and expenses, hospital and medical care, grants and reimbursements, time off work, rehabilitation and rehabilitation costs, fines and reintegration, fines, damage to equipment and facilities, etc.
In addition to these costs, there are some less obvious costs, which are usually borne by the business, that are not always directly measurable and are indirectly described in the literature (Kongtip and Yoosook, 2007). Some of the indirect costs, according to Dorman (2000), are the interruption of the production process immediately after an accident, the effects on colleagues' morale, the costs of investigating and recording the accident, the costs of preventive and/or training of substitutes, reduced productivity of potential substitutes, material and equipment disasters, reduced post-accident quality, reduced productivity of injured workers transferred to light jobs, cost of stocks or high spare capacity, psychological problems of the victim after returning to work, etc. (European Agency for Safety and Health at Work, 2013).

Furthermore, in some cases the cost of strikes following a major accident may be added and the cost of salaries of overworked staff to address absenteeism accidents at work. This type of costs, though, is very rare to be seen in Micro enterprises. Increased productivity of healthy workers should also be considered when working in better working conditions. An older study of Wilthagen and Tros (2004) underlines that the Indirect cost often tends to reach four times the direct cost and belongs mainly to the variable cost category, thus giving a strong incentive to the business. It is clear that there can be no consistent and unambiguous documentation of the above quantitative ratio, which merely gives an empirical picture of the costs of accidents and illnesses at work (Pickett, 2010). Especially, when this has to be applied to the environment of a Micro company, the costs’ picture can be nothing but empirical and business sector specific, if not strictly case specific.
4.2.1. The Concept of “Safety Culture”

The term “Safety Culture” first appeared in the 1987 OECD report by the Nuclear Energy Agency (INSG, 1988) on the grounds of the disaster in Chernobyl in 1986. Winning ground over the past decades internationally, the term comes to describe the corporate atmosphere in which security culture is accepted as the number one priority of organizations and high-risk industries.

The International Atomic Energy Agency (IAEA, 1991) provides the following definition of the safety culture for business (Reiman and Rollenhagen, 2014):

*The safety culture is the set of characteristics and attitudes that determines in individuals and organizations that security issues and nuclear power stations are above all, and that security must receive due attention, which derives from its importance.*

The UK Health and Safety Committee (HSE, 1993) then offered the safety culture one of the most prevalent definitions, according to which:

*The safety culture of an organization, it is the product of individual and group values, attitudes, abilities and behaviors that determine the loyalty, style and experience of an organization’s Health and Safety Administration.*

Cooper (2002) argues that after 1990 the term gained increased value and it has been loosely used in order to describe corporate culture in which safety is understood and accepted as top priority. Professor Frank Guldenmund (2010) explains in his book titled “Understanding and Exploring Safety Culture” that there is a variety of safety culture definitions over the years, which can be either explicit or implicit. In Table 1 below, there is a summary of the variety of definitions of
“safety culture”; the vast majority of them focus on the key-role of the management of the company in close association with the employees’ behavior towards safety issues.

Table 1: Definitions of Safety Culture, adopted by Frank Guldenmund (2010), "Understanding and Exploring Safety Culture"

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Definition of safety culture/climate</th>
</tr>
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<tbody>
<tr>
<td>Zohar (1980)</td>
<td>A summary of molar perceptions that employees share about their work environments (safety climate)</td>
</tr>
<tr>
<td>Glennon (1982)</td>
<td>Employees' perceptions of the many characteristics of their organisation that have a direct impact upon their behaviour to reduce or eliminate danger (safety climate) and, Safety climate is a special kind of organisational climate</td>
</tr>
<tr>
<td>Brown &amp; Holmes (1986)</td>
<td>A set of perceptions or beliefs held by an individual and/or group about a particular entity (safety climate)</td>
</tr>
<tr>
<td>Lutness (1987)</td>
<td>Not explicitly stated (safety climate)</td>
</tr>
<tr>
<td>Cox &amp; Cox (1991)</td>
<td>Safety cultures reflect the attitudes, beliefs, perceptions, and values that employees share in relation to safety (safety culture)</td>
</tr>
<tr>
<td>Dedobbeleer &amp; Béland (1991)</td>
<td>Molar perceptions people have of their work settings (safety culture)</td>
</tr>
<tr>
<td>International Nuclear Safety Advisory Group (1991)</td>
<td>Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance (safety culture)</td>
</tr>
<tr>
<td>Pidgeon (1991)</td>
<td>The set of beliefs, norms, attitudes, roles, and social and technical practices that are concerned with minimising the exposure of employees, managers, customers and members of the public to conditions considered dangerous or injurious (safety culture)</td>
</tr>
<tr>
<td>Safety Research Unit (1993)</td>
<td>Not explicitly stated (safety climate)</td>
</tr>
<tr>
<td>Cooper &amp; Philips (1994)</td>
<td>Safety climate is concerned with the shared perceptions and beliefs that workers hold regarding safety in their work place (safety climate)</td>
</tr>
<tr>
<td>Geller (1994)</td>
<td>In a total safety culture (TSC), everyone feels responsible for safety and pursues it on a daily basis (safety culture)</td>
</tr>
<tr>
<td>Niskanen (1994)</td>
<td>Safety climate refers to a set of attributes that can be perceived about particular work organisations and which may be induced by the policies and practices that those organisations impose upon their workers and supervisors (safety climate)</td>
</tr>
<tr>
<td>Coyle et al. (1995)</td>
<td>The objective measurement of attitudes and perceptions toward occupational health and safety issues (safety climate)</td>
</tr>
<tr>
<td>Berends (1996)</td>
<td>The collective mental programming towards safety of a group of organisation members (safety culture)</td>
</tr>
<tr>
<td>Lee (1996)</td>
<td>The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, and organisation's health and safety management (ACSNi) (safety culture)</td>
</tr>
<tr>
<td>Cabrera et al. (1997)</td>
<td>The shared perceptions of organisational members about their work environment and, more precisely, about their organisational safety policies (safety climate)</td>
</tr>
<tr>
<td>Williamson et al. (1997)</td>
<td>Safety climate is a summary concept describing the safety ethic in an organisation or workplace which is reflected in employees' beliefs about safety (safety climate)</td>
</tr>
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</table>
Throughout the years, several research attempts tried to give a variety of dimensions to explain the terms safety culture and/or safety climate. As Guldenmund (2000) stresses, Glennon (1982) tried to capture safety climate “as the perception of organizational reality, that seems to suggest one kind of attitude measurement, but only partly as perceptions are not identical to measurements”. However, safety culture/climate has been proven many times in real life to have been critical to the failure or success of a company. The working environment of an enterprise should have predefined responsibilities as well as detailed practice at all levels according to Sorensen (2002). Neal and Griffin (2002) include in their work the idea from Barling and Zacharatos (1999) that leadership is one of the most critical determinants of safety; it is leaders who have a key role in shaping the safety culture in a company and they manage to motivate employees to perform their duties safely. An example of existing safety culture can be seen in the recent work of Ozmec et al. (2015) where safety appears to be a very complex and non-specific practice in the case of safety practice in small construction companies. Here, the owner/managers both demand and depend on the employees to do the right thing, although the definition of this “right thing” often remains unclear. In addition, the main concerns and approaches of the owner/manager are not always observed as something protective in favor of the employee, but as something that will either improve or make the workflow difficult.

Nahrgang et al. (2011) in their meta-analytic investigation for safety at work, came up with the following interesting results. The conditions in the workplace are divided into two distinct groups, (i) job demands within the safety context – potential risks and/or hazards that are existing in the workplace, physical demands associated with the work, in addition to the complexity of the work itself; and, (ii) job resources – comprising of knowledge of safety, autonomy and supportive environment. The job resources are the ones that give the employee the necessary skills and
appropriate awareness to address their targets successfully as well as to reduce job demands. The manager within this “job resources” framework makes the knowledge of safety available to the employees in order for them to be able and acquire the dedicate know-how so as to be able to perform safely in their working milieu. Examples of such knowledge can be the correct and safe use of the Personal Protective Equipment (PPE), to become familiar with the health and safety procedures in general and, finally, to act through a best practices policy to minimize occupational risk. With regards to autonomy, the term represents the freedom of choice of the employee to carry out business related tasks, to make autonomous decisions without asking for every single issue his/her manager’s guidance and to decide on his/her own on which working methods to follow. Finally, there is the supportive environment, a term to highlight the supportive behavior of the manager towards the employees.

Another important distinction with regards to variables, or better put, characteristics that could explain the term safety climate is the one adopted by Guldenmund in his paper from 2000, where he partly used the work from Cox and Cox (1991), and proposed the four (4) ‘principal’ attitude objects related to safety climate, namely: 1. Hardware/physical environment, 2. Software, 3. People, 4. Risk. Nevertheless, though, this classification is too wide and non-specific to be of any use (Guldenmund, 2007). Nonetheless, accident prevention has always being influenced by a positive safety culture within an organization. Choudhry et al. (2007) argue that the situational aspects of safety culture are to be seen in the structure of an organization, e.g. policies, working procedures, managerial systems etc. In research, organizational culture has been traditionally measured with the use of quantitative methods, like interviews and/or observations.

Within the context of safety, it is of great importance for the employees to establish a solid communication channel with the management as well as to receive managerial support while
performing their intra-day tasks. The characteristics described in the lines above stress the importance of safety culture in the majority of the enterprises around the world. Flin et al. (2000) found a barely shocking element that the role of management in determining the safety of the workplace appears so frequently, even though the understanding of management behavior processes, their perceptions by the personnel and any influence these processes might have on the personnel seem to be less well established. For this framework of safety culture, when the question falls on the Micro enterprises, all these features – especially the job resources – come into play and emphasize the importance of the managerial skills of the owner/manager of the micro firm.

4.2.2. Part of The Wider Culture

Furthermore, it is widely recognized that an organization's culture is directly linked to the success or failure of its operation and it has many definitions as it is a complex concept governed by various parameters (Reiman and Rollenhagen, 2014). In the 1970s the term "organization culture" prevailed, while in the 1980s, it was gradually replaced by the term “culture”. Today, the term culture of an organization, it has become to mean the manifest of culture within the organization. According to Eniola and Ektenbang (2014) the organization’s climate is followed by culture, or else culture is the expression of an organization's climate.

In such a context, there are many authors who believe that it is important for the organization, the existence of the safety culture within the wider perspective of the culture, especially for Small and Medium enterprises (Brooks, 2008). In that context, some of the most recent definitions of safety culture are as follows:

➢ A sum of basic perceptions that employees share in their working environment (Anthony, 2014)
Employees’ perceptions, which have a direct effect on their behavior to reduce or eliminate the risk. The safety culture is a particular kind of the business’ climate (Eniola and Ektebang, 2014)

The main perceptions of employees on their working environment (Brooks, 2008)

Safety culture refers to the common perceptions and beliefs that employees follow about security at their workplace (Brooks, 2008)

Safety culture is a concept that describes the security morale of an organization or workplace, reflected in workers' beliefs about security (Petitta, et al., 2017)

Safety culture is the set of characteristics, habits and peculiarities of the organizations that establish it as a priority (Anthony, 2014)

Safety culture is the product of individual and group values, habits, perceptions, abilities and behavioral patterns that define the commitment, style and competence-sufficiency of the organization's health and safety management (Chowdhury, Audretsch, Belitski, 2015)

4.2.3. The International Approach to the Small and Medium Enterprises’ Safety Culture

The occurrence of adverse effects as a result of employees’ errors that entail endless losses for the sufferer, but also affect the professional at the physical and/or psychological level, demonstrates the need to develop strategies to monitor the errors relating to the safety of sufferers in small and medium business (Brooks, 2008). For the sufferer, the mistakes are related to both physical and psychological traumas and disabilities, which often result in his/her distraction from his/her own work and, potentially from his/her social environment, while for the small and medium organizations, unwanted actions entail an increase in their operating costs, loss of confidence in the institution, and moral problems. It is therefore reasonable for all these reasons that small and
medium organizations, to commit themselves to adopting a safety culture model in the interest of the safety of the sufferers (Eniola and Ektebang, 2014).

Safety culture is a subset of the overall culture of an organization and is associated with both individual work and organizational characteristics that affect safety and health (Anthony, 2014). Understanding the way in which safety performance can be sustained and maintained in small and medium enterprises, as well as the identification of vulnerabilities that lead to a decrease in performance and are causes for failure, is achieved through the assessment and understanding of the organization's safety culture (Chowdhury et al., 2015).

The common silent perceptions shared by people about their workplace are the highest level of the safety culture. Attitudes and beliefs that SMEs express, can change the behaviors that lead to accepting bad conditions and poor compliance with standards and procedures and, thus causing unpleasant incidents. A group, however, rarely knows its deep common perceptions as it is seldom expressed or seen (Brooks, 2008; Ahmad and Shalik, 2012).

According to Schein (2013), the existence of a safety culture is essential for the efficient performance of SMEs; the stronger the safety culture, the more effective the organization is (Eniola and Ektebang, 2014). Schein (2013) also emphasizes that safety culture is a social control mechanism and can create the basis for manipulation of the SMEs' employees in their way of thinking, feeling and reacting. There is a correlation between safety culture at work and safety effects of both employers and employees. A recent research of Bratkovic et al. (2016) underlines the importance of systems and organizational factors as predictors of positive or negative safety results. A strong safety culture has five main features, in line with the international framework developed by the IAEA (International Atomic Energy Agency) for small and medium enterprises:
i. Recognition of common values, perceptions of security

ii. Security accountability

iii. Detail for learning

iv. Group work

v. Commitment of the administration for security

The successful implementation and safety performance achieved in the operation of SMEs it is due to the management systems they have developed in conjunction with the actions of the employees, as individuals or as groups (Brooks, 2008). A management system that promotes and supports a strong safety culture, it provides a common understanding of the core aspects of the safety culture within the small and medium enterprises, it provides the means by which the organization supports individuals and groups in performing their tasks safely and successfully (Porkka, 2016), perceiving the interaction between individuals, technology and organization and reinforcing the attitude of "learning and questions" at all levels of the organization (Anthony, 2014).

Moreover, people use alternatives to the define the safety culture. However, these terms are different. The culture of SMEs as well as the culture of a country are difficult to measure or change. As highlighted by Guldenmund (2018), safety culture understands that the values, attitudes and behaviors of employees in terms of how they think and act in this direction play an important role in the safety performance of a company. Literature emphasizes that safety culture has great potential to improve a small and medium company's safety performance and reduce injuries at the workplace. Researchers argue that if a company systematically monitors its safety environment and tries to strengthen it, this could lead to sustainable improvements in the performance of Health and Safety at Work (Hui-Nee, 2014).
One of the pillars of the safety movement for employers and employees in small and medium enterprises, it has been to promote a safety culture. A positive safety culture, unlike an "abnormal", is characterized by the recognition of the inevitability of errors and the pursuit of identifying preventatively existing latent threats. According to Reiman and Rollenhagen (2013), the organizations with a positive safety culture are characterized by communication based on mutual trust and the common understanding of importance of security and confidence in the effectiveness of preventive measures (Anthony, 2014).

In the field of aviation for example, the safety improvements over the years have been achieved through the implementation of many small changes in processes, equipment, education and organization that contribute to the creation of effective practices and a strong safety culture. In the health sector, the evaluation of the safety culture is a tool for improving the safety of the sufferers. It can be used to make a research on conditions that lead to adverse effects and harm to the patient as well as to create interventions to improve safety in health care organizations. Assessing safety culture can be considered as the starting point for planning action on changes to safety of patients (Guldenmund, 2010).

A feature of high reliability industries is their ability to learn from mistakes and make changes. Most SMEs, however, do not recognize that safety must be a precondition and not just a priority. When promoting the customer's interest in safe customer service and employees in a safe working environment, the productivity and profitability of the firm itself are also promoted and improved. SMEs should become "high-trust organizations" capable of delivering safe, effective customer-centered care. This can be do through a culture-based, transparent, supportive and learning-oriented working environment, where all employees treat each other safely and with respect, putting the interest in the customer as a top priority (Arend, 2014).
In order to organize safe SMEs, there is a need to create an environment where every employee finds satisfaction from his work is a fundamental challenge for any leadership. Typically, a strong safety culture includes the commitment of the administration to promote and protect the error reporting and to supplement safety promotion reports (Petita, et al., 2017).

4.2.4. Business’ Safety Assessment – A Tool to Improve the Change

In small and medium enterprises, the evaluation of improvement initiatives and quality assessments is achieved by measuring the customer's safety climate, the measurable components of the safety culture, which is a widely used tool, as a high level of security climate offers a basis for providing safe care to sufferers according to many researchers. A large number of surveys, therefore, focus on the development of safety culture measurement tools. Even though there are many ways to measure it, such as interviews, observations etc. the most commonly used method is this of the delivery of standard, simple questionnaires. The tools for measuring the climate of safety that have been developed so far differ mainly based on the field they apply, the dimensions they are investigating, their length, their level of development and validation in a national context (Brooks, 2008).

Errors in SMEs are unpleasant events for the sufferer as well as for the professionals. The consequences of such incidents, they have been widely studied in the literature. However, the error is a "taboo" issue in the smaller SMEs, i.e. Micro enterprises, that is scarcely discussed, and significant learning opportunities are lost. Errors happening in Micro firms and adverse events unfavorably affect the emotional and working well-being of professionals, as well as the quality and cost of business services delivered. Companies’ administrations should treat those who have
committed a mistake as the second victim after the victim who has suffered the error and offer them support and advice (Nielsen, 2014).

According to data collected by the World Health Organization (WHO), one out of ten sufferers in developed countries can be harmed by a series of errors or unwanted incidents in small and medium enterprises. The interest a few years ago in detecting sources of risk as well as in finding ways to limit them in the provision of products and services in small and medium enterprises, it was limited. However, in recent years, there has been a need to educate, encourage and motivate professionals to report the adverse events and mistakes that occur, as well as the need for information systems to locate, record and analyze them. Employees should be encouraged to report on errors reporting through the creation of a transparent, impartial and non-repudiating reporting framework. However, this does not serve any real purpose. It is necessary to initially analyze the data gathered and then search for solutions and take steps to avoid repeating such errors in the future. The main objective is to learn small and medium enterprises’ systems and professionals from their mistakes, since according to surveys 70% of adverse events are preventable (Anthony, 2014).

**4.2.5. Research on Risks and Errors for the Achievement of Safety Culture**

There are two ways of approaching human error, the atomic approach and the approach of the system. The first refers to the thinking that mistakes are the result of carelessness, neglect or lack of memory of the individual is also the dominant one (Brooks, 2008). In this way, the professional is targeted, and error reporting is avoided. On the other hand, the approach of the system has a
holistic attitude towards mistakes. It admits people are making mistakes because mistakes are inevitable even inside the best organized SMEs.

Problems faced by organizations are complex and result from the interaction of many factors. Errors are caused by systemic factors that are affected by the organization's strategy, culture, and management's perception of risk. The important thing when an undesirable event occurs is not who made the mistake, but how and why the defenses failed and what factors helped create the conditions that led to the error (Ahmad and Shalik, 2012). The prevailing view is that we cannot change the human factor, but people can change the conditions that they work to be less prone to mistake. This approach recognizes the learning process as enhancing uncertainty. The human error is usually accused of unwanted events, because almost always occurs at the time immediately before the adverse event. Two important facts about human error should not be overlooked. First, even the best scientists can make the worst mistakes. Second, these are not accidental mistakes, rather than repeated mistakes; same or similar situations and conditions can lead to similar errors regardless of the persons involved. Therefore, any attempt to limit mistakes, which focuses on the individual and does not seek the systemic factors that contribute to mistakes, is doomed to fail. Human factor is the ultimate cause of undesirable events. Many SMEs, like the ones using chemicals for example, are operating in dangerous conditions, and they should develop defenses and processes that interpose between the source of the cause and the potential victim to suffer the losses (Anthony, 2014).

In the system approach of error, the defensive mechanisms and safeguards hold a dominant position. High-tech systems have many defense mechanisms, others based on individuals (surgeons, pilots, control center operators, etc.) and others in procedures and administrative controls. Their function is to protect potential victims from threatened disasters. Although they are
effective, they still have their vulnerabilities. The defensive mechanisms resemble "Swiss cheese". As this cheese has holes, these mechanisms and processes present holes that open and permanently change position. When the holes of different "slices" come in the same line, then the probability of an error that brings the risk closer to the victim is revealed. As Anthony (2014) describes holes in defensive mechanisms are the result of "active failures," or "latent conditions." For the most part, the adverse events concern the combination of these factors. The "active failures" are bad practices by people who come in direct contact with the patient or the system and may be in any form: mistakes, procedural violations, negligence, lack of attention. Usually have a direct and transient impact on the integrity of the defense mechanisms. These operations have a causal history that extends back to time and to the higher levels of the system. The "launchers" are inevitably "opportunistic pathogens" within the system and result from decisions in process design and from manufacturers and senior management errors. The latent conditions may remain inactive for many years until they are combined with active failures and a chance of accidents is created. Laid conditions, unlike active ones, can be detected and restored before an undesirable event occurs. The interest of researchers over the last few years has been increasing for the development of risk and error management tools. An integrated management system will target the individual, the group, as well as the organization as a whole.

SMEs recognize the need to address the safety problem and adopt strategies to prevent it. However, when it comes to Micro enterprises this matter receives in many cases less attention than it should. Reason vary and can be counted as the lack of a management system in place, the lack of educated knowledge about the potential negative impact of the errors both on the employees and on the business itself, or it can even be that employees and/or owner/managers of Micros tend to neglect the importance of the safety culture in their business environment, mainly due to the small size of
their business. In any case, should Micro firms neglect safety culture? The answer is definitely negative.
4.3.1. Risk Communication

The recognition of risk in business is the most important and difficult stage in risk management. It is the first stage and the basis for the next steps’ implementation such as the Risk Communication (Altman et al., 2010). The key variable for recognizing risks is to carefully assess the particular characteristics of each situation that will lead to the adverse event. In addition, the recognition of risk is directly related to the degree of exposure of the business to uncertainty. In order to identify this organization's exposure, it is essential for the organization to precisely know of the market in which it operates and its strategic and operational objectives. It is still necessary to identify factors that can be opportunities or threats to these goals (de Araujo Lima et al., 2020). Some examples of risk identification techniques are described by Semper and Beltran (2014):

➢ The brainstorming session
➢ The use of questionnaires
➢ The operational studies, which examine each operational process
➢ The comparative benchmarking
➢ Analysis of the risk scenarios in business
➢ Hazard and Operability Studies (Hazard and Operability Studies)

The risk identification should be approached in such a way as to ensure that all the activities of the entity and all the risks arising from these activities are identified. The businesses for risk identification can be categorized as follows, according to the Institute of Risk Management (IRM):

❖ Strategies which relate to the company's long-term strategic goals. These activities may be affected by regulatory changes, from government and political dangers, by the availability of funds, reputation and changes in the natural environment.
❖ Functional, related to the day-to-day situations faced by an organization in pursuit of its goals.

❖ Financial, related to the effective management and control of the organization's financial issues, such as foreign exchange rates and interest rate trends.

❖ Knowledge management, which refers to the effective management and control of the company's resources.

4.3.2. The Characteristics of Risk Communication in Small and Medium Enterprises (SMEs)

Essentially, the aspect of risk communication in small and medium enterprises is a more integrated approach to the concept of risk management. The concept of risk communication in SMEs includes the concepts of risk management, holistic risk management, risk management strategy and integrated risk management. Each of these concepts, it differs slightly in the track on which it focuses. However, the general idea of all these terms, it is similar (Elshadidy et al., 2018).

The process followed in the aspect of risk communication in SMEs starts, initially, with the recognition of the risks faced by the business. Then, the decisions are made as to which risks the entity will be actively managing. Finally, to create an action plan to address identified risks (Semper and Beltran, 2014). The risk communication in SMEs provides a framework for employees to deal with all risks, which typically involves identifying specific events or circumstances that are related to the organization's goals (benefits and opportunities), their assessment concerns the probability and magnitude of the impacts, the definition of a response strategy, and the monitoring of the progress of the economic unit (Linsley et al., 2018; Daza and Hargiss, 2020).
According to the definition given by the Committee of Sponsoring Organizations (COSO) (Jerrard et al., 2008), the aspect of risk communication in SMEs, is defined as a process implemented by the Board of Directors of an enterprise, by the management and others employees of the company, is applied to the entity-wide strategy and is designed to recognize events that may affect it. In addition, it manages the risk that lies within the framework of risk on the part of the company and provides reasonable assurance that the entity's objectives are being achieved (Sabada, et al., 2014). In addition, COSO argues that the risk communication in small and medium enterprises should benefit and strengthen the decision-making process as well as controlling the risk management (Linsley et al. 2018; de Araujo Lima et al., 2020). Another definition of risk communication in SMEs refers to the Enterprise Risk Management (ERM) as a process of planning, organizing and controlling the business of a business that aims to minimize the impact of risks on the capital and earnings of the organization (Schwarzkopf, 2006). Furthermore, according to the definition given by the Casualty Actuarial Society, the aspect of risk communication in SMEs is the discipline by which the organization in any sector evaluates, controls, exploits, finances and monitors the risk that it derives from all sources, with a view to increasing the value in the short and long term for the interested parties of the firm (Gilmore, et al., 2004).

It is generally noted that Management and Senior Executives in Businesses are not in a position to get the full picture of the course of the entity. In most companies, risk management actions and functions generate large-scale reports. However, many times through these reports, the members of the management of a company fail to obtain sufficient and useful information about the threats that loom the entity. So, an important test - a good test - is to find out whether senior executives and Management are able to answer a set of important questions that are presented as follows (Elshadidy et al., 2018):
✓ What are the 10 main risks that threaten the entity?

✓ Is any of our business goals at risk?

✓ Are there Key Risk Indicators (KRIs) that monitor exposure to significant risks to risk tolerance?

✓ What were the actual losses and problems? Did we recognize these in previous assessments and risk reports?

✓ Does our business comply with laws, regulations and policies for managing operational risks?

If Management and Senior Executives are unsure of their answers to the above-mentioned fundamental questions about risks, then there is a strong likelihood that this business will benefit from a more integrated approach, such as ERM. In summary, the aspect of risk communication in SMEs has the following characteristics (Linsley et al., 2018; de Araujo Lima et al., 2020):

✓ It is a continuous process that takes place within the company.

✓ It is implemented by people who they work on it at every level of the organization.

✓ It helps to regulate the entity's strategy.

✓ It applies to the entire business, at each level.

✓ It is designed in such a way as to help identify potential opportunities or threats to the organization's course.

✓ It can provide reasonable assurance and safety to the members of the company's management.

✓ It is geared towards achieving the business objectives in one or more overlapping categories.
Additionally, as Miromiya (2010) argues, the aspect of risk communication in SMEs deals with the introduction of supervision, control and discipline, in order to constantly drive the company to improve its risk management capabilities in a changing operating environment. Several important frameworks are identified in the risk communication in small and medium enterprises, each of which depicts an approach to identifying, analyzing, addressing and monitoring threats and opportunities faced by an entity in its internal and external environment (Sun et al., 2019).

According to Park (2010), the management of each entity should choose the business risk strategy to follow in order to address the identified difficulties. This strategy may include the following actions:

✓ Avoiding Risk: It stops any activity creating risks.
✓ Risk Reduction: Performs activities to reduce the likelihood of the impact of risk.
✓ Alternative risk actions: Undertakes alternative activities to achieve minimization of risk.
✓ Risk Sharing: Carries or separates part of the risk in order to limit possible impacts.
✓ Acceptance of risk: It does not take measures to address the risk due to the high cost, and therefore accepts the risk.

In order to facilitate operations in the implementation of the aspect of risk communication in small and medium enterprises, the COSO framework developed an ERM Integrated Framework (2004), also known as the COSO Cube. This is the evolution of the COSO framework, which was developed in 1992 (Ogawa and Piller, 2006). The aspect of risk communication in small and medium enterprises provides a common dictionary that includes terminology, giving full direction and guidance for implementing Corporate Risk Management. COSO's framework requires
organizations to look at the overall portfolio of risks, to study how these independent risks interact and the management to develop an appropriate approach to reduce these risks in a way that is consistent with its strategy undertaking and the take-up of risks.

4.3.3. The Concepts of Corporate Risk Communication

The aspect of risk communication in small and medium enterprises, as mentioned, is a synthesis of many processes. In order for these procedures to be carried out properly, there are some elements that support risk management, as well as some concepts that refer to these elements and apply to all organizations. Altman et al. (2010) present these concepts as follows:

✓ **Risk exposure:** This is a quantitative measure that measures the probability of loss for the business. Through this magnitude, the entity’s exposure to risks is cumulatively calculated.

✓ **Risk appetite:** Refers to the level of risk a business is willing to accept and accept in pursuit of its objectives and before it is deemed necessary to take action to reduce the risk. Risk appetite represents the balance between the potential advantages of an innovation and the possible threats that a change can bring.

✓ **Risk Tolerance:** Refers to the behavior of people (especially consumers and investors) when exposed to uncertainty in order to reduce uncertainty levels. It also relates to volatility levels in returns on investments, which an investor is willing to "bear".

✓ **Risk Mitigation:** Associated with the systematic reduction of the level of exposure to risk, or the possibility of occurrence.

✓ **Risk Assessment:** Defined as a quantitative or qualitative risk assessment and an analysis of its impact on business activities. Quantitative risk assessment requires the calculation of two components of the risk, the magnitude of the potential loss and the likelihood that the loss will occur.
✓ **Key Risk Indicators:** A risk indicator is a tool, a measurable size, used to indicate the degree of risk that an activity has the entity. These indicators monitor and measure emerging or future risks that may affect the business's activities. In addition, risk indicators are used by businesses to get informed and alerted to a growing exposure to risk.

4.3.4. Implementing Risk Communication

Today, a large percentage of SMEs have begun to use the aspect of risk communication as a business strategy tool to manage and address more effectively the various risks that may have an impact on the company's capital and profits (Aven, 2012). However, it is noted that only a few companies can argue that they have fully implemented the aspect of risk communication as defined by the COSO framework. In addition, for the majority of economic entities, the gap between traditional risk management and Corporate Risk Management is too large to approach.

The transition from traditional risk management communication to Corporate Risk Management Communication, it is not an easy and simple process. According to the simple risk management communication approach, the process is divided into (i) the risk that is perceived as a purely negative thing to be avoided, and (ii) to the risk management activities that are transactional or cost oriented. In addition, ERM is expected to be preventive and risk management is a strategic process based on the value of the entity rather than the cost (Laforet, 2008). In fact, the characteristic of risk communication in small and medium enterprises is the best approach to risk management, which involves different techniques implemented by different companies in different ways. Risk communication in small and medium enterprises focuses in the entire portfolio of assets of the enterprise, including its intangible assets. For this reason, most companies are in the process of adopting this process - ERM, with the aim of helping to increase the value of the organization,
addressing governance challenges and regulatory challenges as well as challenges arising from external and internal risks (Morimiya, 2010).

4.3.5. Applications to Business’ Risk Communication

Three main business applications of risk communication in small and medium enterprises are identified. The first is about reducing losses. The second concerns the management communication of uncertainty, and the third implementation is related to optimizing business performance in communication (Ogawa and Piller, 2006). The order in which they are presented, it relates to the historical nature of their occurrence and their historical development, and to the order in which each organization will implement them in order to develop its risk management capabilities. The combination of all the above applications leads to the framework of risk communication in SMEs (Sabada, et al., 2014).

In the first stage, the aim is to reduce the negative impact of the risk and the losses through specific communication. This first business application emerged in the 1970s and 1980s and focuses on risk protection with negative results. The practices used at this stage relate to credit controls, investment policies and liquidity policies, audit procedures and insurance coverage. For example, market risk management practices were designed to minimize potential portfolio losses and liquidity losses (Semper and Beltran, 2014).

It was found that these first-stage practices could not adequately address the negative impact of risk. Even though loss reduction is considered to be one of the company's main goals, practices that focus only on it are not enough. One way for an organization to escape from these applications was to make it clear how risk management can be a positive force in supporting business profitability and growth. Thus, businesses were led to the second business application of
uncertainty management (Aven, 2012). In this second business application, which was launched in the 1990s, risk communication in small and medium enterprises focuses on managing the volatility of business and financial results. This stage began because of the transition from constant parity to floating, and at the same time to the big fluctuations observed in oil prices in 1970. In 1980, there was increased inflation, volatility in interest rates and crises identified in lending. Such fluctuations continued in the 1990s, with stock market shifts and economic upheavals being shifted from one market to the other (Morimiya, 2010). Such incidents and situations have brought organizations to the point where they cannot cope with the financial obstacles and the increased volatility of their profits. Thus, it was necessary managerial practices of communicating the risk to evolve in order to help entities anticipate potential losses and reduce the variety of possible outcomes from these changes to be able to cope with increased volatility. In the third business application mentioned, risk communication management seeks to optimize the communication performance of the entity. At this stage, communication is distinguished by a more integrated approach to the various types of risk. In the second stage, the risks were only partially approached. This integrated risk approach is an important element in the relationship between performance and risk, which is also essential for Corporate Risk Management. In the first two phases, businesses essentially maintain a defensive stance and a more control-oriented approach to managing negative risks and volatility. In the latest business application, the action of communicating the risk seeks to optimize the performance of the entity, supporting and influencing pricing, resource allocation, and other business decisions (Wang et al., 2010).
4.4.1. Occupational Safety and Health (OSH) Management in Small and Medium Enterprises (SMEs)

The organization and management of staff has been in business for several years. Since people having started to work together and set common goals, there must definitely be coordination and distribution of work proportional to individuals. Every employee had to have defined tasks that would follow him or her faithfully so that his goals could be achieved. There was also the reward of each employee based on his performance at work (Abrahamsen et al., 2009).

One of the main founders of the Organization and Management, Taylor Frederic, who with his writing project "Principles of Scientific Management" published in 1910 in the United States, was established as the father of Science of Organization and Management. He believed that the only way to get higher salaries and increase the profits of a business was to increase its productivity. In short, the purpose of Taylor’s management is to ensure the maximum prosperity of both the employer and the beneficiary at the same time. Taylor believed that rising wages and gains would be achieved through productivity gains. Certainly, the contribution of the French engineer Henri Fayol, who is considered after Taylor, the father of the Theory of Management, gave more attention to the high hierarchical levels of the organizational and administrative pyramid and analyzed the duties of the management. A few years later, Luther Gulick, one of the founders of the Scientific Management, formulated the Managing Director’s functions, which over time proved to be the most authentic in time. It has been the basis of many variants such as organization, staffing, coordination and budgeting.
The French sociologist Max Weber (1864-1920), as he was looking for methods of social science research, placed a particular emphasis on management as a social phenomenon. He argued that bureaucracy is the most effective means of exercising control over employees. Its key features are narrowly defined competencies, strict rules and the implementation of the hierarchical organization system (Wirth and 2008). The American mechanic engineer Henry Laurence Gantt (1861-1919) Taylor’s friend supported the need for collaboration and understanding between the management and employees of a business. It emphasizes the importance of education in a company but also the employee's involvement in administrative problems (Wahlstrom and Rollenhagen, 2014). In 1920, Elton Mayo and Roethlisberger were Taylor's opponents and argued that if businesses allowed employees to engage in terms of working conditions and working methods, they would have a more mortified morale. They would improve and would be more willing to cooperate with their colleagues.

After World War II, the organization and administration of staff began to be an integral and perhaps the most significant part of a business that was interested in its prosperity and its way to the top. That's how people started to recruit for these positions that possessed the required university education and knowledge. The organization and administration of staff is considered an investment for a company that manages it properly because it can have people in its potential as important as to bring many profits and prestige to it. Nowadays, in 2019, the development of human resources departments in enterprises is rapid, as it is now one of the contributors who are even involved in the company's business strategy, including company’s health and safety as well.
4.4.2. Basic Concepts of Organization and Management in Safety Management Systems

The management can be defined as the union of a group of people who through their work strive to achieve the common goals they have set. As Wu et al. (2010) underline, key elements that define the organization are: people, goals, work-systems-plans, time and boundaries. Similarly, as an organization, it is defined the structure and interconnection of various actors with the aim of achieving a purpose defined in advance. Without the presence of people or groups that create relationships, there can be no organization. It is that, which sets goals and puts people on the road to success. The organization, as a whole, is responsible for defining the duties and work of the people or groups of whom they represent the specific jobs they undertake to accomplish. The organization has continuity in time is not something impulsive and spontaneous, momentary. Every business, no matter of its size or its area of activities is an entity, a productive-economic organization that is linked to peoples’ needs and their satisfaction by setting goals and achieving them. As people create groups and unite there is greater specialization and division into the work. With this, the efficiency of human work is achieved. The goal of a business-organization may be a situation in which it wishes to arrive, such as the performance and development of work more efficiently and correctly than employees and the fulfillment of its goals (Wahlstrom and Rollenhagen, 2014).

Management is engaged in the search, discovery and implementation of required effective methods for achieving the goals and objectives of the business. It also activates, directs and controls the organization's action plan and procedures. Administration is understood as a science divided into public and private (Wachter and Yorio, 2014). The manager can supervise, guide a business and
all the people working in it. It is also the activation and activation of the various actors of the organization in order to achieve the purpose of the organizational scheme of the system (Wu, Lin, Shiau, 2010). The manager is the one who performs the above and tries to satisfy the wishes of the manager or business owner by organizing and managing his staff.

Therefore, organization and management are a combined process of managing the planning and control of an enterprise, as well as supervision in order to effectively achieve its goals and objectives. Based on the above, the organizational and safety management functions in SMEs can be defined as planning or control in organization and management. Effective safety management is considered to be the one that manages all functions so that they are executed correctly and within a framework of safety in a working environment, daily. In a company, senior executives plan the program, allocate tasks to the company's staff, and define job positions, providing guidelines for doing everything right and finally checking the results of this process (Bottani et al., 2009).

Planning is understood as a system of actions that is used to define the objectives of the business. It also identifies the ways and means to be used to achieve its objectives. The organization comes immediately after planning to ensure efficiency in the business, if and/or when it is used in the right way. That is to say, the structures, procedures and operating rules of the company are in line. The person in charge of organizing the business classifies, allocates, assigns the duties of the staff, the responsibilities and in general keeps the yarn to progress and evolve smoothly.

Safety management functions in SMEs have to deal with the proper management of the personnel, i.e. the human factor of the company. Management is meant to guide and encourage staff to better achieve their goals. For effective management, there must also be communication between business
executives and staff. Collaboration and teamwork are important components for a good workplace climate. All the abilities and skills of the members of the company must be activated towards a safety framework. The control and supervision of the work carried out are two important actions, since through them the mistakes and weaknesses can be identified so that they are corrected (Hale, et al., 2010). After all, when there is an accident that was the result of a business weakness and/or a human mistake, we have to control and investigate it. The most important argument towards looking into an incident or an accident is learning (Boustras and Guldenmund, 2018); by learning the company is receiving feedback for the future and it will decrease the chances of the same event to happen again. This is turn increases the safety of the company, no matter its size.

Another key function of the organizational and safety management functions is of course, the decision-making process. It is vital for a business to have the right people who can make the right decision among the alternatives that are presented to them every day. A strain is effective when it is able to make the right decisions at the right time (Wu et al., 2010) For a decision to be made, knowledge, information and job-related techniques are required, as well as the ability of the person, who handles the particular situation, to be able to carry them out and achieve the desired result. These functions are inseparably linked to the smooth running of the organization and management of the business and the achievement of its goals until there are suitable individuals to manage it (Wahlstrom and Rollenhagen, 2014).

4.4.3. Forms of Safety Management Functions

The main form of safety management functions in small and medium enterprises, is regarded as the Typical form. Basic principles of the above are:
✓ The business structure that should be simple and flexible
✓ Staffing should be based on business needs
✓ Responsibilities must be clear and understandable for staff
✓ The collaboration of a group of individuals leads to the creation of a form of organization that can be either formal or informal.

Official form of an organization is the one that has elements such as rules, goals, regulations, and formal structure of the organization. Characterized by peoples’ collaboration to achieve the common goals set by executives for the business (Hale, et al., 2010).

The organizational and safety management functions in small and medium enterprises, it will be considered effective, if the enterprise, as a whole, succeeds in achieving its objectives. Surely the goals are to be attained at the minimum cost. Do not waste and be productive, but also allow managers and staff to take part in resolving various business problems. Also, to be productive, he must provide for the security of the staff and give them the opportunity to evolve and according to what they offer to be paid. (Remawi et al., 2011)

4.4.4. The Integrated Management Systems as a Part of Safety Management Functions

There is a general difficulty in rendering the term "integrated" due to the fact that the word has different meanings even in English. Any analyst using the word, depending on how strictly or loosely it does, it will give it a different connotation. In addition, the fact that in Greek there are many corresponding words for its presentation, such as: integration, union, integration, incorporation, merger, but these also have different depending on their use (Wu et al., 2010), it makes it even more trivial to correctly address the term in every case. It appears that the various
definitions of "Integrated Management System" have different focuses on and around which they are developing in an SME environment. According to California State University, "Systems Integration" is the art and science of the integration of processes, functions, people and data so that the end result is a tight system in which joining points are not seen (Hale, et al., 2010).

In their research Karapetrovich and Willborn (1998) report that system integration is the interconnection of two systems in a way that results in a loss of independence of one or both, means that these systems are complete. This normally leads to a strong and more understandable management-administrative system (Ismail et al., 2012). Regarding the term "management system" by the International Organization for Standardization, ISO states: "The methodology used by an organization to make decisions and manage its resources is often referred to as a management system". Since safety is of such a principal importance in many SMEs environments, especially when the company is using potentially hazardous chemicals, then it makes absolutely sense to integrate safety requirements within a quality management system, as a possible initial stage in the integration efforts (Beckmerhagen et al., 2003).

4.4.5. The Concept of Quality Costs as Part of the Organizational and Safety Management Functions

Quality, cost and reliability are closely linked inside business. Without financial constraints, every business would achieve high quality in every product or service it is offering. However, financial constraints exist, and the cost is always assessed in relation to the results of business’ operation (Wu et al., 2010). The cost of a product combined with the desired profit from this product determines the final price of the product itself. Product evaluation by consumers is based on its price and quality. At managerial level, we see that very often the cost of quality is perceived as yet
another cost to be allocated to the final price of the product, yet the benefits resulting from the increased quality level are not taken into account accordingly. The acceptable level of quality of the products that make up the portfolio of a business is a strategic decision that businesses should take into account quality costs. According to Laberge and Ledoux, (2011), there are two concepts of quality:

1. "Quality" defines those product features that reflect consumer needs, so they provide customer satisfaction. In this sense, quality is defined based on profit. The purpose of a high quality is to increase customer satisfaction and, hopefully, increase profit. However, providing more or better-quality features usually requires an investment, that is, an increase in costs. As a result, the highest quality usually "costs more".

2. "Quality" means the avoidance of discrepancies and errors requiring reprocessing of the product produced or leading to failure to meet consumer requirements, cause customer dissatisfaction and as follows customer complaints and others. In this sense, quality is defined on the basis of cost and the highest quality is usually "costing less" (Ismail et al., 2012).

The concept of "cost of quality" tends to have multiple meanings. Some managers, or business owner/managers, when they use the term "cost of quality", they perceive the costs resulting from the low level of quality, i.e. withdrawals, reprocessing, fines etc. On the contrary, other business managers and/or owners, when they use the term "cost of quality", they understand the cost of raising quality and/or the cost of running the Quality Assurance and Quality Control activities. For the following reasons, the cost associated with low quality is estimated: (i) to quantify the cost of the departments involved in the improvement, (ii) to justify their efforts, (iii) to focus their efforts and demonstrate their progress in the administration.
Another category for the decrease of the quality costs in SMEs is considered to be the preventive costs. This category provides the costs resulting from the prevention of failures. The prevention costs focus on quality assurance and minimize the likelihood of a failure in the company's products or services or even in the day-to-day operations of the company. It also includes the quality of designing the quality system, which includes training on quality issues, preventive maintenance, internal controls, quality planning, etc. (Wahlstrom and Rollenhagen, 2014). In the very recent study of Psomas at al. (2018) in SMEs of the food industry in Greece, it was found that “a company can make decisions to upgrade the prevention and appraisal costs and decrease the internal- and external-failure costs in order to be more competitive in the market”.

Except from the above, there is also the case of Quality Assessment Cost as a tool of safety management system in business and especially in small and medium enterprises. This assessment “defines” the costs of direct quality measurement actions. In this case, the quality means compliance with customer/consumer requirements. Laboratory quality controls (including consumables and laboratory equipment), quality problems analysis, ratings, tests, measurements, etc. are included. Another example of cost estimation is the cost of inspections. The organizations must establish a system of inspection of the raw materials they receive and the products they produce before delivering to the customer. Usually this is achieved by sampling the products upon receipt and testing costs included in the assessment costs (Wu et al., 2010).

Finally, Costs of Failure is a further instrument of safety management system in business and especially in small and medium enterprises where this could result from products that do not meet customers' expectations/demands. Costs of failures divided into two types, namely internal and external failures:
✓ **Internal failure**: the cost of an internal failure is that which arises prior to the delivery of the products to the customer. Costs arising from production waste, repair of equipment or machinery from reprocessing of products, from one hundred percent screening, from lost efficiency, i.e. unplanned shutdowns of equipment, activities that delay production without any added value etc.

✓ **External failure**: the cost of an external failure can occur after the product has reached the customer. Examples of the cost of such failures are the cost of product replacement, market failure, lost sales revenue, return, revocation, legal obligations that arise, etc. (Traumann et al., 2013).

Any potential occupational hazards from the incorrect or unsafe storage, use and/or waste management of chemical substances in this case fall into the category of internal failure. As a result, when a company uses the tool of Costs of Failure in their management process and is able to spot significant safety-related flaws in the production and/or in the delivery process of a service or of a product to the customer, then it is imperative to make the right decisions and take the appropriate measures in order to decrease, if not eliminate, any safety-related issues that not only can increase the production costs, but also they could prove to be serious occupational risks.

**4.4.6. Safety Performance Indicators**

In recent years we have all seen major safety related challenges in the workplaces worldwide. In this context, SMEs, being the ones that have the most vital role in the economic growth, not only in the EU but around the world, are to become aware of and establish in their environments the idea of “Safety Performance” and try to highlight which indicators they have to focus on to be able to evaluate their performance in that sense. Micro firms are the most difficult to apply any
measurements to, due to their small size, their limited business activities and their thoughts of lack of danger within their working environment. Moreover, the sector of those Micro SMEs that are using, storing or just trading chemical substances in their daily businesses is very difficult to research. In the existing literature to date, there are some recent research efforts that are emphasizing the need and use of Safety Performance Indicators (SPIs), nevertheless these efforts lead to evidence that are neither focused on Chemical and/or potentially hazardous substances, nor on the Micro enterprise environment. In the work of Ali Gopang et al. (2017) the authors used the “occupational health and safety measures – OHSMs” in order to measure safety performance in 65 SMEs in Pakistan; in their questionnaire they used, amongst others, safety indicators such as (i) illumination at the operational area and ventilation (which could be aligned with our “General protective provisions against Chemicals, since these are generic actions), (ii) protective clothing (aligned with the PPE in our case), and (iii) accident prevention measures, directional signs and safety manuals (these could be in parallel to the Information on chemicals via Tables, Signs, Oral or Written instructions). Based on their findings the SMEs owners found out to not “pay much attention to these important parameters..and these should be implemented both locally and globally” so that companies achieve a better performance in the future.

Givehchi et al. (2017) argued that safety climate is closely related to safety indicators. Moreover, the believe that the safety culture within a company is recognized as the major influence on the safety-related behavior of employees. The leading SPIs they used in their research, which was identical to the analysis that is being introduced later in this project, without the Hierarchical Regression Analysis for the production of a model as it will be presented later in this paper, were (i) health and safety training, (ii) number of training sessions, (iii) safety data sheets, (iv) number
of safety inspections, and (v) number of non-compliances and hazards observed. The first three (3) indicators overlap with the indicators used in the survey tool of this project; the rest could not have been used, since they are focused on larger companies, rather than Micro SMEs. Similarly, Sinelnikov et al. (2015) tried to use particular indicators to measure occupational health and safety performance. They highlight that the concept of particular leading indicators as a measure of OHS performance remains murky and the existing literature regarding these indicators is a compilation of thoughts, opinions and some empirical research and case studies from a variety of industries. As a result, it is quite difficult, if available at all, to find in the existing research efforts to date a list of safety performance indicators that are meant to be used in order to measure the actual performance of Micro SMEs regarding the safety of chemicals. In 2016 Shea et al. come to emphasize the “leading indicators” are metrics attempting to measure some variable believed to be an indicator of future safety performance. Consequently, they tried to summarize some generic leading indicators that would be useful to any organization in the measurement of its safety performance; these indicators are (i) safety climate, (ii) safety culture, (iii) safety management, (vi) OHS training, (v) risk management (assessment), (vi) OHS communication (information giving) etc.

As it is obvious from the literature, there is no safety performance model available that could measure how well SMEs, and especially Micro firms, are scoring when they have to handle hazardous chemical substances in their day-to-day business activities. Previous research efforts have investigated some indicators, which in many cases are generic and could be used in a variety of organizations irrelevant to their business sectors and to their size. Nevertheless, only some of them could actually be used in the researched field of this project. Furthermore, there is no model per se that is focused on the Micro environment. As a consequence, any simulation models on risk
or any models showing a system engineering approach with regards to safety fall outside of the scope of this research and they have no application in that sense.
4.5.1. Risk Prevention

Risk prevention is businesses refers to the process of developing an approach and designing a plan of prevention activities towards a potential risk in a project or business operation (Blazy and Weill, 2013). The outcome of this process summarizes in a Risk Management Document. This document describes how risk identification, qualitative and quantitative analysis, response planning, monitoring and risk control will be structured and carried out throughout the life cycle of the project in any business environment. However, it does not consider per se the answers to all individual risks; this is a task covered by the Risk Response Prevention Plan. The Risk Management Prevention Document includes the following (Blazy and Weill, 2013):

✓ **Methodology**: It states the orientations, tools and data sources that can be used to run risk management prevention in a particular project.

✓ **Roles and Responsibilities**: It defines the lead, support, and members of the risk management prevention team for each type of risk management document.

✓ **Budget**: It outlines the project's risk management prevention budget in business.

✓ **Time**: It determines how often the management procedures will be performed risk throughout the life of the project.

✓ **Scoring and Interpretation**: Appropriate scoring and interpretation methods for the timetable for qualitative and quantitative risk analysis. Methods and scoring should be defined in advance to ensure consistency.

✓ **Limits**: the key criteria for the risks to be followed, by whom and in what way. It is worth mentioning and included because the owner of the project, customers and other stakeholders have different levels at the risk threshold.

✓ **Form of exposure**: It describes the content and format of the risk response plan. This section also sets out how the results of risk management processes should be documented, analyzed and communicated to the project team and internal / external stakeholders.

✓ **Monitoring**: It documents how all aspects of risk activities should be recorded.
Typically, the Manager implements the Risk Management Prevention Plan along with the core members of the project team. The results, in the form of a document, are communicated initially to all interested parties and/or to the whole company thereafter. A risk log will then be created according to the results of its management prevention plan.

4.5.2. Identification of Hazards in Risk Prevention

Risk identification is the process that identifies and determines the risks most likely to avert the project from achieving its objectives. Risk identification includes the documentation of the characteristics of the identified risks. Outcome of the risk identification is a list of project hazards (Kozubíková et al., 2015). Risk identification is not a one-off action; on the contrary, it is a repetitive process that should be done on an ongoing basis during the lifecycle of a particular project or business service provided and also during the lifetime of the company on general basis. The identification process should cover all kinds of risks. Risks beyond the power of the project team are communicated to stakeholders for further analysis (Hasle et al., 2009). The management team working on risk prevention in a company is responsible to choose how to better approach its prevention activities. The most important aspect is to maintain a structured tactic for recognizing new, formerly unknown risks. In such case, the risk control lists are also very useful for checking the identified risks (Papadopoulos, et al., 2010). However, the checklists should be sparingly used as they have the disadvantage of reflecting only the old knowledge of the risks accumulated in the organization and can prevent the team from being creative in identifying new and former unknown risks.
The risk identification process in SMEs should start from the initially identified areas of uncertainty in a project or in a business sector, continuing all the way to the objectives as identified in the Management Plan of the company. Another basic part for risk prevention is the risk analysis which is the process of assessing the impacts and likelihood of identifying risks, prioritizing them according to the severity of their impacts on the objectives of the business, assessing the overall level of risks and the probability of achieving the objectives set by the management of the company (Belás et al., 2014). The risk analysis is divided into two major stages:

✓ **Qualitative risk analysis**  
Qualitative risk analysis is the process of assessing the impacts and risk hazards identified on a qualitative basis, i.e. without the use of numerical methods. Risks have also been prioritized according to the degree of seriousness of the potential impact of the project objectives. Qualitative analysis is a quick and casual method that provides the initial understanding of the severity of the risk. It allows, however, the continuation of the risk management process with the transition to risk response planning without losing time in much more detailed and time-consuming quantitative analysis. The result of this process is a list of risk priorities. Also, at this stage, the risks to be taken for further quantitative analysis are selected.

✓ **Quantitative risk analysis**  
Quantitative risk analysis further deepens the investigation of individual risks by evaluating the numerical impact on project objectives, i.e. in terms of time and cost impact. It can also provide the following results: (i) Probable project risk analysis (using the Monte Carlo method), (ii) Likelihood of achieving the project's time and cost objectives, (iii) Overall level of project risks

The quantitative analysis for the risk prevention in small and medium enterprises could sometimes be omitted through the risk response planning process immediately after qualitative analysis. The
scope and level of detail of the quantitative analysis can also vary a lot. In some cases, it is sufficient to make only numerical estimates of the impacts of the individual risks at the discretion of the Project Coordinator (Kozubíková, et al., 2015).

4.5.3. Hazard Response Plan

Another key characteristic for risk prevention in SMEs is the Hazard Response Plan. Planning a risk response is the process of developing alternative proposals and defining actions to deal with project risks that actually end up happening. This process ensures that the risks are handled correctly and the responsibilities for the agreed responses are attributed to the relevant members of the group. The risk response strategy is defined prior to the planning of risk interventions. There are four strategies available for risk prevention (Jogersen et al., 2010):

- **Avoidance**: The goal is to eliminate a risk, usually eliminating the cause of the risk. The possibility of avoiding some of the risks is relatively good during pre-sales activities, when there is still the possibility to choose different approaches and to affect the contractual terms and commitments. After signing the contract with the possibilities of avoiding the risks is much lower, because the distribution of the majority of the risks incurred by the contract

- **Mitigation**: The goal is to reduce the probability and/or the consequences of the risk to an acceptable level. Primary efforts should be to reduce the likelihood by affecting the interfaces of the risk events with the cause of the risk

- **Transfer**: The transfer of risk is aimed at streaming (e.g. customer or subcontractor) together with the ownership of the response. Worth to note that the transfer of risk only transfers responsibility for the management of that risk. It does not eliminate the danger
Acceptance: This option is used when the project team decides not to take action to address the risks or cannot identify any other appropriate response strategy. The project team should then prepare to see and accept the consequences of the risk that should actually occur (passive acceptance). The project team may also develop an emergency plan to be implemented when the risk occurs (active acceptance). In case of insignificant risk this may be the most cost-effective option. However, accepting "high" risks should not be an option under any circumstances.

The outcome of the design of the risk response could be noted as follows:

- Plan for dealing with the risk
- Emergency plan and contingency reserve
- Contractual agreements reflecting decisions to transfer certain risks

4.5.4. Monitoring and Risk Control

Furthermore, there is also the process of the Monitoring and Risk Control. An appropriate official body for monitoring and controlling risks in a business environment. It is not desirable to re-examine the risk regime less frequently (Hasle et al., 2009). The risks must be constantly monitored and controlled by the owners and/or managers, who should be taking the necessary measures without delay. The purpose of an official forum for monitoring and controlling risks is to exchange risk information with the whole group and other stakeholders, the latest report on the state of risk and the escalation of risks or decision-making in relation to risks. The aim of risk monitoring for the risk prevention in small and medium enterprises is to check for the following (Kozubíková et al., 2015):

- Implementing actions to respond to the risk (both for integration and the status of ongoing actions)
✓ The validity of assumptions about the project environment
✓ Validity and changes in contractual commitments and project objectives
✓ Additional risk identification and/or analysis is required. In some cases, it may still be necessary to review the Risk Management Plan.
✓ If all the hazards have been avoided.
✓ If emergency actions are triggered by effected risks (effective).

The risk control for the risk prevention in small and medium enterprises, it involves administering the implementation of the risk interventions or corrective action to respond to the risk. It may also include launching emergency actions or redesigning the project. The risks of a project can be categorized in a variety of different ways (Kozubíková et al., 2015). The choice of method or classification of methods is at the discretion of the designer according to the needs of the specific enterprise. The most common risk categorization criteria are the following (British Institute of Risk Management, 2002; Blazy and Weill, 2013):

1) Ability to predict the risk known risks are the risks to them which can predict, analyze, and create response plan
2) Unknown risks are the risks to them which cannot be predicted and described, so it is impossible to have specific prevention proposals. These risks are usually either a result of the uniqueness of the project or the result of unpredictable external factors.
3) Origin of the hazard - Internal risks are called the risks are created by events within the project. The basic criterion for considering the risk internally is that the role of the project may affect the likelihood of its occurrence and its consequences.
4) External risks are called the risks created by events outside the project. Unlike internal risks, the developer cannot influence their likelihood of occurrence.
5) Native Uncertainty and Pure Risks - Native uncertainty exists when the risk is associated with variance of a project size around a value, when a measurable size appears to follow a distribution (e.g., raw material price).
6) Pure risks are those that are not intrinsically uncertain, but they are made up of specific events (e.g., failure to secure a state subsidy, with whatever consequences this entails).

7) Techniques: affect technical parameters of the business delivery

8) Material/Physical: material level, e.g. damage to facilities due to earthquake.

9) Subsequent: economic consequences as a result of risk with other types of technical consequences.

10) Legal: they have a legal impact.

According to the recent work of Gorzen-Mitka (2019) a process of modelling was able to give out a graphical presentation showing the operating sequence of main risk factors so as to better understand the logic of their relationship and the actual potential hazards in the SMEs. In addition, this would help the management team to optimize their decision-making process through a risk prevention perspective. What is important not to be left out from any decision-making process is the fact that the overall risk is not always and/or totally equal to the sum of the individual risks as it includes all the sources of uncertainty and could present all the possible effects that the various risk combinations bring to the business activity or to a business project (Ozturk and Mrkaic, 2014).

Proper and timely recognition of the risks and their characteristics is of major importance. As Behr and Guettler (2007) highlight, risk identification procedure is the most important for the management of the company, as the existence of unrecognized risks makes it difficult for them to be managed and sometimes the management of the potential hazards becomes impossible. Risk identification process is repeated several times over the life cycle of a business. Common reasons why this happens are -but not limited to- given below (Behr and Guettler, 2007):

- **Changes in the external environment**: e.g. changes in legislation, the entry of a competitive project into the market, changes in political affairs. Unexpected factors such as
those mentioned above may introduce risks that were either not considered significant or previously

- **Changes in the internal environment**: such as accidents, switching suppliers, changes in the workforce, etc. They may affect the project by creating risks of an economic nature, changing the time horizon of implementation or challenging the achievement of its quality objectives project.

- **Monitoring and adaptation**: During the implementation of the project, information is gathered which leads the scholars to review their estimates of project risks. Risks that were considered insignificant might hide more potential damage, opportunities initially set, as targets may be considered unrealistic, while new risks are perceived as the work team and scholars gain more experience.

Even though, as already mentioned above, the risk identification procedure is or may be repeated several times during the project, however the intervals between repetitions may vary. Likewise, the method used by the management in each repetition may differ, in an effort to investigate and study the possible hazards from different perspectives. At this point, it is important to note that it is impossible to identify all the risks, nor is it the goal of achieving perfect predictions about the future and the accident-free viability of any business environment. The aim is to identify the sources of uncertainty that can significantly affect the working conditions and the health and safety of the employees (Verbano and Venturini, 2013).

### 4.5.5. Risk Assessment Methodology for Business Projects

Finally, as the Project Management Institute (2013) emphasizes the company’s management and the risk assessment/risk prevention working group use a variety of tools and methods to create a realistic and comprehensive picture of the most important uncertainty factors that can affect the
successful implementation of a business project. The most important methodology that is usually being used is based on the following:

✓ **Using critical expertise.** Establishing contact with experts who, due to their experience in similar projects/conditions, can recognize risks that are common to such projects, or risks in their field of expertise. Notwithstanding the validity of the advisory use of experts, the working group should not overlook the possible subjectivity of their views.

✓ **Using a pre-checklist.** Using a checklist is particularly useful as a "starting point" (Ozturk and Mrkaic, 2014) to identify potential project risks. The checklist develops according to the previous experience of the researcher/auditor in similar projects and includes potential risks that may affect the implementation of the project. Many scholars use ready-made lists that are commercially available or employ polls and questionnaires to enrich the list they will use. Notwithstanding the usefulness and ease of use of a preliminary checklist, it is impossible to include all possible uncertainties, while creating a very long list does not guarantee better results in realistic risk identification. Finally, the use of the professional's critical competence remains of major importance as risk management cannot be confined to a fully automated process, and upon completion of the project, the list should be re-examined to add the knowledge acquired by the scholar for future use projects.

✓ **Study of documents and project features.** Study of project data, i.e. projects, budget, studies, etc. They can give the studies information on risks that may affect the project. The evaluation of these records and the consistency between the plans and the forecasts of the studies may also give the scholar evidence of hidden uncertainty factors.

✓ **Analysis of assumptions.** The design of the project, as well as the decisions regarding its implementation, are based on a variety of assumptions and assumptions concerning the external and internal environment of the project, the scientific background, the financial needs of the project, etc. By studying these assumptions, whether they correspond to reality,
revealing possible failures or reasonable mistakes and inaccuracies that could pose risks to the project (PMI, 2013).

✓ **SWOT analysis.** The SWOT analysis relates to the exploration of the project in four distinct perspectives:

- Strengths related to the internal environment of the project, such as the multidisciplinary working group.
- Weaknesses, also internal environment such as for example the small size of the business.
- Opportunities, which relate to the external environment of the project, such as the fall in the price of oil.
- Threats, also external, such as its political instability country in a given period.

All in all, in the most up-to-date research work of Lima et al. (2019) it is becoming clear that until now there is no holistic approach neither diffused nor sufficiently developed in any of the business areas of SMEs, albeit the types of identified risks are showing an increasing trend in the past decades. Novel emerging risk management streams are rising. Particularly, the significance of Project Risk Management, of Strategic Risk Management, and of Supply Chain Risk Management has been growing. This in turn thrusts researchers, auditing professionals and practitioners to try and deepen their knowledge of the tools and practices that characterize them. New-fangled, original theoretical and practical studies on risk in SMEs is going to provide them with the appropriate support towards protecting their business and leveraging their market value, taking advantage of the management of diverse forms of hazards.
4.6.1. The Role of the Owner in Small and Medium Enterprises

There is a variety of characteristics that the owner of a business should have or adopt and maintain as principles so as to maximize his leadership abilities. These elements, which are mentioned as follows, they will help him stay forever a leader as the owner of the business (Ramdani et al., 2009).

1. Inspiration / Perfection
2. Setting priorities.
3. Integrity
4. Making positive changes
5. Troubleshooting.
6. Evolution and development of human resources.
7. Vision.
8. Influence / Inspiration.

Everyone affects someone else. Even the most introverted person is going to affect hundreds of others during his or her life. In every situation, where there is a group of people, there is also a prominent initiator. Every inspirer of a group is easily understood. Observing people as they are gathered, discussing a subject, we will find that one's view will be the most accepted and respected. During the upcoming debate, the eyes of most will be focused on one person and everyone agrees with someone very quickly. This man has managed to influence his surroundings and has succeeded in his accomplishments (Yang, et al., 2007). Even though there is little raw, empirical evidence about the success of small business owners, van Praag (2003) underscores that the potential hazards
rates within a company are affected not only by the business conditions, but also by the characteristics of the owner/manager. Influence is a capacity that is gradually being developed. The element of communication, recognition and influence have critical roles in the daily doing-business in any company. When there is effective communication between leader-executives there is recognition and then influence. Business influences must direct people to fulfill the targets, scopes and the vision of the company. The owner of the business should increase his influence forces by constantly motivating his/her employees to increase their self-control, determination, and sense that they contribute substantially to the overall project. According to the research of Walker and Brown (2004) the success of small businesses are based on some particular factors, or better put criteria, that their owners must be fulfilling; in the micro environment terms like personal satisfaction, flexible working, pride in the job tend to be more important than the financial target of building wealth. In that sense, the personal factors of the owner/manager, such as age, IT literacy, legislation awareness etc. are vital towards the success of the business itself.

4.6.2. Levels of Leadership on Behalf of the Business’ Owners

Based on the above, it should be noted that there are some specific levels for business’ owners that they need to clear in their working environment, as follows (Yang, et al., 2007):

Level 1 – Owners’ Position

This level is the first in the course of the owner of the business. The influence exercised by the owner of the business; it is solely due to the position and/or the title he holds. At this level, the owner of the business, he is involved with the employee’s general rights, safety protocols, tradition and/or culture within the company and organizational charts. The owner/manager has the power, but real leaders are not enough to have only the power of technical knowledge and the power to
perform the proper processes of a business. People do not follow the owner of the business because they want it only because of their declared position. They will only do what they have to do when asked. If employees notice that the leader is lacking trust, then they will be lagging behind in commitment and devotion. Furthermore, if there is the conclusion that the owner of the business cannot go to the next level of his/her role, his/her morale will be gradually low. As a result, it will be obvious that few employees will be following his/her commands and position. The pleasure and success of the manager’s leadership depends on the ability to rise in leadership levels (Twati and Gammack, 2006).

**Level 2 - Building relationships**

"Real leadership means that people follow you without being forced" (Saffu et al., 2008)

The above phrase gets flesh and bones for the first time in the second level of leadership, which is the one of building relationships. People, in some cases, they do not care about how much the owner or the manager of the business knows, until they understand how much he cares about. Basic argument for this is fact that if the owner/manager cares about the business, he/she will be able to cover any gaps or any flaws he/she might be having. Leadership does not start with the mind but with the heart. It blossoms with essential relationships and not with regulations. The owner of the business in the first level, it is often led by intimidation. In contrast to this, the second level leads through interdependencies and interactions with other business members. The agenda includes the development of people. At this level time and energy, there are channeled into the needs and desires of each member of the group separately. The leader who is incapable of building solid and chronic relationships, he will soon find out that he cannot maintain long and effective leadership. A typical example is the spouse who moves from the first level of marriage (position / title) to the third level
of the family (production) and neglects the relationships that need to be built for the proper maintenance of a family. In the process, the family "decomposes», and this reflects on the spouse's poor professional career. Relationship building is the "glue" that holds the power for lasting and steady production (Saffu, Walker, Hinson, 2008).

Level 3 – Results

At this level, many things are starting to happen. Profits are rising, morale rises, needs are adequately covered, and objectives are achieved. The owner of the business is enjoyable, and problems are corrected at the lowest cost in effort. Everyone is result oriented, as these are the main reason for a business. This is the main difference with the two previous levels (1,2). At level 2, people come close without necessarily having a comparable goal. At this level, people join together to achieve a goal. As Gorgievski et al. (2011) highlight there are personal differences within any organization; never the less, as literature underlines there are ten (10) criteria, or values, to have a successful company. Amongst them, having satisfied stakeholders, that is not only satisfied clients but also satisfied, engaged and safe employees, is one of the main factors that will help a company to grow safely.

Level 4 - Developing people

Even though the owners of an enterprise could be many, of all ages, sizes, philosophies in different circumstances, the smaller the company the less the shareholders. When it comes to Micro SMEs, the rule is that there is one owner, or maybe two, and one of them is also the manager; however, there are some exceptions to this rule, yet rare. In any case, unlike "moderate" leaders and simple administrators, the owner of a company is recognized because his/her workforce tends to show
steady, superior performance. The owner of a business is respected not only because of his/her strengths but also because of his/her ability to empower others. Effortless attempt without success results in failure. The primary duty of a leader is to develop his staff. Personally, loyalty and dedication culminate when his followers know personal development through his guidance.

**Level 5 – Personality**

The 5th level is characterized by the personality of the owner of the business, where for many years he/she demonstrates the ability and the willingness to remain a leader, acquiring many loyal and dedicated followers, i.e. employees. Today, everyone respects and distinguishes the personality and ability to evolve and develop not only businesses and organizations, but most importantly the people working in them. Many try it but few do it.

**4.6.3. The Role of the Owner of the Business to Set Priorities**

Providing and prioritizing marks the main differences between the owner/manager of an enterprise and an employee. The success of the owner of the business lies in the progressive perception of predetermined goals. The principle of priorities and the ability to achieve goals are essential components for successful leadership (Saffu et al., 2008). In 1897 Vilfredo Pareto introduced his “Pareto Principle”, which states that 20% of input is responsible for 80% of the outcome (Abdalrahman and Elgenaid, 2017). The "Pareto principle" or else the "80-20 principle" tells us that 20% of the priorities will give 80% of the desired results. That is, if the leader dedicates his/her time, energy, money and staff to the 20% core priorities, he will meet 80% of company’s goals (Riemenschneider et al., 2003). Every business owner needs to understand the usefulness of the "Pareto principle". This strategy will help him to increase his organization's productivity and
profits. Following some examples, it is found that: 20% of the executives of a business are responsible for 80% of their success. Since the owner of a business has distinguished and understood the difference between a new change and an urgent change, he/she can act as a creator of positive change. Recent years are characterized by many changes and discontinuities; the leader must be at the forefront to encourage and urge for change, showing how survival in the race of developments. For this to happen, one must have understood the three conditions that will bring the change (Tan, et al., 2009).

➢ To know if there are technical specifications for change.

➢ To understand the motivational demands of people for change.

➢ Changes create the fear of failure.

Many people, fearing that failure is their element, they hold on to what creates comfort and security and constantly resists a change, any change. Time is the most valuable product for many. When a change is imminent, we usually see how much it will affect our time. When the cost of change is time, few want to opt in for that change. Nevertheless, when the particular moment comes, the business owner has to figure out whether his employees are willing to accept a change. The ability of the owner/manager to be ready to make changes goes hand in hand with whether his employees trust him and respect him.

In any case, the owner of the business must always advise and guide the others by providing them with clear guidelines for prioritization, isolation of unnecessary work, and focusing on the subsequent value of the change (Quayle, 2002). In addition, it is the responsibility of the owner/manager to act in such a way so as to solve any troubleshooting that may rise within the
company’s employees and show them what they should do or how they should perform. According to Saffu et al. (2008), there are four main reasons why people do not act as they should:

i. They do not know what they have to do
ii. They do not know how to do so
iii. They do not know why they have to do so
iv. They find obstacles on their way

Clearly, the business owner should always know how to reply to “what? how? and why?” and what characterizes his/her qualities as a manager is the attitude when he/she faces a problematic situation. This is a very vital point for the environment of Micro enterprises. When the employees are facing an owner/manager who they can trust, then a change is easier to be adopted and followed by them. As Sorensen et al. (2011) argued trust is essential for the success of the change, since any action towards introducing a change in the working setting tends to always trigger enhanced scrutiny of the intentions of the management.

4.6.4. The Owner/Manager as a Leader

Sometimes difficulties and complications in the business practice are the reason we can reach to the solution of the problem. The only obstacle an eagle will encounter, in its attempt to fly more easily and faster, is air. If people remove the air and let it fly in the gap, the eagle will not be able to fly at all. The only element that resists the eagle is what allows it to fly (Hasle, et al., 2011). In the same sense, the key obstacle a boat has to overcome in order for its propeller to be able to work faster, it is water. The same idea that obstacles and difficulties are the actual conditions for success, applies to the people themselves. A life without obstacles and difficulties would wipe out all the forces and possibilities. By completely eliminating the problems, the productive tendency is lost. A further example is the problems arising from mass ignorance which in turn give more meaning
to the education and training of the masses, the people. In the case of medicine and pharmacology, disease problems highlight the need and give greater value to the creation of more effective medicines.

Many times, the problems become greater because of people’s reactions when they occur. Problems in a business setting are usually temporary, as long as they do not remain unsolved. It has been observed that the magnitude of a problem also depends on the "size" of the person facing it. The "great" leader knows very well that the problems do not stop by themselves, but people take necessary actions to stop the problems. The capable manager knows that weapons to fight against the upcoming problems is his/her attitude towards them in parallel with the appropriate planning and preparation of the rest of the workforce in order to solve them. This is why, a skilled and caring for the business manager is spending time on and resources on the continuous improvement and development of his/her staff. Truth is that if employees, along with the management willingness, they do not devote time to their improvement, they will necessarily devote time to solving their problems. As a result, is it better to be proactive rather than reactive.

The one who influences others to follow him is a leader, but with some limitations. The one who influences others to lead is a leader without limits. No one can become a great leader wanting to do everything on his own or to receive only the recognition and reward of a success. Even though, an owner/manager as a leader is not alone, all people having managerial positions are trying to do it all, and unfortunately, at some point, sooner or later they will fail. They will be in the same situation as a builder trying to carry 200 kilos of bricks alone from the top floor of the building to the yard. The owner/manager as a leader, especially of a Micro firm, he/she must first of all acknowledge that the most valuable assets the company has are its people. The proper manager,
who is acting and shares the virtues of a leader, is not enough to exercise power only to his/her staff. He/she should not only see and treat people simply as a means of production and/or delivery of services. A leading owner/manager tends to communicate with the employees, is continuously close to them and helps them evolve, even overcome any difficulties that may rise in their daily business activities (Yang, et al., 2007).

People are the main element for any business, whether it is a production business, a resale or even a service company. Nothing moves until people move it. Successful businesses are those in which good relationships exist between employees and employers. Employees remain motivated and more efficient when their efforts are recognized and paid for their results by their managers. Consequently, the attitude of the owner/manager as a leader determines the attitude of his/her employees to be acting as his/her dedicated followers. Without any doubts, a caring leader is a source of inspiration. The theory of attitude is directly related to the theory of action-reaction in physics. In the case of a leading owner/manager, this theory is multiplied by the importance of his/her position and the continuous engagement and communication with different departments in the company. Many times, owner/managers notice that employees ignore the importance of the attitude they hold towards others, and for anything that happens to them they blame everything other but their own actions. For example, in a business an employee who did not get promotion, considers that it was not "the right moment in the right place" and does not blame its attitude towards the rest of its staff and superiors (Brunetto and Farr-Wharton, 2007).

Moreover, one of the most important elements that distinguish a great leader is the ability to predict. If he/she loses this ability, the owner/manager remains the leader only in the title, as he/she does not lead but responds to immediate events and apparently gradually loses his leadership. There are
many examples that leaders have ceased to lead because of their inability to predict anything that could have been predicted (Twati and Gammack, 2006). Additionally, the manager, being a leader, must have the vision of something he wants to accomplish. Vision is transformed into the driving force behind every effort to achieve goals and problem solving. The owner/manager should transmit the spirit of vision to the other people within the organization, bringing them together and evolving them, which is essential in order to achieve the goals and target of the company. When the leader has a vision, the time is "running", the morale of the whole company goes up, personal commitment of anyone working in the firm becomes the slogan and great winning stories are becoming true. As previously mentioned, many leaders who lost their vision, they also lost their leadership. People do what they see - this is the most important motivation principle. According to Wang et al. (2011) the underline that based on research, 89% of what we learn comes from our visual stimuli, 10% of our acoustic stimuli, and the remaining 1% comes from our other senses. According to the above data, human development depends mainly on visual stimulation. When there is vision and the leader who wants to do it, the motivation begins. People cannot follow a dream on their own, unless they follow the man who will break their way. For this reason, in the beginning, the vision makes the leader who is in charge of following it, spreading it and finding followers (Wang et al., 2011).

Concluding, the vision is not just an important element of a leading owner/manager, but it is necessary constitutional part for the company as a whole. The business owner must be a visionary person and should be able to express it clearly and dynamically in every case. It is not enough to be an ideologist and to simply try to persuade the rest of his ideas. There is a big difference from a visionary man and a human ideologue (Saffu et al., 2008). As argued by Sorensen et al. (2011) when the manager takes strong actions that symbolize integrity and competence, the trust from the
side of the employees to the manager and the company becomes more solid. All in all, in contemporary business life, especially when the business activities are surrounded by chemical potential risks and hazards, health and safety problems are becoming ever more complicated. As a consequence, real-life health and safety challenges can be tackled by the correct interventions. Following Hasle (2011) the needed interventions should be built “on a better understanding of the interplay between market forces, societal regulations, core business activities and company strategies — all expressed through employers’ and workers’ interpretations of options and constraints”. In the environment of the Micro enterprises, the owner/manager is the key person, who will stimulate the initiation of the necessary communication with the employees, so as to discuss the needs, map the problems and provide the solutions needed for the risk-free and safe activities of the company.
4.7.1. Training and Education in the environment of Small and Medium Enterprises

Occupational Health and Safety rules in workplaces are a requirement of the modern business environment and the goal of any society with basic principles for the protection of human life and the natural environment. The International Labor Organization (ILO) International Conventions, the European Union (EU) Directives and any further regulatory/legislative provisions implemented by the countries, they oblige employers and employees to take appropriate health and safety measures to prevent accidents at work and/or work occupational diseases, protect the health of human resources and avoid the creation of hazardous situations as well as the pollution of the natural environment (Babchuk and Fried, 2003). In order to achieve these objectives, both employers and employees must be compliant with the agreed rules. These rules define, *inter alia*, the context in which the external and internal spaces of workplace buildings are used and the ways in which the various works are carried out. According to Babchuk and Fried (2003) the following points need to be always into scope, when training and education programs are to be delivered:

- Ensuring the suitability of the building/facilities and the technological infrastructure that is being used
- Easy access to fire-fighting vehicles and ambulances in the event of an emergency (fire) and to inform employees about how to deal with such incidents
- Preparedness and Training on First Aid at Work in case of accident and proper protocol of access to hospital care
- Proper storage and use of flammable and hazardous, chemical substances, gases, liquids etc. to prevent accidents
- Appropriate personnel training on safety rules when using machinery
- Appropriate management or destruction of toxic and hazardous waste, as well as infectious and radioactive materials, if present
Proper and simple labeling of all workspaces and prohibition rules for hazardous work or working conditions

Training and briefing of the personnel in the Heating Ventilation Air-Conditioning (HVAC) measures

Obligatory application of the recent/updated EU Directives and the legislation

The above-mentioned key-points are general principles on the preparedness through training towards the prevention of occupational risks as well as for the safe-guarding of health and safety, for the reduction of occupational accidents and/or occupational disease, for better information, and balanced participation of workers and the managers, or owner/managers in the case of Micro SMEs, in the implementation of the appropriate rules and guidelines for health and safety at work. In the recent work of Einarsdottir and Snorradottir (2019), in which they conducted a research about occupational safety and health education and safety training of teenage employees in Iceland, they found out that there was severe inadequacy in safety training and education quantity and quality amongst companies. The OSH education delivered was unsystematic, while the safety training programs showed very low engagement. As a result, there should be a more systematic approach in the future for OSH education and the local authorities should be making sure that both employers provide for their employees, while the latter are fully aware of their responsibilities towards health and safety provisions. Ricci et al. (2016) found in their meta-analysis for the effectiveness of OSH training that indeed training showed a strong increase in the perception, the attitudes and the beliefs of the workers towards safety and health, however there were medium evidence for the actual impact of the training in their daily behaviors. Loosemore and Malouf (2019) are coming to support this view through their research in Australian construction companies; employees had a better cognitive and behavioral understanding of safety and the health risks at work, yet their daily safety attitudes remained unchanged. What is important in this research is that variables such as age, gender and
academic education of the employees can play a critical role in the risk perception as well as in the safety attitude formation process that builds up via OSH education and safety training.

4.7.2. The Committee on Health and Safety

Depending on the number of employees employed by each business, the Legislations followed by each country require the establishment of a Health and Safety Committee of employees, or a representative, for the health and safety of workers. The Health and Safety Committee is a consultative body and has the following responsibilities:

(a) Assessing and evaluating the working conditions in the enterprise, proposing measures to improve them and to make the working environment safer, monitoring compliance with health and safety legislation and guidelines, while contributing to their implementation by the employees and the management of the company (owner/manager for Micros)

(b) In the event of serious occupational accidents or related incidents, there is an investigation taking place followed by the proposal of appropriate measures to prevent the recurrence of the events

c) Identifies occupational hazards (risk identification) in workplaces or workplaces, and proposes measures to address it, thus taking part in shaping the company's policy to prevent occupational dangers

(d) It shall be informed by the management for the occurrence of occupational accidents and occupational diseases that took place in order for them to be recorded
(e) It shall be informed of the introduction of new production processes, machinery, tools and materials into the undertaking, or the operation of new plants therein, to the extent that they affect health and safety conditions at work, so as to organize dedicated training and education programs for the safe use of the new equipment.

(f) In the event of an immediate and serious risk, the employer shall take appropriate measures, without prejudice to the interruption of the machinery or the installation or production process.

(g) It may seek the assistance of experts on health and safety issues of workers, with the agreement of the employer.

4.7.3. Employer’s obligations

Human behavior is a major contribution to accidents and to the prevention of them. As it is widely introduced in a great amount of the available research on occupational safety, the existence of a good safety behavior tends to mirror a good safety compliance as well. Nevertheless, there cannot be a good amount of safety behavior within a company, irrelevant to its size, unless the management, or the employer, or in the case of Micro enterprises the owner/manager gives the “good example” and is working towards a working environment that is focused on safety and health. Employers tend to have a wide variety of obligations in that sense; (a) they need to apply the hygiene and safety measures in accordance with the changing circumstances and to seek to improve the existing situations, (b) to supervise the correct application of workers' health and safety measures, (c) to inform workers of the occupational risk of their work, (d) to develop a preventive action plan and improve working conditions in the enterprise, (e) to ensure the maintenance and monitoring of the safe operation of facilities and facilities, and, finally, (f) to encourage, provide and facilitate the safety training and OSH education for workers and their representatives. The employer also has to
facilitate health and safety procedures or the employee representative in the performance of their duties, as well as to inform and provide any information concerning the business and is relevant to the work of health and safety procedures or employee representative (Babchuk and Fried, 2003). Based on Goetzel et al. (2008) when the employers promote health and safety programs at work this leads to a better human capital in the working environment that views health and safety of employees as an essential ingredient in order to ensure the success of the company while having a productive and healthy workforce. As Zin and Ismail (2012) argue any health and safety issues in a company cannot be tackled unless the employers take some actions to change the stance and perceptions of employees towards safety. In another research of Ghhetri et al. (2018) it became evident that the relationship between employer sponsored safety training and education and workforce productivity was quite significant. The training programs did not only bring an added value to the skills and productivity of the employees, but also they played a role in the company’s cost savings from potential hazards and occupational accident through the increased overall awareness and appreciation of the importance of occupational safety and health in the daily business activities. On the other hand, there are some Micro firms that do not appreciate everything that is included in the term OSH and they tend to see health and safety as a legal requirement per se. To support this idea, the recent work of Bonafede et al. (2016) about the OSH management perceptions of employers in a study of SMEs in Italy, they found out that the employers of the Micro enterprises were found to be less persuaded in terms of the usefulness of the occupational risk assessment and other OSH management activities, such as OSH education and safety training, stating that they viewed OSH as a legal obligation rather than as a sum of value adding activities for their companies.
4.7.4. The Employees’ Training on Health & Safety Issues in Business

The issue of the safety and hygiene of employers, especially those working in particular working conditions, such as construction sites using chemicals, cleaning agencies, petrol and oil stations, color paints industry etc., is crucial as education becomes specialized. Training on these issues can be the most critical factor in preventing accidents and occurring risks. The essential contribution of education is to develop a culture of safety and hygiene in the performance of work tasks (NNIOH, 2018). Health and safety training is crucial, especially in the case of these business environments that the use of chemical substances is pivotal for their daily activities. In these settings the risks are particularly high, and the worker's behavior should follow specific standards. The effort to educate employees on health and safety issues is not an easy process, nor is it always accompanied by positive reactions as employees often oppose any attempt to change their habits, work patterns, and acquire new skills. Any worker and especially those employed on construction sites are accompanied by Occupational Safety and Health Council (2009) experience and values (Simpson et al., 2018).

Employees prior to any educational intervention are initially challenged to confront internally with their whole experience and values, to shape positive intentions and expectations towards education, to change the way of learning, and to show interest and zeal towards security and hygiene education (Simpson et al., 2004). There is no shortage of cases where workers have significant learning difficulties, reduced skills and skills, fears and concerns, lack of self-confidence, reduced self-esteem. The training of employers in safety and health matters is not always accompanied by the relevant interest (NNIOH, 2018).
Essentially, training is called upon to motivate employees’ interest and create motivation for learning. Successful learning on OSH issues is not only the result of motivating employees to participate in the training programs, but also to provide with adequate knowledge for those who have taken the training. In any case, appropriate choices and combinations of educational methods and techniques and their proper implementation should be made. The training of workers on safety and health issues also requires the active participation of both the participants of the training and the professionals in charge to deliver the training. Educational techniques will essentially play a critical role in the stimulation of employees, in order for the latter to develop a strong and interdependent relationship with the knowledge and training they will receive. (Cleveland, 2007). According to the above, employee OSH training and education is not a simple process. Particular attention should be paid to the selection of trainers, educational techniques, training tools and the adaptation of knowledge to the needs of workers. Following Simpson et al. (2004) the effective intervention of employee education is primarily based on stimulating interest in this direction and on adopting appropriate approaches.

4.7.5. Training and Education - General Approaches

The concept of employee training due to its multidimensional character has taken several conceptual approaches. In a sense, education is defined as the "systematic effort to develop specific skills, abilities and techniques from the point of view of employees to increase efficiency in the performance of work tasks". In others, employee training has a character of improving work efficiency by meeting the needs of businesses and organizations. Employee training is a planned and systematic effort to enrich the knowledge and skills of employees and to shape specific work behaviors (Catsby, et al., 2007).
Employee training also takes a different approach, including all work learning efforts aimed at both personal and organizational performance. Moreover, it includes the systematic diagnosis of needs, the development of skills, and the possibility of changing the working environment with benefits for job performance and benefits for the enterprise (Bjorkman and Xiucheng, 2002). Based on the definitions above, it is evident that employee training is built on systematic effort, knowledge development, skills and attitudes to meet current and future needs of both employees and business. Education is another process of work behavior on issues related to work skills, communication, performance, competence management and the development of industrial relations. The systematic process of employee training includes the analysis of educational needs, intervention requirements, appropriate educational planning, the implementation of education and the evaluation of any educational efforts (Goldstein, 2002).

The purpose and role of employee training is no other than the emergence of skills and competencies that will lead to an increase in the efficiency for business environment. However, the success of education is based on both stimulating interest for employees and the success of shaping the appropriate educational framework. Recognizing the need for employee training is the means to achieve professional goals while its provision depends on the preparation of the appropriate program. Providing specific training for the employees is crucial to meeting individual business objectives. The achievement of these objectives is based on the implementation of educational programs which should respond to the training needs of the employees and the business as a whole. The systematic analysis of educational needs makes a decisive contribution to the shaping of relevant programs to highlight the skills and skills of employees. Identifying any educational deficits and attempting to cover them will also form the framework for achieving professional goals (Simpson et al., 2004). As Wilkins (2011) highlighted “strong health and safety training programs
improve employee retention as well as compliance with health and safety requirements”. Laberge et al. (2014) argue that learning rather than strictly teaching does better assist with the development of occupational safety and health skills. In that sense, pure theoretical teaching programs without on the job training, problem-based learning, scenario evaluation and assessment etc. might not be so value adding towards a better understanding of health and safety risks. This is why Gaudart et al. (2008) emphasized that there is a risk of meeting an opportunistic teaching model, which could be having some flaws leaving gaps behind it, when the learning is not adequately coordinated with the appropriate teaching.

Training and education programs offer significant benefits both for employees and the business. Through the educational process, companies are able to develop workers' skills along with any other competencies related to increasing work performance. Regular, systematic training together with continuous education not only improves job performance but also significantly reduces job-related learning disparities that may lead to increased work-related risks. Furthermore, training activities also facilitate objective assessment while at the same time the choice for assignment is based on the level of education. Coordination of education, implementation and evaluation contribute decisively both to the achievement of the objectives and to the work development of the employees (Bjorkman and Xiucheng, 2002).

Successful training is the result of an appropriate, initial design and integrated implementation process in order to meet the educational targets. The training process is based on appropriate assessments, planning, implementation and evaluation combined with the choice of a suitable training method. A great variety of educational approaches are available include workplace, or on-the-job training, coaching, mentoring, group participation, seminars and workshops, placement of
the assistant and assignment (Elwood and James, 2003). In addition, there is always the option in the majority of the countries available that the employees' health and safety training can be delivered by or through the guidance of official bodies within the country, such as the Labor inspection department, or by the relevant internationally recognized association, e.g. NEBOSH, IOSH etc. The need to introduce health and safety training at workplaces has been highlighted for several decades in a way that responds to the educational needs of all workers. The provision of employee training is an obligation of the employer who chooses the most appropriate method based on the needs of employees and the company (Catsby, et al., 2007).

Before undertaking any work, the employee is required to be informed of both his or her duties and the measures to be taken regarding occupational safety and health. However, primary, secondary and/or tertiary education level could be crucial. Subsequent employees are called in the framework of their basic education to have a standard of health and safety knowledge and perception and to be aware of the dangers at work. As Bjorkman and Xiucheng (2002) emphasized education and prevention training are key determinants especially in secondary, tertiary and/or higher education so that future workers are fully informed.

The issue of employee safety and health concerns not only companies but also the wider community. The way in which workers are trained in OSH matters has been involved over time to reduce as far as possible any risks, not only company-based ones. Cleveland (2007) argues that the issue of employee training on safety and health issues is shared between education in-work, on-the-job training and on-the-job training in collaboration with various stakeholders, i.e. educational institutions, health and safety organizations and organizations. The most vital point of employee OSH education focuses on the training provided in the work environment. The worker should have
a complete picture and training on the health and safety rules and legislations that he/she must be following, when performing his/her duties at work. The organization and delivery of seminars and support in taking up tasks by providing clear and written instructions is of crucial importance. The employee, as argued by Catsby et al. (2007) is required to be trained in health and safety matters by: a) organizing seminars by the competent safety officer in the case of training a large number of workers; b) written instructions; c) oral instruction; d) video viewing; e) leaflets, posters, warning signs.

In conclusion, OSH training and education is a significant activity for any business environment. It is based on the initiatives of the management of the business, or the owner/manager if the size of the enterprise is small, and also requires sufficient knowledge from executives performing this task. When it comes to Occupational Safety and Health there is always the need for more substantial and deeper training, in any sector of business activities. Following Konijn et al. (2017) exposure of employees to OSH training is related to higher OSH awareness in a broad range of occupations and business sector. Nevertheless, in addition to what is done at the enterprise level, health and safety training becomes more widespread. Prevention campaigns by broadcasting relevant media messages, short film screenings, interviews, news releases as well as the publication of articles on the prevention of accidents at work and occupational hazards are a basic source of information and training for workers. However, in spite of any other issues or characteristics of OSH education and safety training *per se*, the role of the human factor is decisive. The personality of each employee and the interest of the managers is basically the basis of the whole building of education (Elwood, James, 2003).
4.8.1. The Management of Occupational Chemical Hazards in SMEs

The health and safety of employees in dedicated settings for the use and/or management of chemical substances or in any other place operating in a small and medium enterprises’ environment with distinct use of chemical products in their everyday business operations, is threatened daily by the immediate and obvious dangers and/or by indirect and long-term effects of the hazardous substances (Brun, 2010). Addressing these risks, which may sometimes even be life threatening, is crucial and it must be based on a regular schedule of risk assessment. Furthermore, any organization working with potentially hazardous substances should be providing continuous training and education sessions in order to keep the responsibility of its employees stimulated, within a framework of continuous vigilance and control. A dedicated health and safety program can provide a general framework, applicable in each case and lead to appropriate information sources for developing solutions to the possible problems that may arise each time (Marquart et al., 2008).

A health and safety framework to safeguard the company and its employees from any chemical hazards, aims to ensure a safe and healthy environment by preventing and addressing the immediate direct and indirect risks that may exist not only in a chemical laboratory, but also in a storage room of canned chemicals for instance in a Micro enterprise environment, by presenting possible ways of dealing with them effectively. It is therefore necessary to create a Health and Safety Guide that will be containing key provisions of the applicable Occupational Safety and Health legislation as well as specific instruction for the Classification, Packaging and Labeling of Dangerous Chemicals and their Mixtures (Oltmanns, e al., 2014). According to Terwoert et al. (2016) one such health and safety guide it should consider including and address the following variables:
➢ Buildings and/or laboratory facilities
➢ Apparatus, instruments, methods
➢ Circulation of chemicals
➢ Determining occupational health and control methods suitability of the premises
➢ Supply of health care materials, installations, instruments and security
➢ Establish health and safety rules and measures
➢ Personnel training, "safety technician” inspection and commitment of the management.

The key to the success of an employee in a health and safety program in any SME it is the triptych Training-Inspection-Management as highlighted by Brun (2010). The initial and most detrimental step is to train the staff in each business according to the needs underlined by the character of the work, which can be made in many ways, such as supervisory material, written instructions, lectures, seminars, etc. Therefore, the training sessions are followed by the determination of responsibility and acceptance of the personal responsibility of the employees. It is necessary to identify the responsibilities of employers and employees and to define the objectives of each workshop in business. The responsibilities and of both employees and employers, are listed in the Health and Safety Guide of each business operating in the local or international market (Lamb et al., 2014). As Walters (2006) argues the employers are responsible for the following tasks:

➢ Ensuring a safe and healthy environment by reducing, preventing, avoiding and controlling identified risks in chemical hazards
➢ The safety and hygiene of their employees
➢ Continuous training and information on safe in small and medium enterprises, including chemical hazards practices
➢ Employee health monitoring program

On the other hand, Zang and Zheng (2012) are making a remark of the responsibilities of the employees:

➢ The compliance with hygiene and safety rules
➢ Protecting the health of themselves and their colleagues
➢ Not make use of substances and machinery without knowing their function

In many cases, usually in the production sector, the above rules are not enough, as there must be inspected by the management of the of the production area or by a specific individual employee - the "Safety Technician". The latter controls the application of the various rules, the suitability or preservation of materials and facilities, and, finally, gives instructions for compliance or improvement of the condition of the laboratory. Consequently, it can be said that businesses environment using chemicals, i.e. dry-cleaners, service areas, paint production companies, any laboratories using hazardous substances etc. should always consider the adoption of a health and safety system as a necessity due to the existence of the many risks involved in their day-to-day delivery of services. The proper design and development of such a system is based on both management and employees, working together and taking responsibility. Each of the Micro enterprises using chemicals should develop a philosophy and a culture towards safe use and management of these substances, while each and every stakeholder should realize that almost any accident can be avoided if there is attention as well as appropriate and valid action by each employee and management. Be working with a culture of prevention, the owner/manager of the Micro firm must ensure proper operation of the health and safety system the company has in place.
4.8.2. Handling chemicals in a safety framework

The proper handling and use of chemicals, is intended to reduce the risk for employees’ work-related accidents. All employees should be aware of both the dangers they are likely to face and the pitfalls of substances that use something that can only be done through proper training (Lamb et al., 2014).

Before using any chemical substance, all employees must be well aware of its characteristics, its functions and its proper usage. Safety data sheets are a very good source of information along with substance labels and related literature, in case it is needed for further information. In any case, the employees need to be aware of the following points, as most of these are to be found in the safety instructions given to the company during the purchase of the chemicals products to be used:

- The percentage of chemicals that are dangerous or toxic, the maximum permitted exposure to these substances and the lethal dose of any toxicant
- How the chemical penetrates the human body (ingestion, inhalation, injection, skin contact)
- The type of risk they face (erosion, eruption, inflammation, irritation, toxicity)
- The way the substance affects the human body
- Symptoms appear after employees’ exposure in large quantities
- Symptoms appear after repeated exposure to
- Cancer challenge to be developed
- Causing abnormalities during pregnancy
- The physical properties of the substance (solid, liquid, gas, explosive, etc.)
- The chemical compatibility of the substances
- Education and Laboratory Practices
➢ Standard operating procedures should be developed after the start of each job with a chemical describing all steps to protect the employee and reduce the risk.

➢ Suggested laboratory practices in small and medium enterprises

➢ Scanners, which are an effective means of controlling it exposure to hazardous substances.

The laboratory supervisor must train staff in the use and operation of the leads to prevent infections and possible accidents.

➢ Personal protective equipment

The majority, if not all, of the above information and/or safety instructions are available on the labels and the packaging of any chemical material that is being sold legally, internationally and is based and follows the international safety standards. A very helpful tool towards the safe use of chemical by any company has been established and implemented by the European Union since June 1st, 2007. This tool goes by the name REACH that stand for the words Registration, Evaluation, Authorization and Restriction of Chemicals. As stated by the European Chemicals Agency (ECHA) REACH does not only apply to all chemical substances from cleaning products and paints to substances used in the production of clothes, electrical appliances and/or furniture and to the heavy industry, but it works towards safeguarding the safety burden in every company, no matter its size. How is this being succeeded? Every Micro firm, SME or large-scale company that is using any kind of chemical substance within the EU is obliged to abide by REACH regulation. By doing so, the companies they have to identify the potential risks and the safe management from the chemicals they are using, to introduce these to ECHA and, in addition to that to forward these practices to the users of these chemical products (www.echa.europa.eu). According to Gubbels et al. (2013) SMEs are provided with a great variety of sources of support to comply with REACH, from national helpdesks in charge for REACH to guidance and assistance offered by ECHA and the EU Commission. However, many
smaller firms, usually the Micro enterprises, do not consider themselves as “involved” in the chemical industry due to the low quantities of substances they might be using. As a result, these companies might still be unaware of REACH (Lewis et al., 2007; Williams et al., 2009). As Scruggs et al. (201) underline that in order for REACH to be effectively, more attention is needed to educate EU companies, and especially smaller companies, i.e. Micro-SMEs, at the most basic level for them to understand why and how they fall into this regulation (Kemmlein et al., 2009).

4.8.3. Labeling and Properties of Chemicals used in Small and Medium Enterprises

Chemicals are generally classified into similar categories in terms of the action of substances, either on humans or on the environment. This classification is not necessarily based on a similar chemical structure of these products. Directive 67/548 / EEC on the Classification, Packaging and Labeling of Dangerous Substances and analogous Directive 88/379 / EEC on preparations (mixtures of substances) have laid the foundations for a unified understanding of the risks arising from the use of chemicals.

According to the regulations on the labeling of substances and preparations, chemicals having a similar action are classified in the same category (flammable, corrosive, irritant etc.) and are characterized by a special mark of their class. The definitions contained in these texts are simple and general and aim to be rapidly classified (Terwoert et al., 2016). Depending on their physical and chemical properties, chemicals are classified into (Zang and Zheng, 2012):
➢ Explosives

➢ Oxidizing substances

➢ Flammable substances

➢ Highly flammable substances

➢ Toxic substances

➢ Harmful substances

➢ Corrosive substances

➢ Irritants

Based on Oltmanns et al. (2014) the above-mentioned are analyzed in the following manner:

❖ **Explosives:** Solid, liquid, viscous or gelatinous substances and preparations which react exothermally and with the simultaneous release of gases, even without the presence of atmospheric oxygen, burst into flame and are susceptible to violent and violent reactions. The use of an explosive should be avoided if it can be replaced with another non-explosive. If explosive substances are to be used at all, this should be done in the smallest possible quantities. Explosive containers should be protected from vibration and high temperatures. When explosive solids are used, any form of impact, even abrasion (e.g. when transporting them with a spatula) should be avoided.

❖ **Oxidants:** participate in violent exothermic reactions in the presence of other highly flammable chemicals.

❖ **Flammable substances:** have a flash point of 21 – 55°C. Highly flammable substances: have a flash point of less than or equal to 21°C. Substances and preparations which can be heated and eventually ignited in the air at normal temperature without power or solid state,
which can be easily ignited after a brief ignition source that effects and still burning or burning after the ignition source is withdrawn in a liquid state, with a very low flash point or in contact with water or liquid air, they emit extremely flammable gases in dangerous quantities.

Particular attention should be paid to flammable solvents, which are at the same time highly volatile. These solvents should only be used on the extractor and their bottles should always be tightly closed. If a large amount of solvent is spilled, the entire premises should be well ventilated immediately. Until ventilation is complete, no electrical switches should be opened/closed, or electric cables moved, as there is a risk of solvent vapors being ignited by sparks that may form. When a compound has a flash point of less than 15°C it is considered flammable. This category includes the most common organic solvents. There should never be more than a total of three liters of flammable solvents in a laboratory, unless protected in suitable fire-resistant metal containers (Zang and Zheng, 2012).

- **Toxic substances:** can cause serious diseases, even death, if they enter the human body by skin, mouth or breathing.

- **Highly toxic substances:** substances and preparations which inhaled, swallowed or absorbed through the skin even in minimal quantities cause death or acute or chronic damage to health. Almost all chemicals, depending on their amount and concentration, can have a toxic effect. Therefore, they should only be handled inside a fume hood and avoid contact with any chemical compound. As a rule, all chemicals should be treated as potential poisons unless they are known to be completely harmless compounds. The toxic effects of the compounds are characterized as either "immediate" or "chronic". The most well-known
poisons, such as hydro cyanine or chlorine, which have a direct toxic effect, are usually treated with due care. However, chronic toxic effects, the effects of which are visible after repeated exposure to the substance even in small amounts, characterize some compounds. One measure of a compound's risk is the TLV (Threshold Limit Value), measured in ppm / m³ or mg / m³. TLV values give the maximum vapor or dust concentration below which the compound can be classified as low risk.

❖ **Harmful substances:** after they penetrate the human body by the skin or breathing, they can cause limited damage to health.

❖ **Corrosive substances:** substances and preparations, which, in contact with living tissues, can destroy them.

  
  **i. Liquid corrosive:** a liquid corrosive will act on the skin slowly or rapidly depending on its concentration and duration of exposure. These substances react directly with the skin and dissolve or remove essential constituents, denaturing its proteins and destroying its cells. Organic, inorganic acids and bases are the most common corrosive liquids. Because liquids often produce vapors, their use must be carried out within the extractor.

  **ii. Solid corrosives:** they react with the components of the skin when dissolved due to moisture on its surface. Because they are solid, these substances are difficult to remove. Also, because they do not react directly with the skin, they cannot be detected and are likely to cause substantial damage before they are detected.
iii. Corrosive gases: Pose the greatest risk to human health because they can damage the lungs and lead to even to death. Their use is compulsory within the hoods and their inhalation is prohibited.

❖ **Irritants:** non-corrosive chemicals that cause inflammation when they come in contact with the skin and mucous membranes.

❖ **Carcinogens:** substances and preparations which, inhaled, ingested or absorbed through the skin, can cause cancer or increase its incidence.

❖ **Mutants:** substances and preparations which, inhaled, ingested or absorbed through the skin, can cause hereditary genetic defects or increase their incidence.

❖ **Reproductive toxic substances:** substances and preparations which, inhaled, ingested or absorbed through the skin, may cause or increase the incidence of non-hereditary offspring phenomena, or adversely affect both reproductive functions.

A substance may exhibit multiple properties at the same time, multiple characterizations are possible (e.g. flammable and harmful substances accompanied by the corresponding signals. The mark of each category is a square on an orange background with a pattern depicting or symbolizing the action of the group's chemicals. The mark is accompanied by a Latin letter which in some cases is followed by a pointer or + sign. The signals are the first level of information a worker can derive for the action of a chemical (Cope, 2007).

A simple signal is often not enough to convey all the information that is interesting or even necessary to their user. The variety of risks and measures to address them requires more specialized knowledge. This is achieved by standardized risk phrases and standard precautions or safe use actions. The former provides information on the risks stemming from the use of the substance, while
the latter refer to measures that are necessary to avoid harming one's health. The phrases are coded and have a number after the letter R (Risk) or S (Safety). For instance, the phrase R 27 means "very toxic to skin contact", the phrase S 37 means "wear suitable gloves" while mixed phrases are possible in each category that combine the individual. For example, R 36/38 means "irritating to eyes and skin" while S 3/7/9 "keep container closed in cool and well-ventilated area" (Terwoert et al., 2016).

Proper labeling of reagent packages, the majority of which are chemicals, aims to inform users of the dangers of chemical reagents and safe handling. The European CLP Regulation (1272/2008) on the Classification, Labeling and Packaging of Chemicals and Mixtures came into force on 20 January 2009. It establishes the European Union's new criteria for classification and labeling, based on the United Nations Global Harmonized System (UNGHS).

In accordance with the provisions of the CLP Regulation, from 1 December 2010 all chemicals placed on the market must be classified, labeled and packaged in accordance with the CLP criteria. Respectively for mixtures of chemicals placed on the market this is valid from 1 June 2015. Manufacturers and importers of chemicals or mixtures are responsible for identifying the hazards of the substances and mixtures and for their classification. As stated by the European Chemical Agency (www.echa.europa.eu) the chemical reagent labels should provide clearly the following information:

- The name of the main chemical(s) and their identification numbers (CAS, EINECS).
- The name, address and telephone number of the manufacturer or importer in the EU.
- Risk Pictogram(s) (Annex B),
❖ All hazard statements and up to 6 precautionary statements (H - phrases, Annex C) (P - phrases, Annex D) resulting from the classification of the chemical or mixture.
❖ The quantity contained in the container; and
❖ Other supplementary information.

The labels must be written in English as well as in the local language of the country of distribution of the product (and in any other language the manufacturer wishes). A label of a hazardous reagent/mixture contains the names of the major chemicals responsible for the final hazard classification of the mixture. Generally, as highlighted by Zalk and Nelson (2008) labels do not contain chemicals that are less than 0.1% by weight unless classified as carcinogenic, mutagenic or toxic to reproduction.

**Note:** The Thirteenth Adaptation to Technical Progress to CLP Regulation ATP amends the CLP by adding ECHA’s Risk Assessment Committee’s latest opinions from 2017 on harmonized classification of more than a few substances. (See: Annex VI). This update was published in October 2018 in the EU Official Journal and it is going enter into force 20 days after its publication, while the changes are going to be applied from 1 May 2020.

4.8.4. Challenged SMEs face during the storage of hazardous substances and the management of chemical waste

Many of the occupational accidents in small and medium enterprises occur due to improper storage of chemicals and/or of any reagents. For the correct and safe storage of chemicals, four basic principles must be applied:
✓ **Maintain control of the goods where always keeping the minimum quantity required in the laboratory purchase a limited quantity.** usually such that it can be used within a year upon regular inspection of warehouses and the disposal of chemicals unsuitable

✓ **Separation of substances according to their compatibility.** The general separation of substances and reagents into acids, bases, etc., with dangerous properties. The practical solution is to create some more specific categories and place these substances in them. to solve serious problems and inevitably other problems. Thus, substances can be categorized depending on how flammable they are, their corrosivity, their toxicity, their oxidation and more. If a substance has more than one danger, it is placed in the category that contains the greatest risk to the laboratory. Compatibility lists must be available at all times and accessible to every employee

✓ **Providing large storage space**

✓ **Suitable storage containers**

The maximum amount of flammable substances that can be stored is usually determined by state safety regulations. Storage facilities for flammable substances are specially designed to protect their contents from external fires and/or exposure to high temperatures (Zalk and Heussen, 2011). Moreover, flammable substances are prohibited from being stored with corrosive substances because they are not compatible.

Consequently, companies should never forget that they cannot, nor are they allowed to, just dispose of any solid or liquid chemicals in the trash or in the sink. The proper management of goods can reduce dangerous chemical waste. This can be achieved in the following ways (Prüss-Ustün et al., 2011):
✓ Development of a central storage system
✓ Purchase and use of small quantities of chemicals to avoid keeping large amounts of them in the warehouses for a long time
✓ Proper marking of all storage containers to avoid infections
✓ Keeping the laboratory clean
✓ Development and implementation of laboratory procedures for the correct
✓ Waste generation management
✓ Replacement of the substances used with less hazardous substances; or recyclable substances
✓ Solvent recycling
✓ The destruction of hazardous materials must be the last step in each laboratory experiment

Each Micro company that is using and/or producing any chemical substances should have a specific storage space for hazardous waste. This space will have the necessary signs and labels, it will be outside the main premises, yet it shall be easily accessible. All waste should be stored in special barrels and these should be then separated into containers. In the highly unlikely case that a Micro enterprise is producing radioactive waste, this can never be stored together with other types of chemical waste (Brun, 2010).

4.8.5. Collection and Disposal of Chemical Waste

Chemical waste, as one would find in a garage/service are for instance, is basically of a special type of hazardous waste, both for the environment and for the humans, and is subject to the legislation concerning waste specifying that they must be inactivated and/or disposed of appropriately.
Although such waste coming from Micro companies, and also from the SMEs, is usually found in small quantities, it should be collected in special containers and delivered to specific local centers for disposal. The dedicated containers for the collection of chemical waste are typically classified into different categories to avoid mixing inappropriate chemicals and to exclude any potential hazardous reactions between them. In many cases, prior to the collection of waste, some processing by the personnel of the company that used the dangerous substances is necessary (Schinkel et al., 2014). Furthermore, any containers used in the process of the disposal must be suitable for the storage of waste (e.g. resistant to solvents), as well as well sealed. Containers should be stored in a well-ventilated area to avoid the accumulation of dangerous vapors. Waste should not be stored for more than nine months. After the expiry of the storage period they should be destroyed or disposed of in special places (Cope, 2007).

When a company, irrelevant to whether it is a Micro-SME or a larger SME, is using a large variety of chemical products, it should always be following a pattern to be able to separate its waste. A waste separation program may include (Tielemans et al., 2011):

- Separation of halogens from non-halogenated solvents because halogenated solvents are carcinogenic and more difficult to process
- They also produce toxic gases when burned
- Exclusion of metals from waste solvents
- Keeping acetone and dichloromethane away from other solvents

Another critical point is that disposal vessels should be kept in good condition to prevent leaks. It is also forbidden to use closed containers with cork or paraffin. If a material is placed in an inappropriate container, it must be removed immediately. The size of the container should be
appropriate to the amount of material discharged and the material from which it is made compatible with the waste material, e.g. acids or bases should not be disposed of in cans (Zalk and Heussen, 2011). Lastly, as emphasized by Cope (2007) each and every waste container in the laboratory should have the necessary identification tag, which should be including:

- The phrase "hazardous waste"
- The name and address of the manufacturer
- The date the container started to be used
- The composition and physical state of the waste
- The hazardous properties of waste
- The name must be specific and not generic, and abbreviations are forbidden.

In conclusion, it is easy to understand that all the above might look very difficult for the most Micro enterprises to follow. Reasons for that are many with the most prominent to be focusing on the size of the company and/or on the actual services that they deliver to the customers. The comment that comes from the personnel of many Micro firms, is more often than not that the amount of chemicals we are using daily is negligible and there is no major risk of an accident. As a result, the priorities of the owner/managers and/or the personnel are further away from regular risk assessment and their priorities are further away from an organized chemical risk management framework. As Walters (2006) argued conventional approaches to support the focus of smaller firms on the chemical risks and on the company’s compliance to the regulation are likely to fail. On the contrary, more direct approaches, such as training and education, or even sectoral focused actions might help Micro firms achieve better results in the handling and safe use of chemical substances.
4.9.1. Social Exchange Theory (SET)

From a profitable private-owned business to a public-school organization, what is observed is the continuous interpersonal interaction between the members of the business/organization. Any kind of interaction that is characterized by intangible social costs and benefits, such as respect, honor, friendship and caring, it falls under the Social Exchange Theory (SET) and encompasses all social systems (Nian, 2011). During the past few decades, particular attention has been given to exploring the relationships that develop within social systems, and more specifically to two specific categories of relationships that surround organizations, which are (i) the leader-member transaction relationships and (ii) the group-member transaction relationships.

The first type of relationship is based on the Leader-Member Exchange Theory (LMX) and it focuses on exploring the binary relationships that the leader develops with each of its members (Van Knippenberg et al., 2004). The second type of relationship is based on the Team-Member Exchange Theory / TMX, developed by Seers (1989), as a complement to the Leader-Member Transaction Theory (LMX). The TMX theory focuses on the study of the relationships that members of an organization form with each other within the working group to which they belong.

The comparative analysis of the degree of influence of LMX-TMX relationships on various organizational outcomes, it was considered an interesting area of research as it identifies the formation of work attitudes and behaviors of members with their leader or team in order to achieve the desired organizational results. The organizational factors selected to investigate are the basic attitudes of employees and are the job satisfaction, organizational commitment and organizational identification.
There is a large number of studies in the literature that have examined the effect of leader-member relationship (LMX) and group-member relationship (TMX) on shaping employees' work attitudes, but few have compared either of them. These employment relationships influence organizational outcomes to a greater extent. At the same time, it is worth noting that research, particularly in Cyprus, Greece and Romania, on the comparative analysis of the degree of influence of LMX-TMX relationships remains very limited. Based on that it is important to have further research going on in order to investigate whether the influence of these relationships is indeed valid for Micro enterprises as well, or if it cannot be applied on them due to their small size.

4.9.2. Explaining SET

The theory of social exchange is, in a sense, a member of the extended family of behavioral theories, but as an approach to the study of interpersonal relationships it also incorporates the concept of interaction. Moreover, it deals directly with close relationships. Van Dyne et al. (2008) emphasized that social exchange strongly illustrates how the structure of different types of social situations can affect individuals' social interactions and social outcomes.

In any social relationship there are at least two people and, as its name implies, this theory deals with how these people exchange rewards. Sociologist Homans (1961) made it clear that he was drawing a sketch from Skinner's contributory psychology. According to Cook (2001) as a model of behavior, it introduces various economic concepts, married to behavior, to interpret interpersonal relationships. The degree to which people like someone else is determined by the cost-reward ratio: What will it cost me to get a positive reward from this person? The theory of social exchange, however, takes an additional step by arguing that the outcomes for the two participants are determined jointly by their actions (Dejoy, et al., 2010; Redmond, 2015).
Although the consequences may not be dramatic, the process is a continuous daily activity. People strive to acquire, maintain, or exchange things of value, tangible or intangible, with other human beings. We are negotiating about what we are prepared to give in return for what they will give us. Some exchanges are short and perhaps shallow in their meaning, while others are continuous, long-lasting and perhaps extremely important. In all cases, we get results or profits that depend on what others are doing. Over time, we strive to develop a way of interacting that is rational and mutually beneficial. Social exchange is a kind of give-and-take type of relationship, and relationships are examples of business transactions. So, is this approach somewhat ‘dry’ in the study of important relationships? If so, its supporters argue that they are nonetheless valid (Huang, et al., 2016).

Foa and Foa (1975) have distinguished six (6) types of rewards, each involving an exchange of resources such as (i) goods, (ii) information, (iii) love, (iv) money, (v) services and (vi) status. Each reward can have a case-specific dimension so that its value depends on who gives the reward. Thus, a hug (a particular case of "love") will be of greater value if it comes from a separate person. Every reward also has a dimension of clarity to make it more tangible, as is obviously money.

There is also a cost to a relationship, such as the time it takes to maintain it or the fact that our friends may not approve of it. Because resources are exchanged with a partner, we try to use a minimax strategy: that is, we try to minimize costs and maximize rewards, although we may not realize it, and may object to the idea that we do (Liu, Loi, Lam, 2011). The social psychology of the groups of Thibaut and Kelley (1959) was a fundamental work on which much of the later research is based. They argued that we need to understand the structure of a relationship in order to deal with the behavior manifested, as it is the structure that determines the rewards and punishments available. One consequence of the minimax strategy is that a relationship is not satisfactory when the cost exceeds the rewards. In practice, people exchange resources with one
another in the hope that they will make a profit that the rewards will outweigh the costs. This is an innovative way to define a "good relationship" (Van Knippenberg et al., 2004).

One last important concept in SET, it is the comparative level (CL) of each individual - a model by which all relationships of a person are judged. People's comparison levels are a product of their past experiences with other people in similar exchanges. If the outcome in this exchange is positive (that is, one person's profit exceeds the level of comparison he or she has developed), the relationship will be hired satisfactorily, and the other person will look attractive. However, there is a lack of satisfaction if the end result is negative (i.e. if the profit is lower than CL). Fortunately, it is possible for both people in a relationship to make a profit and thus get satisfaction. According to Huang et al. (2016) CL concept helps to interpret the reasons why some relationships may be acceptable at certain times but not others.

A key feature of exchange theory is that it interprets the several variations in relationships, namely:

✓ Differences between people in how they perceive rewards and costs (one may find that receiving advice from their partner without asking for it is a reward, while another may believe otherwise).

✓ In-person differences based on different CLs that change both over time and from frame to frame (e.g. I like companionship but prefer to shop for clothes myself).

✓ Interest in the applications of social exchange theory has increased in recent years.

For example, Rusbult has defined the concept of investing to include how rewards, costs and different CLs are interconnected with relationship satisfaction and commitment to it (van Dam,
A meta-analysis by Le and Agnew (2003) reviewed more than fifty investment-based studies to show that relationship shock is strongly related to lack of commitment.

Finally, the original theory of Kelley and Thibaut’s social exchange (1959) has been extended to a more general theory of interdependence. The latter emphasizes the idea that partners in a long-term relationship gradually become mutually interdependent, satisfying each other's needs within the relationship. The broader theory also intends to contribute to an understanding of intergroup relations and the reasons why people behave socially (Liu et al., 2011).

4.9.3. SET and the Term LMX Theory

Traditional leadership theories that focus on a leader's personality traits and behavior (behavioral theories) assume that leaders develop fairly homogeneous relationships with all of their members. In the mid-1970s, leader-member transaction theory (LMX) first emerged from Graen and his colleagues, giving a completely different dimension to the concept of leadership (Luria, 2010).

The LMX theory is a leadership model that differs from many of these leadership models that have been used in the literature at times because it focuses on the relationship between couples, more specifically the Vertical Dyad Linkage-VDL. As argued by Nian (2011), the difference between the LMX model and the VDL model lies in the fact that the former goes beyond a description of the differentiated relationships in a workgroup, to an explanation of how these relationships develop and what are the consequences of relationships on the functioning of the organization.

Essentially, it is a theory that does not examine the behavior or characteristics of leaders or employees, but the relationship between them, and more specifically, perceives leadership as a binary transaction process between the leader and each subordinate separately as highlighted by
Liu et al. (2011). The notion of "individually" has a strong resonance in the formulation of this theory, due to the different kind of relationship the leader develops with each member of the organization.

4.9.4. SET and the Term TMX Theory

*Group-member transaction theory (TMX)* refers to the labor relations transaction between members of the working group and was first developed by Seers (1989) as an adjunct to leader-member transaction theory (LMX). It emphasizes the exchange relationships between team members and the mutual commitment between members in the resulting exchange relationships. Group member transaction theory (TMX) has been formally defined by Dejoy et al. (2010) “as each group member's perception of the quality of 'reciprocity between a member and his group in relation to the member's contribution to the group, through the exchange of ideas, feedback and helping other members and, in turn, gaining support, help and recognition from other members of the group on his / her own’.

According to TMX theory, each group is made up of different members, so the relationships that develop between them will differ according to the abilities and interests of the individuals, as well as the needs of the other members (Seers, 1989; Seers et al., 1995). Wech (2003) mentioned that the quality of the exchange relationship indicates the effectiveness of the working relationships that members develop within the organization.

In this respect, Mehta (2016) suggested that the quality of TMX may differ in the content and the exchange process between individual team members. In the workplace, there are essentially two types of interaction relationships between members. The first type (i) concerns the formation of a low-quality member-group relationship and is limited to exchanges based on the requirement to
complete tasks. On the opposite side, is the second type (ii) that results in the formation of high-quality group-member relationships. This type of relationship involves the exchange of resources and support that go beyond what is needed to complete the tasks, providing work-related assistance, guidance, and reliance on mutual support and mutual help from members (Wech, 2003). In fact, the TMX theory holds that when employees in an organization perform behaviors that benefit one another, exchange relationships increase quality.

4.9.5. Challenges arising in the handling of chemicals from human behaviors and interactions

Employees facing high accountability environments, they may initially choose to engage in proactive attitudes to reduce their stress levels, related to these environments. On the contrary, people who work by limiting their views, by comparison, they are unlikely to be able to reduce the uncertainty associated with high accountability and high policy perceptions. Previous research suggests that lack of uncertainty reduction behavior is directly linked to job dissatisfaction (Herman et al., 2008). Because employees are usually unable to stop feeling "accountable" while at work and often have to justify behaviors across multiple constituencies, increased control can cause stress, conflict and overload. In addition, as a result of reduced exposure to information, lower incidence of opinion-seeking behavior may predict increased work intensity when accountability and policy are at the same time high. However, as stated by Andrews et al. (2009) due to its favorable impact on social exchange regulation and resource protection, it is considered that proactive expression of opinion will have a positive effect on work intensity in environments with high accountability and high policy perceptions.
The perception of individuals' behavior in organizations has been found to have significant effects on outcomes, such as employee satisfaction, retirement, cynicism and generous work behavior. Ferris et al. (2002) detailed a rich research agenda to further understand policy perceptions. They raised two issues in their discussions: (a) the more positive aspect of political behavior and (b) the expansion of knowledge about perceived political behavior according to organizational focus. Furthermore, they emphasized that these are particularly important, since both have not been adequately researched and have the potential to significantly alter the study and understanding of workplace policy.

As described in the lines above, if the employees are showing greater feelings of accountability they have to widen their interactions in the working environment and reduce their stress levels that might be a consequence of limited information of the job safety -and other- procedures, or even lacking the knowledge of the safety policy of the company. The higher the exposure of employees to valid sources of information the greater the knowledge spill-over effect it will be amongst them, pushing them to having more proactive behaviors and interactions with the co-workers as well as with the management of the company. Consequently, there will be a further, multileveled exchange of opinions on a variety of issues, actual or potential, which in turn might be playing a crucial role in the Micro SME environment during the handling of chemicals. It is well-known the important role of training and education in the business environment in general; this importance is also highlighted in pages of this study. When it comes to the possible risks stemming from the improper handling and management of chemicals, human behavior characteristics such as good communication between the employees, the ability to proactively introduce and promote opinions on the way the business is running amongst the working personnel and the management as well as the solid understanding of the company perceptions and policies on the usage of hazardous
substances will reduce the challenges arising from possible stressful scenarios, increased chances of internal conflicts and uncontrolled work intensity in the environment of any Micro enterprise that is having the presence of chemical products, that can possibly cause any harm to its employees, in the list of its way of doing business daily.

4.9.6. The Job Satisfaction in Business

It has been observed, as emphasized by Luria (2010) that the primary purpose of all organizations and businesses is to maximize employees so as to ensure their maximum performance, and thus achieve organizational goals. Employee motivation is directly related to satisfying their own needs. The content of job satisfaction has been defined in a variety of ways. According to Van Dyne et al. (2008), job satisfaction expresses the degree to which employees like or dislike their work, arguing that it is a positive emotional state resulting from the evaluation of their work or job, of her experience. Job satisfaction seems to be interpreted as an internal state of the worker.

According to Wright and Davis (2003), job satisfaction refers to the evaluation of the individual as to what he/she is looking for in his/her job and what he/she ultimately receives. This definition agrees with Wanous and Lawler (1972). In general, job satisfaction can be defined as a general attitude toward work (Luria, 2010). The basis of the concept of job satisfaction lies in the categorization of the key theories that have been developed to interpret the nature and meaning of job satisfaction. These theories have been categorized as follows (Huang, et al., 2016):

✓ **Situational theories:** Occasional theories perceive job satisfaction as a result of the nature of work for one or other factors in the work environment. This category belongs to the theory of the Job Characteristics Model, according to which organizations that provide employees with intrinsic characteristics, such as autonomy, feedback, job identity, etc., are able to expect higher levels of employee satisfaction with their work.
✓ **Dispositional theories:** According to these theories, job satisfaction is based on one's personal characteristics. A basic theory of this category is the Value-Percept theory, according to which the employee's satisfaction with his job depends on his evaluation of the fulfillment of his goals-desires.

✓ **Interactive theories:** Unlike previous theories that interpret the concept of job satisfaction one-dimensional, these theories hold that job satisfaction is multifaceted. They argue that it is the result of both the nature of the work itself and the characteristics of the individual. According to the literature, one interactive theory is that of Hulin (1991), who listened to the two previous categories of theories and combined their characteristics. He argued, therefore, that job satisfaction is a function that balances between input roles and output roles, that is, what the employee brings to the job (e.g., experience, effort, knowledge) and what the employee (e.g., salary, hierarchical rank, working conditions) receives from work.

4.9.7. Organizational Commitment in Business

The organizational commitment is an important part of the employee's psychosocial status based on the argument of Srivastava and Singh (2015). Employees with a high organizational commitment appear to engage in many behaviors that are considered to be beneficial to the organization. The concept of organizational commitment has been extensively explored and, according to the literature, reflects a continuous attachment and commitment of the individual to the organization in which he works.

More specifically, Meyer and Allen (1991) report that organizational commitment reflects how employees perceive the nature of their work relationships with their organization in which they work and should be treated as a psychological condition. It is therefore argued by researchers that organizational commitment reflects the psychological attachment between the
business/organization and the employee, both through the employee's emotions and through his or her behavior towards the business or organization in which he/she works (Martin, et al., 2010).

The psychological attachment between employee and business / organization can occur in three forms:

i. Compliance, which occurs when employees adopt attitudes and behaviors in order to reap benefits and not because they agree with them.

ii. Identification, which occurs when employees respect and honestly adhere to the values and rules of the business or organization.

iii. Internalization, which occurs when the individual assimilates to such an extent the values of the business or organization that the beliefs of the organization are identical with the values of the individual.

On the other hand, Allen and Meyer (1990) identified three types of organizational commitment. The first type is the so-called affective commitment, which refers to the employee's emotional attachment, identification and participation in the organization. When employees are satisfied with the role they hold in the particular business/organization, they are drawn to this type of dedication and believe in the goals of the organization. Fundamentally, according to Herman et al. (2008), employees with strong emotional commitment continue to work for a company or organization because they want it themselves.

The second type is the continuous commitment, which refers to the cost-related commitment to the employee from a possible departure from the organization. Employees' awareness of the lack of alternatives outside the business environment reinforces the feeling of continuous commitment. In many cases, the cost of leaving can include losing, among other things, a good salary or other
material benefits, as well as social contacts or friendships. Employees associated with an organization through continuity commitment remain in it because they need to (Mehta, 2016).

The third type concerns the normative commitment, which refers to the employee's sense of obligation to remain with the organization because of his commitment to the organization. Recognition for certain benefits (e.g. private insurance, additional pay etc.) causes employees to feel obligated to commit and pay back as liabilities. Andrews at al. (2009) made the remark that workers with a high level of regulatory commitment are trained to stay in the organization or business because this is ethically right.

Conclusively, if someone could define the key differences between the three types of organizational commitment, the following basic distinction would be appropriate: emotional commitment expresses the 'will to work', continuity commitment expresses the 'need for work', and finally regulatory commitment expresses the 'obligation to work'. In addition, it is worth noting that Meyer and Allen (1991) consider the three types of organizational commitment to be interconnected and directly related. That is to say, each individual will display all three types of engagement at a different level, but each. For example, an employee may feel strongly about the obligation and the need to stay in the business / organization but has little desire to remain.

4.9.8. SET in the daily business environment

As emphasized in the literature, Social Exchange Theory has a multidisciplinary character and is being applied to and/or acting as the backbone of several research fields and topics. By using the SET model researchers try to interpret the several aspects of the society and the interactions between individuals amongst them. The interactions between people, in our case between employers and employees are based on the scheme of rewards and punishments. Key role in the
above-mentioned theory is the fact the one interaction between two parties that is approved by the
one party is more likely to be repeated compared to another action, which has already been
disapproved by the same source. Individuals tend to make decisions based on the future outcome
of their actions; they would choose an action that will provide them with the highest profits, the
most security but also on the other hand they would like to succeed in that with the fewer expenses
and the least possible consequences. As Blau (1964) stresses in his book with the title “Exchange
and Power in Social Life” the term “social exchange refers to the voluntary actions of individuals,
which are motivated by the returns they are expected to bring and typically do in fact bring from
others” (Cook 2015). At this point it is very important to highlight the fact that social exchange
encompasses unspecified obligations that is the most critical characteristic, when compared to pure
economic exchange. One example of social exchange theory in the business environment can be
the fact that one employee can help his/her co-worker for a few times during a specific task;
however, if the co-worker cannot reciprocate this help, his colleague will understand that he had
lost some time and will never try to help again (Blau, 1964). DeJoy et al. (2010) argue that safety
research has an increasing interest in trying to understand how social exchange theory address
safety-related perceptions and the behaviors of employees.

Moreover, in their research paper where they tested a model of social exchange and safety
management, they found out that occupational safety and health policies impacted both the safety
climate and the organizational commitment; safety climate was related to perceived safety at work,
while organizational commitment was related to withdrawal behaviors, such as absenteeism and
tardiness, and employee vitality. Kouabenan et al. (2015) underline the findings of Mearns and
Yule (2009) in their paper showing that “the more the managers were perceived as getting
involved in safety-related actions and as caring about employees’ well-being, the less the latter

often tended to take risks or violate safety rules”. In the most recent study of Mullen et al. (2017) there is clear evidence that employees tend to build up perceptions and/or beliefs with regards to employer safety obligations during their employment period. In addition, they mention research evidence on social exchange theory of Blau (1964) in the wider field of safety literature that put forward that “positive attitudes and behavior result through the reciprocation of social influences experienced within an organization” (Mullen et al., 2017). It is broadly appreciated that when there is a fulfillment of any kind of safety-related obligations and/or responsibilities by the employers in terms of providing safety training, the use of Personal Protective Equipment and the proper maintenance of any kind of equipment, this action triggers the feeling of employees that their existence and their efforts are being valued within an organization.

Research so far has shown that when leaders tend to put a strong emphasis on safety this leads to improved employee safety motivation, participation and compliance (Neal and Griffin, 2006). As stressed out by Emerson (1976), Cook (2001, 2015) and Redmond (2015) social exchange theory is better to be taken as a “frame of reference that takes the movement of resources via social process as its focus”. Additionally, the main scope of this social exchange framework is being characterized by the subsequent assumption: “a resource will continue to flow only if there is a valued return contingent upon it” (Emerson, 1976; Cook and Rice, 2006; Redmond, 2015). In conclusion, as Hadjimanolis et al. (2015) emphasized social exchange theory offers a great outline for the health and safety study. As it comes forward from the theory itself, people in general, and employees in particular, when they are receiving good treatment from their organizations/companies then they tend to reciprocate. This action of reciprocation from the side of the employees is described with more and deeper interest in the organization, better satisfaction from the provisions of the company, and all in all an improved performance in all levels.
Lastly, many authors to date have seen and researched the safety related behavior as a social exchange (Hofmann and Morgeson, 1999; Ford and Tetrick, 2011). Following Hasle et al. (2011) a long-term face-to-face interactions’ pattern in the environment of the Micro firm it helps employees understand the thoughts, the needs and the reactions of the owner/manager, which in turn transforms the business climate to a more friendly one showing better group interactions. These characteristics are vital and give a special meaning to the working relations in the Micro company. Mearns et al. (2010) have found in their study that employers and/or owner/managers who invested more in better health policies in their companies they were received a higher employee commitment and safety compliance. Since Burke et al. (2002) argued that one dimension of work performance is safety performance, Widersal-Bazyl and Warszewska-Makuch (2008) came to emphasize that the participation of employees in the organizational decisions showed a positive impact on safety in the work environment. Safety performance of the company is increased due to the willingness of the employees to comply with safety regulations, since they themselves are becoming part of the decision-making process.
5. Research Methodology

The investigation consisted of two separate parts. The first part included a focus group interview consisting of Labor Inspection Officers from the Department of Labor Inspection of the Ministry of Labor, Welfare and Social Insurance from Cyprus and Greece. A group of 6 labor inspectors, with extensive experience of inspecting small companies, were invited to attend an interview in order to discuss and look deeper in crucial issues that had to do with the safety issues arising in Micro enterprises using chemical substances. Their contribution added valuable information on the table stemming from data of relevant documentations and records of the Department of Labor Inspection as well as from their own experiences of real-time auditing inspections they performed in micro companies so far. A similar research approach has already been applied in the past by Walker and Tait (2004) in their research paper for “Health and Safety Management in small enterprises”; they designed a checklist with the help of an experienced Health and Safety Inspector, so as to assist small businesses’ managers in replying adequately. Once our focus group interview was finished in April 2018, the results were collected and analyzed in comparison to the available literature resources at that date. An extensive research has been performed for a period of 24 months, that is from May 2016 to May 2018, in order to find and go through any available relevant publication on Micro companies, on SMEs and on the use and management of chemical substances at work. The initial search had been performed in English language, and the review has been updated till the last days of the production of this research. In order to obtain the maximum feedback from this procedure, we touched upon a wider perspective on occupational safety and health issues related to the role of the owners/managers of the micro enterprises.
Next step was to design a questionnaire for a nationwide survey in Cyprus, Greece and Romania, that would be detailed and informative yet short and easy to be comprehended by the majority of the working force in all the participating companies in the research project. The research started during the Summer of 2018 with Micro firms from all around Cyprus, which have been contacted and selected randomly to participate in the research project. Cyprus is divided into five districts that is the District of Nicosia, the District of Larnaca, the District of Limassol, the District of Paphos and the District of Ammochostos. Primary target was to manage and come to an agreement with Micro enterprises from each district. Subsequent stage was to secure the participation in this research of at least one employee and the owner/manager of each of the Micro firms. As soon as their involvement was agreed, we proceeded to the secondary contact in person to discuss any queries from the interviewees’ part and to schedule the date and the place for conducting the research. Same strategy had been followed previously in the environment of Micro companies in Cyprus by Boustras et al. (2015) and Hadjimanolis et al. (2015). Following the example of Walker and Tait (2004) in order to encourage the participation of the micro companies, at the end of the interview the owner/manager was able to arise any health and safety issues and/or worries he/she might be having to that point, which could have been noted separately to this research for future/further research targets/needs. In the case of Greece, the sample has been gathered from most parts of the country, i.e. 39% from the northern and 29% southern part of Greece as well as from islands both from the Ionian Sea 14% and the Aegean Sea 18%. Target was to approach roughly 120-180 Micro companies and agree with them for their participation in the research. Finally, in Romania the sample was mainly gathered from the wider area of Bucharest only reason for that was the large and very widespread area that businesses are covering in and around Bucharest, as well as the difficulties we have faced while trying to approach Micro enterprises in
the rural areas of the country. Sample size in the case of Romania was smaller than in the other two countries of interest, however the researcher managed to exceed the participation of the minimum initial target of 50-80 Micro companies.

At the same time that the survey started in Cyprus, there was the second nationwide survey taking place in Greece, followed by the third one taking place in Romania. In order to cover all three EU countries, the surveys had to be designed in that manner so that they were able to overlap with regards to the period of time that was dedicated to gather the questionnaires from all targeted populations. The questionnaire was the same since all the countries share many common characteristics and, furthermore, they belong to the same geographical point, that is the South Eastern Europe (see Figure 1). The interviews were assisted by (i) state labor inspectors and/or professionals of the External Services for Protection and Prevention (ΕΞΥΠΠ), who are certified and authorized by the Labor Inspection Department of the country of interest, (ii) the companies’ registries from the Ministry of Finance (CY), (iii) the data of the Economic Chamber of Greece and the Micro companies registry of (iv) the Chamber of Commerce and Industry of Romania (see Appendix II for Layman’s report).
Figure 1: Pin-pointed EU Member States participated in this study (Source: www.nationsonline.org)

The input from the above-mentioned sources have facilitated the researcher to approach the businesses he was interested in from the private sector via some of their employees/officials. Nevertheless, the survey that was conducted in Romania did not include the last part of the labor inspectors’ questionnaire, since we were not able to ensure the participation of relevant personnel of the Labor Inspection department. In an effort to employ professionals providing identical services to the External Services for Protection and Prevention (ΕΞΥΠΠ) that were available in Cyprus and Greece, this has proven to be a very costly and extremely time-consuming process that fell outside of the financial and time limits of this project. Based on the above, we gathered only questionnaires for the employees and the owner/managers.
In terms of the sampling method used throughout this long-term survey research in the three countries of reference, that was a non-probability sampling at convenience. There are various types of sampling methods available for a researcher to conduct any type of research and/or survey. Taking into consideration the special type of SME that the Micro enterprises belong to, the decision was made to proceed with a convenience non-probability sampling. According to Wilson (2016) following this type of sampling we are “selecting cases at hand until the desired number of items is reached”. As Etikan et al. (2016) argue this sampling method is used to address research criteria such as geographical proximity, availability at a given time, easy access and/or willingness to participate in the study.

5.1. Questionnaire

The survey tool used in this was designed in such a way to guarantee the most objective results possible. In order for the researcher to succeed in that, the questionnaire was divided into three (3) distinctive parts following the work of Boustras et al. (2015) and Hadjimanolis et al. (2015). Based on the example of the above authors and due to the fact that this approach was proven to be very successful in the demanding environment of the Micro enterprise, even though it had a specific geographical focus that was a small EU member state, the questionnaire was structured as follows:

(a) the first part of the survey tool was focused on the Employee of the Micro SME and consisted of 37 questions, having an introductory part of demographics (four questions) followed by work-related and focused on chemical safety and management questions. More specifically the remaining of the 33 questions were indirectly organized in smaller groups so as to address the particular information required from the responders on safety performance and on legislation compliance; for example Question 10 and 13 are acquiring
feedback on the decision making process that takes place in the company by asking “My employer is consulting me on the correct management of chemicals” and “My opinion on issues regarding the correct management of chemicals is being taken into consideration by the management of the company” respectively. Moreover, Question 11 and 35 are acquiring information on the use of the personal protective equipment (PPE) against chemical by asking “My employer is interested in the protection of employees from chemicals’ exposure” and “I am provided with the necessary protection from chemicals” respectively. The level of organizational commitment is researched in a similar way like in the study of Hadjimanolis and Boustras (2015) on the basis of three questions, namely Question 18, 22 and 23 which are having the form of “I discuss the problems I am facing at work due to chemicals with other people”, “In general, I am satisfied with the way my remarks/flags are being managed in terms of the management of the chemical substances” and “In order for us to reach the company’s targets we do not abide by the relevant legislation for the proper information of the chemical products” accordingly. Another important aspect of safety is the perception of employees on the level of the interest of the employer in safety; this is address via the group of Questions 11,12,17, which are “My employer is interested in the protection of employees from chemicals’ exposure”, “I am aware of the ideas of my employer regarding the correct control and management of chemicals” and “I would like to have better controls in place for the chemicals we use/produce” accordingly. The perceived by the employees safety conditions of the company in general were investigated through Questions 17, 20, 23 which are “I would like to have better controls in place for the chemicals we use/produce”, “In my opinion, the chemical products being used in our company have all the necessary safety
descriptions/labelling” and “In order for us to reach the company’s targets we do not abide by the relevant legislation for the proper information of the chemical products” correspondingly. Lastly, concluding the group of items explaining safety performance, the participation of the employees in safety information of the chemical products used in their company Questions 10 and 22 have been grouped together, which are “My employer is consulting me on the correct management of chemicals” and “In general, I am satisfied with the way my remarks/flags are being managed in terms of the management of the chemical substances” respectively. With regards to the legislation compliance, Question 19 and 20, that is “The chemical products being used in our company have safety labelling in the country’s language” and “In my opinion, the chemical products being used in our company have all the necessary safety descriptions/labelling”, reply to the appropriate labelling on chemicals following the EU Legislation and/or EU Directives’ guidelines. Finally, Question 16 and 23, “Do I feel exposed to the chemicals at work?” and “In order for us to reach the company’s targets we do not abide by the relevant legislation for the proper information of the chemical products” respectively, are describing the safety environment of the company in relation to the legislation compliance.

(b) The second part was dedicated to the Employer and/or Owner/manager of the Micro firm. This section consisted of a 22-item, company focused questionnaire, which had as a target to capture the perception of the employer for the safety standards and procedures in the company. Question 21 of this part of the survey tool has been used to assess the willingness of employees to use their PPE the simple form “Are employees willing to use PPE”? in relation to safety performance, while Question 12 “I give instructions/guidelines to my employees on the correct use of chemicals” is used to control the company’s legal
compliance. The remaining of the information from this part of the questionnaire were used in the explanation of the Hierarchical Regression Analysis model.

(c) Lastly, part three was the section for the labor inspector and/or the health and safety professional of the External Services for Protection and Prevention (ΕΞΥΠΠ), who were observing the premises of the Micro firm once they administered the questionnaires to each company. This approach has already been followed by Boustras et al. (2015) and Hadjimanolis et al. (2015) in their research to capture the health and safety management status and the work attitudes and safety performance in Cypriot Micro-SMEs accordingly.

The uniqueness of this particular survey tool (see Appendix I) is based on the exclusive attention that is given to the Micro enterprises that are using chemicals on a day-to-day basis either in their production processes, in the delivery of their services or just in trading chemical goods/products. Furthermore, it has been used in three EU Member States all of which belong in the same geographical area, however when their data are compared interesting findings are to be noted.

5.2. Statistical Methodology

The data obtained by the survey that took place in the three (3) EU Member States were analyzed by using the Statistical Package for Social Sciences software version 26 (SPSS, Chicago, IL, USA). A range of statistical techniques has been used. For univariate analysis, results for variables measured on the Likert scale or in a 10-scale measurement (considered as continuous), are presented with a measure of central tendency (mean) and measures of dispersion (standard deviation, min, and max). For nominal variables – categorical data (companies demographics and dichotomous variables), frequency of responses and relative frequency have been calculated.
For bivariate analysis (comparisons of two variables), differences in mean scores between two groups were tested using independent samples Student’s t-test. For more than two groups, one-way ANOVA with Tukey LSD post-hoc test has been employed. Chi square test of independence has been implemented to examine if there was any relation between two categorical variables (e.g. gender & country). Statistical correlations between the two-scale variables were evaluated by the Pearson correlation coefficient.

In multivariate analysis, the Hierarchical Regression model has been applied for Greece and Cyprus. Following the argument of Tisak (1994) “hierarchical regression analysis is potentially a very useful statistical technique for establishing the significance of sets of predictor variables”. Consequently, the main data analysis technique employed for this large-scale study is the Multivariate Hierarchical Regression model. A similar regression analysis has been followed in the recent past in an identical manner by Hadjimanolis et al. (2015).

This is a statistical strategy that helps the researcher to assess and evaluate the relationships that exist among variables of interest and, also, to measure hypotheses regarding a dependent variable and several independent variables together (Gelman, 2006). As Younhee and Young (2016) describe this is a distinct form of a “multiple linear regression analysis in which more variables are added to the model in separate steps (the process is called “blocks”) and it is frequently performed to statistically “control” for certain variables, to see whether adding variables significantly improves a model’s ability to predict the criterion variable and/or to investigate a moderating effect of a variable, i.e., whether or not one further variable is able to impact the relationship between two other variables”. What is more, this analytic tool can help highlight, whether or not the variables of interest offer a statistically significant amount of explaining the variability in the dependent variable through controlling all other variables. A further justification
for the use of this statistical model is the fact that the steps of this study fall into hierarchical steps
and the researcher intended to investigate if some sets of variables account for additional variability
and/or significance in the study.

Finally, a 5% significance level has been considered for all tests.

5.3. Ethical Considerations

All the participants of the surveys, – employees, owners/managers – were initially informed of the
purpose of the study. A form for their written consent was attached to the questionnaire and their
anonymity has always been secured, as it is highlighted by the EU GDPR legislation for the
protection of personal data. In the event that any of the participants would like to provide answers
to the questionnaires that were strictly confidential he/she could have done so, as he/she would be
protected due to the anonymity of the survey forms. The researcher has been personally responsible
for the data collection and their analysis, which means that no individual questionnaire can go in
public view, even though there will not be any personal details written on them.

5.4. Limitations

In terms of limitations, the present research has always faced a major issue with not enough, if
any, existing literature to advocate for important characteristics of Micro firms and the use of
chemicals in their daily activities, not only in country level but also European-wide and
internationally. A possible way to overcome this problem was to focus on generic Small- and
Medium-sized Enterprises literature and gather any available research results to date to advocate
towards our research hypotheses. After the research project has been materialized, a comparison
of the findings was to be discussed in parallel to the existing literature.
Another limitation has been the response rate of the Micro enterprises. Due to their small size and the usual “family-like” working environment, owner/managers and/or employees tend to be reluctant to participate in business research actions. However, there was an initial strong belief, especially in the cases of Cyprus and Greece, that this obstacle would have been overwhelmed with the help and support of the Cyprus Safety and Health Association, of the labor inspectors and of the officials of the relevant chambers in these two countries. Indeed, their guidance, advice and their contribution in general assisted in ensuring the staff of the Micro companies to be interviewed, that this research attend will act in favor and not against them in any way and it has a strictly academic character. As a result, the response rates we received were 31%, 47% and 71% for Romania, Greece and Cyprus respectively. Finally, the implementation of this research along with the fact that some owner/managers might have given positively biased responses in terms of the safety policies, training, health and safety provisions and their actual knowledge of the appropriate occupational health and safety and/or chemical substances safety legislation are to be counted as potential limitations as well.

One last limitation, since the sampling method was a non-probability at convenience one, as one could argue for, is the collection of observational data from the labor inspectors and/or the professionals of the External Services for Protection and Prevention (ΕΞΥΠΠ) for the third part of the survey, since the latter might have shown some bias while recording the data Hadjimanolis et al. (2015).

All these limitations had to be acknowledged and highlighted in order to be taken into consideration not only for the evaluation of the current research, but also for future research efforts/projects in the field of SMEs.
6. Data Analysis and Discussion

6.1. Occupational safety perceptions of employees and owner/managers on the management of chemicals in Micro SMEs in Cyprus, Greece and Romania

Part I – The Views of Employees

Initially, the survey starts with some demographics of the employees and their comparison between the 3 countries. The results showed that in the first three age groups, namely 18-25, 26-45, 46-60 the distribution for all countries was roughly the same, however in the last group, that is 60+, Greece and Romania had similar percentages, while for Cyprus this percentage was smaller.

![Graph 1: Age Group of Employees (per country)](image)

Next variable that was examined was Gender in which Cyprus and Romania seem to have more Males than Females compared to the numbers of Greece that are almost balanced and around 50% to 60%.
Graph 2: Gender of Employees (per country)

Regarding the Years working in the company it has been observed that Romania has the highest percentage in Employees working 2-4 years in the company and has the lowest percentage in the people working more than 10 years in the same company. This is characteristic of the different structure of the Romanian economy and Business sectors in general and can be partly explained due to the restructuring of the economy after the severe financial crisis the country has been into for more than a decade now, right after the international financial crisis of 2008. According to the Chi-Square test for this item the results show a marginal statistical significance having a $p < 0.05$ \( \chi^2(6) = 12.145 \ p=0.059 \).

Graph 3: Years working in the same company (per country)
Regarding the level of Education of the Employees Cyprus had the higher percentage amongst the three countries in High-School leavers and Romania had the highest numbers in University degree holders and Post-graduates, closely followed by Greece in both of these groups. These results have a high statistical significance with a $p < 0.001$ [$x^2(6)=40.902 \quad p=0.000$]. One good explanation for the high scoring of Romania in these two fields is the fact that the actual differences in the salaries of employees do not differ substantially between a School leaver and a University Graduate, hence since we have a rising number of new companies in the country, the employers and/or business owners prefer to employ tertiary educated personnel for a smaller difference in the monthly wages.

![Graph 4: Educational level of Employees (per country)](image)

Since the survey is focused on the Micro companies that are using and storing chemicals, being also a cross-sectional survey including all type of Micro-SME that include any kind of chemical substances in their daily business practice. As a result, the results of the item Position in the company were expected to show a variety within the country and amongst the countries of focus. What is vital to be noted at this point is the fact that Cyprus has the least Chemist in their Micros while at the same time it has the most Administration staff. This can be explained due to the character of the business environment of Cyprus that is characterized more as a country that produces Services rather than a country with intense industrial activity, that is the case of Greece.
and Romania in the comparison of the group of these three countries. Here the results are also statistically significant since the Chi-Square gave a $p < 0.001$ \[ x^2(6)=45.695 \; p=0.000 \].

**Graph 5: Position of the Employee in the company (per country)**

The next two items reveal the more production-oriented business sector of Romania compared to Greece and Cyprus, since the country is producing Chemicals in more than 60% of our sample, when Greece and Cyprus are between 20-30% only. The results have a high statistical significance with a $p < 0.001$ \[ x^2(6)=45.261 \; p=0.000 \].

**Graph 6: Production of Chemical in Micros (per country)**
Moreover, Romania is balancing with Greece, with 92.5% and 96.5% respectively, in the Use of chemicals during the production/doing business of the Micro SMEs showing statistically significant results with a p < 0.001 \[x^2(6)=42.551 \ p=0.000\].

![Graph 7: Use of Chemicals in the daily activities of the company](image)

As far as Training on the correct use of chemicals at work is concerned, Romania had the lowest percentage in people, who did not receive any training, followed by Greece and lastly Cyprus. This coincides with a previous item of this research, which showed the “Services” character of the Cypriot Micro companies compared to the rest of the countries. If someone will look at the other groups of training provided, he is going to notice that in the first two groups, namely 5-10hrs and 10-20hrs, the situation is balanced between all three countries, when in the last group with the longest training on chemicals the highest percentage is scored by Greece (41.2%) and it more than double from the last-placed Romania (19.8%), leaving Cyprus finding herself in the middle. Chi-Square Test revealed the statistical significance of these findings since it introduced a p < 0.05 \[x^2(6)=21.538 \ p=0.001\].
Graph 8: Hours of training on chemicals (per country)

With regards to the Trainer, Greece was clearly the one out of the three countries that prefers External collaborators to deliver the training compared to Cyprus and Romania that are both have similar responses in favor of their Existing staff to deliver the training. However, it is crucial to report here that the Chi-Square underlined that our results are not statistically significant for this item, since the $p > 0.05$ and $p > 0.10$ [$x^2(2)=1.735$ $p=0.420$]. A plausible explanation could be that the employees were not completely honest with their responses in this one.

Graph 9: Person in charge for the delivery of the training (per country)

The knowledge of the Employees regarding the existence of Safety Data Sheets in their companies has proven to be marginally statistically significant at a 5% Confidence Interval (CI), and
statistically significant at a 10% CI, with a \([x^2(6)=12.367 \ p=0.054]\). In any case more than 50% of the Micro companies in all three countries are using Safety Data Sheets, while a large percentage of 30% of the Employees did not know of them. One would argue that this could be due to the position of the employee, who gave the responses to this questionnaire, nevertheless when a company has any kind of chemical substance present as part of its daily activities, employees should know of the existence of the Safety Data Sheets.

Graph 10: Safety Data Sheets in Micros (per country)

In the item regarding any request for Medical Care during the past year for work-related problems, the results showed that in all three cases there were few requests only. This could be partially explained for the case of Cyprus based on the type of Micro enterprises in the country, however, it seems worrying that Romania and Greece had also so many health care requests as Cyprus, considering the more production-oriented type of Micros they are having. A possible reason for these numbers is under-reporting of incidents by the employees in the fear of being obliged to go into unpaid sick leave or even to lose their jobs. Chi-Square Test came to verify these results as not being statistically significant having a \(p > 0.10\) \([x^2(6)=3.197 \ p=0.202]\).
Concerning the provisions of the Micro firms towards the necessary protection of the personnel against chemicals, both items that focused on general protection and on specialized Personal Protective Equipment (PPE) had very similar responses from the countries. Romania was the best amongst the three participants scoring 100% in both questions (see Table 2), followed by Greece that scored a mean of 98% in both leaving Cyprus last with a mean of 94%. However, Chi-Square Test showed that Q35 was statistically significant having a $p < 0.05$ [$\chi^2(2)=10.564 \ p=0.005$], while Q36 was not statistically significant since it had a $p > 0.10$ [$\chi^2(2)=2.176 \ p=0.337$].
For the rest of the items in the survey tool, one-way analysis of variance (ANOVA) has been performed, in order to investigate and determine the existence of any statistically significant differences between the means of our 3 independent groups.

The Null Hypothesis here ($H_0$) says that the evidence from the three countries are equal:

$$H_0 = \mu_{CY} = \mu_{GR} = \mu_{RO} = \mu_{CY,GR,RO}$$
Table 3: ANOVA and Tukey HSD (Post Hoc Test)

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** Mean value statistically significant ( post-hoc test : Tukey HSD )
After performing a test for the homogeneity of the variances, there was no significant differentiation in most of the items, however, Tukey Honest Significant Difference (Tukey HSD) Post Hoc Test revealed the need of more than one grouping of the results of the three countries in more than one variable. In the Questions Q10, Q15, Q22, Q34 there is no evidence that Mean values are different, so there was one group for all three countries (see Table 3). Nevertheless, Romania in questions Q11 and Q21 has lower mean values compared to the other two counties. In both questions there is a notion that the employee cannot have a well-established contact like it happens with the other two counties. Hence, the scoring is lower both in the question about the knowledge of the employees on whether or not the employer is interested in their protection and also in the other item that shows the employees might be somehow reluctant to flag any issues to their employer. Greece on the other hand has higher means in two other questions, which are Q19 and Q20. These deviations from the means of the other countries in the above questions emphasize that Greece is performing better in the correct labelling with appropriate/enough detailed descriptions of the chemicals they are using. Finally, Cyprus is deviating from the means in Q13, Q16, Q17, Q18, Q23. By being higher in Q13 it gives a great feedback since it is critical that the company is consulting its employees in serious issues on chemicals. On the contrary, the rest of the four questions that some issues regarding chemical safety are existing in Cypriot Micro SMEs compared to the ones in Greece and Romania. Namely, personnel is feeling relatively more exposed to chemicals and would like better controlling from the companies in terms of the use of these substances; furthermore, the mean is higher in the question of the perception of the employees on whether or not the company abides by the legislation so as to reach its targets, showing that Cypriot Micro firms might be willing to slightly deviate from the rules in place regarding chemical safety.
Part II – The Views of Owner-Managers

Since the study was spread in a variety of sectors of Micro firms in order to cover as many companies as possible, the option in the survey tool was a five (5) item question, as described in the graph below. It is interesting to note that Romania was the country with the highest percentage of Chemical Industry Micro SMEs, Greece ranked first in the Processing sector having 2.5 times more Micro companies in this field compared to the last placed Romania and Cyprus had the most Micros in the Services sector. Important to comment on is the fact that Greece and Romania had almost equal numbers in the Primary sector, while Cyprus was lagging behind by a ten-fold difference in the percentage.

![Business Sectors Graph](image)

*Graph 12: Business Sectors of Micro firms per country*

The item asking the Owner-Manager whether the company has a Safety Technician in their premises Romania came first with positive replies that reached 80%, Greece followed with 43% and Cyprus came last having a mere 37%; results were statistically significant with a p < 0.001 \( \chi^2(2)=58.583 \ p=0.000 \). This evidence can be easily explained based on the more industrialized character of the Romania Micro enterprises.
The next item was investigating who is undertaking the duties of the Safety Technician whenever the company did not have one in place. In Cyprus these duties were undertaken by the Employer in a percentage of almost 80% while Romania and Greece had similar performance in that at around 60%. The main difference between Romania and Greece was the fact that Romania chooses an External collaborator, when the Employer cannot take over these duties, while Greece prefers an External Services Provider for Protection and Prevention of Risks (ΕΞΥΠΠ). According to Chi-Square Test the findings were statistically significant with a p < 0.001 [$\chi^2(4)=44.409$ p=0.000].
Romania had practically everywhere a risk assessment in place when Greece in \( \frac{3}{4} \) of the companies and Cyprus only in \( \frac{1}{2} \) of its Micros. The statistical significance of these results is high due to the \( p < 0.001 \) \( [x^2(2)=78.499 \; p=0.000] \).

![Graph 15: Risk assessment per company](image)

Furthermore, it is noted that all three countries are scoring really well in the provision of dedicated training for their employees with minor differences in their percentages; this result is statistically significant in the 10% confidence level since the Chi-Square gave out a \( p < 0.10 \) \( [x^2(2)=5.486 \; p=0.064] \).

![Graph 16: Provision of training on the use of chemicals in Micros (per country)](image)
In order to investigate how many hours, the training lasts, the survey tool included a specific item that had three possible answers for the duration of the training. Based on the responses of the Owner-Managers we can see that Greece tends to prefer a longer lasting training of more than 10 hours, Cyprus has a preference in the longer training but they provide also shorter training schemes that last between 5-10 hours, while Romania is almost balanced between 5-10 hours and more than 10 hours. The results were statistically significant with a p < 0.001 [$\chi^2(4)=30.303$, p=0.000].

![Graph 17: Duration of the training on the use of chemicals](image)

In terms of the Safety Data Sheets in the company the majority of the managers in Romania replied positively, closely followed by Greece showing a difference of 5% between them and last place belongs to Cyprus that scored 86%. Chi-Squared Tests confirmed the statistical significance of these percentages with a p < 0.001 [$\chi^2(2)=15.624$, p=0.000].
Even though the Owner-Managers gave statistically significant responses in terms of the existence of Safety Data Sheets in their business environments, the results for the item of the access of employees in these Data Sheets were very positive in all three countries, yet the Chi-Square Test has proved them to be not statistically significant since the p-value was $p > 0.10$ [$x^2(2)=4.117$ $p=0.128$]. The easiest and most logical explanation for this result is that the Owner-Managers were biased in their responses and they tried to be more positive than the actual truth.

The next three graphs highlight the preference of each country in the way they provide their employees with information about the correct use of chemicals. Based on the data Romania
preferred to primarily give out Verbal instructions, followed by Written instructions and in a lesser amount, instructions on Signs. Cyprus follows Romania showing the same pattern, while Greece favored mainly Written instructions and instructions on Signs leaving the option of Verbal instructions last. All the results below were statistically significant according to the p-values of the Chi-Squared Tests, namely Verbal: \( p < 0.001 \ [x^2(4)=48.975 \ p=0.000]\); Written: \( p < 0.001 \ [x^2(4)=54.687 \ p=0.000]\); and, Signs: \( p < 0.001 \ [x^2(2)=142.606 \ p=0.000]\).
Nearly unanimously all three countries are providing their employees with relevant protection from chemicals. Even though Cyprus had a slightly lower percentage (93.8%) compared to Romania and Greece that both reached 100%, the results were statistically significant with a p < 0.001 [χ²(2)=17.655 p=0.000].

When a written Occupational Risk Assessment is in place, there should be a dedicated part, chapter or paragraph that focused on the potential chemical hazards. Owner-Managers of Romania ranked first in these items scoring 98.4%, followed by Greece with 79.9% and Cyprus with 64.7%. These findings showed a high statistical significance with a p < 0.000 [χ²(2)=47.731 p=0.000].
A very critical matter in the daily business environment is the ability of the employees to read and understand the necessary information on the substances they are using. As a result, Owner-Managers were asked whether or not they provide the description/information of the material they are using in their daily practice in a language that the personnel will be able to understand in each country, other than in English (i.e. in Greek, Romanian). Greece and Romania scored 100% in this field while Cyprus only 91.6%. Results were statistically significant having a p < 0.001 \[ \chi^2(2)=18.585 \ p=0.000 \]. An explanation for that is the multicultural business environment in Cyprus, where companies can employ people from Third Countries, such as India, Pakistan, China etc., which makes it quite difficult to be translating everything in several languages. Hence, the availability in all three countries when it comes to the description of the substances, they are using is the local language (Greek or Romanian accordingly) and the English language as a universal prerequisite.
Since proper ways to package and label are vital for the safe management of chemical the survey tool was asking the Owner-Managers their idea about their knowledge on this field. As expected, the responses were virtually all positive, nevertheless they were not statistically significant at the 10% CI, since the Chi-Square Test gave a $p > 0.10$ [$x^2(6)=8.611 \ p=0.197$].

Another significant item that can show the way a company is perceiving the validity and importance of available information on the chemical substances it is using is the source of this information. Romanian companies preferred to gather information directly from the Suppliers and they also find it good to use the internet; their last resort is to reach External Consultants. Greece
on the other hand put Suppliers high in their list, followed by Labor Inspectors, External Consultants and Safety Data Sheets; Internet for Greek Micro SMEs seems to be indeed their last resort in their quest for gathering information. Lastly, Cyprus chose Suppliers, followed by Safety Data Sheets and Labor Inspectors in equal amounts, then Cypriot Micro firms consult the Internet and at the end they ask any External Consultants. The findings were statistically significant since the Chi-Square Test revealed following evidence in terms of the relevant p values, namely for Internet: \( p < 0.001 \) \([x^2(2)=53.140 \ p=0.000]\); Safety Data Sheets: \( p < 0.001 \) \([x^2(2)=24.952 \ p=0.000]\); External Consultants: \( p < 0.001 \) \([x^2(2)=22.245 \ p=0.000]\); Labor Inspectors: \( p < 0.05 \) \([x^2(2)=57.995 \ p=0.000]\); Suppliers: \( p < 0.001 \) \([x^2(2)=16.661 \ p=0.000]\).

Key idea of this research was the belief that Owner-Managers’ responses would be similar in some critical matters among the three countries of interest, we performed One-way ANOVA once more for this part of the survey.

The Null Hypothesis here \( (H_0) \) says that the evidence from the three countries are equal:

\[
H_0= \mu_{CY} = \mu_{GR} = \mu_{RO} = \mu_{CY, GR, RO}
\]
For the items Q10, Q11 and Q22 the means for the groups of the three countries were homogenous (see Table 4). However, in the item Q21 Romania deviated from the means of Cyprus and Greece showing a lower mean average. This leads to the conclusion that personnel of Micro firms in Romania are less willing to use their Personal Protective Equipment (PPE) compared to their colleagues in the other two countries. One possible explanation could be that they are better trained, and they make proper use of the PPE when it is need, compared to a potential overuse in the case of the other two countries.

Table 4: ANOVA and Tukey HSD (Post Hoc Test)

<table>
<thead>
<tr>
<th>Country</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>95% Confidence Interval for Mean</th>
<th>F value</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Upper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q10 – I ask my employees' opinion on issues related to correct management of chemicals?</td>
<td>Greece</td>
<td>141</td>
<td>3.95</td>
<td>0.96</td>
<td>3.79</td>
<td>4.11</td>
</tr>
<tr>
<td></td>
<td>Cyprus</td>
<td>161</td>
<td>3.76</td>
<td>1.19</td>
<td>3.57</td>
<td>3.94</td>
</tr>
<tr>
<td></td>
<td>Romania</td>
<td>123</td>
<td>3.85</td>
<td>1.00</td>
<td>3.68</td>
<td>4.03</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>425</td>
<td>3.85</td>
<td>1.06</td>
<td>3.75</td>
<td>3.95</td>
</tr>
<tr>
<td>Q11 – Do I give time to my employees to study the information of the chemicals used in the company?</td>
<td>Greece</td>
<td>142</td>
<td>4.37</td>
<td>0.75</td>
<td>4.25</td>
<td>4.50</td>
</tr>
<tr>
<td></td>
<td>Cyprus</td>
<td>161</td>
<td>4.17</td>
<td>0.98</td>
<td>4.02</td>
<td>4.32</td>
</tr>
<tr>
<td></td>
<td>Romania</td>
<td>123</td>
<td>4.32</td>
<td>0.50</td>
<td>4.23</td>
<td>4.41</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>426</td>
<td>4.28</td>
<td>0.79</td>
<td>4.20</td>
<td>4.35</td>
</tr>
<tr>
<td>Q21 – Are employees willing to use the PPE</td>
<td>Greece</td>
<td>146</td>
<td>4.19</td>
<td>0.64</td>
<td>4.09</td>
<td>4.30</td>
</tr>
<tr>
<td></td>
<td>Cyprus</td>
<td>165</td>
<td>4.04</td>
<td>0.85</td>
<td>3.91</td>
<td>4.17</td>
</tr>
<tr>
<td></td>
<td>Romania</td>
<td>123</td>
<td>3.81 **</td>
<td>0.53</td>
<td>3.72</td>
<td>3.91</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>434</td>
<td>4.03</td>
<td>0.71</td>
<td>3.96</td>
<td>4.09</td>
</tr>
<tr>
<td>Q22 – Are employees willing to follow the instructions given for the correct use of chemicals</td>
<td>Greece</td>
<td>144</td>
<td>4.26</td>
<td>0.60</td>
<td>4.16</td>
<td>4.36</td>
</tr>
<tr>
<td></td>
<td>Cyprus</td>
<td>164</td>
<td>4.22</td>
<td>0.83</td>
<td>4.09</td>
<td>4.35</td>
</tr>
<tr>
<td></td>
<td>Romania</td>
<td>123</td>
<td>4.12</td>
<td>0.49</td>
<td>4.03</td>
<td>4.21</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>431</td>
<td>4.21</td>
<td>0.67</td>
<td>4.14</td>
<td>4.27</td>
</tr>
</tbody>
</table>

** Mean value statistically significant ( post-hoc test : Tukey HSD )

6.2 Measuring Safety Performance (SP) and Legislation Compliance (LC) in Greece and Cyprus

Part I – Hypotheses investigation

In order to measure the Safety Performance of Micro enterprises that are using chemicals two new variables have been calculated adopting the work of Boustras et. al (2015) and Hadjimanolis et al.
(2015) in similar research efforts within the Micro SMEs sector. In an effort to succeed in a more detailed capturing of the performance of the Micro companies in the wider Safety framework there were constructed two new summative variables to measure Safety Performance (SP) and Legislation Compliance (LC) accordingly, instead of just one summative variable for Safety Performance as used in the previous research works. These two new variables were based on the Labor Inspectors Questionnaire, namely (1) Legislation Compliance (summative Q1+Q2) and (2) Safety Performance (summative Q3+Q4+Q5+Q6+Q7+Q8), in order for the researcher to control for the subsequent hypotheses.

For both SP and LC and other variables, Spearman’s correlation coefficient ($r_s$) has been calculated to examine if any statistically significant correlation is present for most of the comparisons.

**Safety Performance (SP)**

As the main starting point, target was to check for the Safety Performance of the firms and these relevant **null hypotheses** ($H_0$) were as follows:

**Safety Performance is not correlated** with:

H1: the willingness of the employees to use the PPE (*measured by Q21 of the management questionnaire*)

H2: the participation of employees in the decision-making process (*measured the responses for Q10+Q13 questions in employees’ questionnaire*)

H3: the use of personal protective equipment (PPE) against chemicals (*measured by the responses for Q11+Q35 questions in employees’ questionnaire*)
H4: the level of organizational commitment of employees (measured by the responses for Q18+Q22+Q23 questions in employees’ questionnaire)

H5: the level of perceived (by employees) employer interest in safety (measured by the responses for Q11+Q12+Q17 questions in employees’ questionnaire)

H6: the perceived (by employees) safety conditions (measured by the responses for Q17+Q20+Q23 questions in employees’ questionnaire)

H7: the participation of employees in safety information (measured by the responses for Q10+Q22 questions in employees’ questionnaire)

Findings for SP

Safety Performance was found to have a statistically significant positive correlation with the willingness of employees to use their Personal Protective Equipment (PPE) both for Greece \( r_s(144)=0.493 \ p<0.001 \) and for Cyprus \( r_s(157)=0.459 \ p<0.001 \) an evidence of rejecting the null hypothesis for H1.

Since the provision of any relevant personal protective equipment is a legal requirement for all companies using and/or producing chemicals, it is expected that the owner/manager will be having positive perceptions regarding the use of the PPE by the personnel. Hence, the perception of owner/managers of Micro SMEs was found to have a positive effect on safety performance; these results align with the work of Boustras et al. (2015), who had the same findings in their research study. Furthermore, it is important to know that safety training, which is a prerequisite for the use of PPE, along with the provision of PPE can be considered as indicators for workers’ safety (Shannon, 1996).
Safety Performance was found to have a statistically significant positive correlation with the participation of employees in the decision-making process for both countries; Greece \( r_s(118)=0.482 \ p<0.001 \) and Cyprus \( r_s(146)=0.262 \ p<0.001 \), however this positive association was stronger in Greece than in Cyprus. Based on the findings the null hypothesis for \( H2 \) is rejected.

As Huang et al. (2012) argued, employees’ perception of safety training can be considered as part of the evaluation of a safety management system of a company. Furthermore, since the majority of the enterprises are offering training programs by default, as already confirmed with the data gathered from the three EU member states, the participation of employees in the decision making process of the company is also crucial for the evaluation of the safety management system in place; reason for that is that the direct feedback from the employees is adding value to the managerial decisions, since there are vital points that only personnel can understand or spot and flag them accordingly. Consequently, as Hadjimanolakis and Boustras (2015) underlined, it is important for management actions to take into consideration the insights of employees in safety as a whole as well as their perceptions on the commitment of the management to safety.

Safety Performance was found to have a statistically significant positive correlation with the use of protective equipment against chemicals. At 5% significance level, Greece had \( r_s(104)=0.246 \ p=0.012 \) and Cyprus had \( r_s(146)=0.205 \ p=0.013 \). Consequently, we reject the null hypothesis \( H3 \).

In parallel to the results of the perception of the owner/managers regarding the use of PPE, the feedback of the employees that was focused not only on PPE but in the general protective equipment available by the Micro firm, was also positive. This result comes to confirm that the
responses of the owner/managers were not biased and were equally objective as the ones of the employees.

**Safety Performance** was found to have a statistically significant positive correlation with the **level of the organizational commitment** of employees for Greece \[ r_s(125)=0.294 \ p=0.001 \], while it was proven to be statistically insignificant for Cyprus \[ r_s(147)=-0.007 \ p=0.934 \]. As a result, the **null hypothesis H4 can be rejected for the case of Greece** (there exists a correlation) and is **accepted for the case of Cyprus** that there is no correlation between Safety Performance and the level of organizational commitment of employees.

Following the literature, the organizational commitment of employees has an effect on the company’s safety performance (Lee et al., 2007). According to Widersal-Bazyl and Warszewska-Makuch (2008), the direct participation of the personnel in the organizational decisions of the company has a positive impact on the safety of the working environment; as a result, this brings further positive spill-overs in the job satisfaction, in better organizational commitment from the side of employees and in total safety performance in general.

**Safety Performance** was found to have a marginally positive correlation with the **perceived by the employees interest in safety of the employer**, however the results were not statistically significant for both countries, namely Cyprus \[ r_s(151)=0.133 \ p=0.104 \] and Greece \[ r_s(138)=0.062 \ p=0.471 \]. As a result, we **accept the null hypothesis H5**.

Even though the available knowledge on safety issues in Micro SMEs is limited (Hasle et al., 2011), Christian at el. (2009) found that safety motivation, safety knowledge and information are important for the improvement of safety performance.
**Safety Performance** was found to have no correlation with the **perceived by the employees safety conditions** for both countries, namely Greece \([r_s(139)=-0.004 \ p=0.966]\) and Cyprus \([r_s(151)=0.044 \ p=0.593]\) and no statistical significance. Consequently, we **accept the null hypothesis** *H*6.

As Dejoy et al. (2004) emphasized, the level of safety of the business environment or the level of safety conditions as perceived by the employees are so critical that are encompassed in the backgrounds of safety performance. The perceived hazards of the business environment in addition to the perceived level of possible risks, tend to depend on the business sector of the company and on the job-specific demands (Nahrgang et al., 2011).

**Safety Performance** was found to have a strong positive correlation with the **participation of employees in safety information procedures** in both countries; Greece \([r_s(115)=0.503 \ p=0.000]\) and Cyprus \([r_s(147)=0.299 \ p=0.000]\). From the results it is clear that the correlation in Greece is much stronger than in Cyprus. Based on the findings we **reject the null hypothesis** *H*7.

Cooper and Phillips (2004) emphasized that the pace of work and/or the work-pressure/workload play an important role in safety. As a result the detailed and focused knowledge and information of the specific safety procedures covering any possible events during the handling of chemicals are critical. That is why the participation of employees in the ways that safety information is delivered is of high importance and was found to have a strong correlation with safety performance.

**Legislation Compliance (LC)**

Next step was to check for the Legislation Compliance of the Company and the dedicated Null hypotheses (H0) were as follows:
The Legislation Compliance of the Company is not correlated to:

H9: the appropriate labelling of the Chemicals (measured by the responses for Q19+Q20 questions in employees’ questionnaire). Spearman’s correlation coefficient has been calculated.

H10: the safety environment (measured by the responses for Q16+Q23 questions in employees’ questionnaire). Spearman’s correlation coefficient has been calculated.

The Legislation Compliance of the Company is not affected by:

H11: the appropriate labelling/information of the Chemicals (measured by Q12 question with dichotomous responses YES-NO for 3 options Oral – Written – Signs in Managers’ questionnaire). Student’s t-test was implemented to identify any statistically significant differences between the two mean scores of Legislation Compliance per option and per country.

Findings for LC

Legislation Compliance has a statistically significant positive correlation with the appropriate labelling of the chemicals. However, the correlation in Cyprus \(r_s(152)=0.291 \ p=0.000\) is much stronger compared to Greece \(r_s(141)=0.209 \ p=0.013\). Based on this evidence we reject the null hypothesis H9.

It is an obligation and a requirement by the existing regulations, REACH and CLP, for the companies to make sure that all chemical products in use in their everyday activities to have the suitable labels, signs and information so that the users of these products are handling them safely. It is quite a challenge that the workforce is up to date through specific training programs, in the form of academic programs, free webinars offered by the EU and other international organizations.
or via on-the-job training with external training. Literature suggests that almost 1.000 new chemical products (i.e. totally new, amended versions of previously products of the markets, etc.), usually found as mixtures in simple commercial products (Shukle et al., 2010; Apatsidou et al., 2020) when more than 100.000 chemical substances are used globally. As a result, the awareness of the correct use and handling of these substances/products through their appropriate labeling is a prerequisite not only for the legislation compliance of any company, but also for its safety performance in general.

**Legislation Compliance** has a statistically significant positive correlation with the **safety environment** in both countries, nevertheless the correlation in Greece \[r_s(141)=0,426 \ p=0,000\] is much stronger than in Cyprus \[r_s(151)=0,194 \ p=0,017\]. Consequently, we **reject the null hypothesis H10**.

**Legislation Compliance** was found **not to be affected** by **Oral** guidance on the information of chemicals by the Owner/Manager since the results for both countries had minor differences between Yes/No and also they were not statistically significant for Greece; Cyprus \[t(151)=-3,048 \ p=0,003\] and Greece \[t(153)=0,779 \ p=0,437\].

In addition, the information given to the employees either in **Writing** or in the form of **Signs** were statistically significant for Cyprus \[t(151)=3,695 \ p < 0,001\] (Written) and \[t(151)=2,248 \ p=0,026\] (Signs), and the results showed that the **Legislation Compliance** is indeed **affected by these options** on the information on chemicals given by the owner/manager (see Table 4).

On the contrary, in the case of **Greece** both of these options were not statistically significant; Written \[t(155)=-0,203 \ p=0,840\] and Oral \[t(155)=-1,370 \ p=0,173\] and due to the minor differences in the means of Yes/No answers, they **do not affect Legislation Compliance** (see
Table 5). One possible explanation for this feedback in Greece could be the fact that responders did not want to expose or be completely honest with the ways the information on chemicals is being distributed in their working environments. Hence, over-reporting might have played a critical role for these numbers.

<table>
<thead>
<tr>
<th>Guidelines</th>
<th>Country</th>
<th>Response</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>df</th>
<th>t-score</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>Greece</td>
<td>Yes</td>
<td>82</td>
<td>16.17</td>
<td>2.46</td>
<td>153</td>
<td>0.779</td>
<td>0.437</td>
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<td>15.84</td>
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<td>-3.048</td>
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<td>0.840</td>
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<td>16.23</td>
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<td>Through Signs</td>
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<td>16.49</td>
<td>2.94</td>
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</tbody>
</table>

Part II – Hierarchical Regression Analysis

Hierarchical regression is a way to show if variables of interest (predictors) explain a statistically significant amount of variance in the dependent variable (SPLC), after accounting for all other variables. This is a framework for model comparison rather than a statistical method. In this framework, a two-step regression model has been implemented. The interest was to determine whether newly added variables at the second step show a significant improvement in R² (the proportion of explained variance in dependent variable by the model).
In order to identify which and how much the parameters under study (independent variables) from employees' perspective and control variables (company’s data) affect the factors of Safety Performance (SP) and Legislation Compliance (LC) combined (SPLC indicator – dependent variable), a Hierarchical Multiple Regression Analysis (HRA) has been applied.

It should be mentioned that LC has been measured with two questions (Q1 and Q2) on a ten-point scale (1=not compliant, 10=fully compliant), while SP with six (Q3 to Q8) dichotomous questions (coded as Yes = 1 – No = 0) by the labor inspectors. Since the two factors have been measured on a different grading scheme, the necessity of adjusting them in a unified scale (from 0 to 100) to calculate the dependent SPLC has been evaluated as an appropriate one. For achieving that, to both LC and SP factors a linear transformation has been applied as follows:

a. **For LC, steps:**

1. Calculation of the mean value of the raw score (L RS\textsubscript{i}) per labor inspector review for each participant

\[
L\ RS\textsubscript{i} = \frac{(Q1\textsubscript{i} + Q2\textsubscript{i})}{2} \quad i = 1 \text{ to } 345 \text{ (Greece & Cyprus)}
\]

2. LC score per review :

\[
LC\text{score-i} = \left\{ \frac{(RS\textsubscript{i}-1)}{\text{range of the scale}} \right\} \times 100,
\]

where range is 9 (10–1 = 9) and \(i = 1 \text{ to } 345\)

b. **For SP, steps:**

1. Calculation of the mean value of the raw score (S RS\textsubscript{i}) per labor inspector review for each participant
\[ S \text{ RS}_i = (Q3_i + \ldots + Q8_i) / 6 \quad i = 1 \text{ to } 345 \quad \text{(Greece & Cyprus)} \]

2. SP score per review:

\[ \text{SP score}_i = S \text{ RS}_i \times 100, \quad i = 1 \text{ to } 345 \quad \text{(range : } 1 \text{ – } 0= 1) \]

c. **Finally, the dependent variable of the overall score for SPLC per participating company has been calculated as follows:**

\[ \text{SPLC} = \text{LC score}_i + \text{SP score}_i \quad i = 1 \text{ to } 345 \]

d. **The model:**

\[ \text{SPLC} = b_0 + b_1 \times \text{sector} + b_2 \times \text{willingness of employees to use PPE} + b_3 \times \text{years of the company doing business} + b_4 \times \text{actual use of PPE} + b_5 \times \text{participation in the decision-making process} + b_6 \times \text{participation in Safety information}. \]

Regarding the independent variables – predictors on employees' perspective and taking into account the previous analysis presented, variables referring to participation in the decision-making process (summative Q10+13), use of PPE (summative Q11+35), and participation in Safety information (summative Q10+22) have been entered into the model.

For control variables, three have been taken into account namely, sector (weighted as 1=services-other, 2=processing, 3=primary sector, and 4=chemical industry), years of the company doing business, and the “willingness of employees to use the PPE” from the managers’ questionnaire.
The model has been applied separately for Greece (N=94) and Cyprus (N=138). The N numbers are less than 345, due to the fact the for some cases in the predictors we have missing values in relevant questions.

Greece

On block 1 (control variables) of the hierarchical multiple regression (see Table 6), sector, willingness to use the PPE, years of company doing business accounted a significant 70.3% of the variance of the dependent SPLC ($R^2 = 0.703$, $F(3,90)=71.148$ $p < 0.001$). When in second step employees’ perspective are entered into the model (Block 2) it accounted for an additional and significant 3.5% to the variance of the dependent ($R^2$ Change = 0.035, $F$ Change (3,87)=3.937 $p = 0.011$). All predictors can explain a significant proportion (73.8%) of the variability observed in SPLC

<table>
<thead>
<tr>
<th>Block</th>
<th>R</th>
<th>$R^2$</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td></td>
<td>$R^2$ Change</td>
<td>$F$ Change</td>
</tr>
<tr>
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<td>8.571</td>
<td>0.703</td>
<td>71.148</td>
</tr>
<tr>
<td>Block 2</td>
<td>0.860$^b$</td>
<td>0.739</td>
<td>8.180</td>
<td>0.035</td>
<td>3.937</td>
</tr>
</tbody>
</table>

Block 1: a. Predictors: (Constant), Q2 – Sector, Q21 – Are employees willing to use the PPE, Q1 – Years of Company doing business

Block 2: b. Predictors: (Constant), Q2 – Sector, Q21 – Are employees willing to use the PPE, Q1 – Years of Company doing business, use of PPE (Q11+35), participation in the decision-making process (Q10+13), and participation in Safety information (Q10+22).

c. Dependent Variable: SPLC

In order to detect the presence of autocorrelation in the residuals (prediction errors) from the regression analysis, the Durbin–Watson statistic has been employed. The computed value of 2.37
is close enough to the accepted range of 1.8 – 2.2 so it can be concluded that there no evidence of a serious autocorrelation which can affect regression coefficients. Also, normal P-P plot for the standardized residuals and scatterplot and standardized predictive value versus standardized residuals have been plotted (see Graph 28). From P-P graph all points are close to the diagonal line, indicating that the distribution of the values of the dependent variable is quite normally distributed. Furthermore, it can be observed at the scatterplot that there is no trend (points are randomly distributed), which mean that there was a good fit of the model to the data.

From the table below (see Table 7) it can be observed that Collinearity statistics are within the acceptable bounds (tolerance > 0.1 and VIF < 10 – variance inflation factor), which means that there is no collinearity present in the model. Concerning the predictors, all the control variables are statistically significant (Block 2, p < 0.001) with a positive B and Beta values. From the three of them the most influential is “years of the company doing business” (B=14.298, 95% CI = 9.077
– 19.518), with the second being the “willingness to use the PPE” (B=12.589, 95% CI = 9.645 – 15.533). All control variables present a positive correlation with the dependent. From the variables measuring the employees’ perception only for the “participation in the decision-making process” b-value is statistically significant (b=2.219, 95% CI = 0.276 – 4.163, p = 0.026) with also a positive correlation. Use of PPE and participation in Safety information cannot be regarded as significant variables.

<table>
<thead>
<tr>
<th>Block 1</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>95.0% Confidence Interval for B</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-68.226</td>
<td>14.767</td>
<td>-4.62</td>
<td>0.000</td>
<td>-97.564 – 38.888</td>
<td></td>
</tr>
<tr>
<td>Willingness to use the PPE</td>
<td>14.810</td>
<td>1.326</td>
<td>0.667</td>
<td>11.17</td>
<td>0.000</td>
<td>12.176 – 17.444</td>
</tr>
<tr>
<td>Years of Company</td>
<td>16.406</td>
<td>2.660</td>
<td>0.379</td>
<td>6.17</td>
<td>0.000</td>
<td>11.121 – 21.691</td>
</tr>
<tr>
<td>Sector</td>
<td>5.742</td>
<td>0.939</td>
<td>0.387</td>
<td>6.12</td>
<td>0.000</td>
<td>3.877 – 7.607</td>
</tr>
<tr>
<td>Block 2</td>
<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td>t</td>
<td>Sig.</td>
<td>95.0% Confidence Interval for B</td>
<td>Collinearity Statistics</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-62.773</td>
<td>14.651</td>
<td>-4.28</td>
<td>0.000</td>
<td>-91.894 – 33.653</td>
<td></td>
</tr>
<tr>
<td>Willingness to use the PPE</td>
<td>12.589</td>
<td>1.481</td>
<td>0.567</td>
<td>8.50</td>
<td>0.000</td>
<td>9.645 – 15.533</td>
</tr>
<tr>
<td>Years of Company</td>
<td>14.298</td>
<td>2.626</td>
<td>0.331</td>
<td>5.44</td>
<td>0.000</td>
<td>9.077 – 19.518</td>
</tr>
<tr>
<td>Sector</td>
<td>4.858</td>
<td>0.942</td>
<td>0.327</td>
<td>5.16</td>
<td>0.000</td>
<td>2.986 – 6.730</td>
</tr>
<tr>
<td>decision-making process</td>
<td>2.219</td>
<td>0.978</td>
<td>0.238</td>
<td>2.27</td>
<td>0.026</td>
<td>0.276 – 4.163</td>
</tr>
<tr>
<td>use of PPE</td>
<td>-0.163</td>
<td>0.866</td>
<td>-0.013</td>
<td>-0.19</td>
<td>0.852</td>
<td>-1.884 – 1.559</td>
</tr>
<tr>
<td>Safety information</td>
<td>-0.054</td>
<td>0.832</td>
<td>-0.007</td>
<td>-0.06</td>
<td>0.948</td>
<td>-1.709 – 1.600</td>
</tr>
</tbody>
</table>

Cyprus

On block 1 (control variables) of the hierarchical multiple regression (see Table 8), sector, willingness to use the PPE, years of company doing business accounted only a significant 44.0% of the variance of the dependent SPLC ($R^2 = 0.440$, F(3,134)=35.039 $p < 0.001$). When in second step employees’ perspective are entered into the model (Block 2) it accounted for an additional not
statistically significant portion of 0.9% to the variance of the dependent \((R^2 \text{ Change} = 0.009, F \text{ Change} (3,131) =0.736 \ p = 0.533)\). It can be said that the predictors for employees’ perspective have no statistically significant influence on the dependent (SPLC).

**Table 8: Hierarchical Regression Model Statistics – Cyprus**

<table>
<thead>
<tr>
<th>Block</th>
<th>R</th>
<th>R²</th>
<th>Std. Error of the Estimate</th>
<th>Change Statistics</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(R^2) Change</td>
<td>F Change</td>
</tr>
<tr>
<td>Block 1</td>
<td>0.663a</td>
<td>0.440</td>
<td>14,195</td>
<td>0,440</td>
<td>35,039</td>
</tr>
<tr>
<td>Block 2</td>
<td>0.670d</td>
<td>0.449</td>
<td>14,237</td>
<td>0.009</td>
<td>0.736</td>
</tr>
</tbody>
</table>

Block 1: a. Predictors: (Constant), Q2 – Sector, Q21 – Are employees willing to use the PPE, Q1 – Years of Company doing business
Block 2: b. Predictors: (Constant), Q2 – Sector, Q21 – Are employees willing to use the PPE, Q1 – Years of Company doing business, use of PPE (Q11+35), participation in the decision-making process (Q10+13), and participation in Safety information (Q10+22).

c. Dependent Variable: SPLC

Durbin–Watson statistic is low, indicating the presence of autocorrelation in the residuals (prediction errors) from the regression analysis, when the three employees’ perspective variables entered into the model. Normal P-P plot for the standardized residuals and scatterplot and standardized predictive value versus standardized residuals have been plotted (see Graph 29). From P-P graph all points are close to the diagonal line, indicating that the distribution of the values of the dependent variable can be regarded as normally distributed. Furthermore, it can be observed at the scatterplot that there is a negative linear trend, which mean that the fit of the model to the data is not quite successful.
Collinearity statistics (see Table 9) are within the acceptable bounds (tolerance > 0.1 and VIF < 10 – variance inflation factor), which means that there is no collinearity present in the model which can affect p values of the b coefficients. Concerning the predictors, and regarding the control variables (Block 2), only “willingness to use the PPE” (b=13.055, 95% CI = 9.429 – 16.681 p <0.001), and Sector (b=4.908, 95% CI = 1.716 – 8.099 p=0.003) are statistically significant with positive B and Beta values. From the two of them the most influential is the first one having a greater b coefficient. None of the other variables have a statistically significant B coefficient, which means that the accepted values of b’s are zero (null hypothesis) and they are not influence as predictors the SPLC score.

**Table 9: Hierarchical Regression Coefficients – Cyprus**

<table>
<thead>
<tr>
<th></th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
<th>95.0% Confidence Interval for B</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
<td></td>
<td>Tolerance</td>
</tr>
<tr>
<td>Block 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>21,930</td>
<td>9,380</td>
<td></td>
<td>2.338</td>
<td>0.021</td>
<td>3.377</td>
</tr>
<tr>
<td>Willingness to use the PPE</td>
<td>13,195</td>
<td>1,406</td>
<td>0.614</td>
<td>9.382</td>
<td>0.000</td>
<td>10,414</td>
</tr>
<tr>
<td>Years of Company</td>
<td>-0.432</td>
<td>1,808</td>
<td>-0.016</td>
<td>-0.239</td>
<td>0.812</td>
<td>-4,007</td>
</tr>
<tr>
<td>Block 2</td>
<td>Sector</td>
<td>5.077</td>
<td>1.582</td>
<td>0.212</td>
<td>3.210</td>
<td>0.002</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>(Constant)</td>
<td>18.557</td>
<td>10.066</td>
<td></td>
<td>1.844</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>Willingness to use the PPE</td>
<td>13.055</td>
<td>1.833</td>
<td>0.608</td>
<td>7.122</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Years of Company</td>
<td>-0.622</td>
<td>2.022</td>
<td>-0.023</td>
<td>-0.308</td>
<td>0.759</td>
</tr>
<tr>
<td></td>
<td>Sector</td>
<td>4.908</td>
<td>1.613</td>
<td>0.205</td>
<td>3.042</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>decision-making process</td>
<td>-1.737</td>
<td>1.276</td>
<td>-0.174</td>
<td>-1.361</td>
<td>0.176</td>
</tr>
<tr>
<td></td>
<td>use of PPE</td>
<td>1.278</td>
<td>1.336</td>
<td>0.101</td>
<td>0.957</td>
<td>0.340</td>
</tr>
<tr>
<td></td>
<td>Safety information</td>
<td>0.655</td>
<td>0.931</td>
<td>0.085</td>
<td>0.703</td>
<td>0.483</td>
</tr>
</tbody>
</table>
7. Originality and Contribution

The literature examining Micro enterprises is minimal to date. What is more, specifically dedicated research for the safe use and/or management of chemical substances in the Micro business environment does not exist. Many researchers claim that as Micro firms are a smaller version of Small- and Medium-sized Enterprises, what is valid for SMEs shall be also functional for Micro firms as well. Real life examples stated many times that is not the case. As Micro enterprises tend to be the vast majority of the business economic activities’ legal form, not only in Europe but also internationally, it is increasingly important to start researching more into their fields of daily functions regarding their safety performance.

The theoretical framework and the practical suggestions that arise from this research project will stimulate thinking by the owner/manager in terms of occupational safety and health and all safety related issues and actions they could opt in for their micro firms. As stated by the World Health Organization (2008) the cost of safety related outcomes is substantial, as it has been estimated that workplace facilities, injuries and illnesses result in financial losses of a percentage between 4-5% of Gross Domestic Product. By taking these numbers into consideration, the reduction of safety related risks for a Micro firm via the implementation of a solid OSH management scheme will have a major positive impact on the economic standing of the company acting proactively, by reducing accidents, minimizing personnel absences due to occupational risks, using the equipment more safely and more sustainable, and by having in place preventive measures and policies; all these should have already been practiced in advance, in order for all the members of the personnel to be able to react towards potential OSH risks and hazards fluently and flawlessly without facing any danger.
Boustras and Hadjimanolis (2015) highlight that the European Union has recognized the importance of SMEs and the vital role in the business environment within the Union. As a result, a number of EU programs have been introduced in order to support and improve the business conditions (Commission of the European Communities, 2002). Furthermore, it has been underlined by several researchers the fact that smaller companies tend to face higher risks (Lamm 2000; Walters, 2001), mainly because they either do not follow the rules stated by the EU and/or the local legislative frameworks due to negligence, or they tend to believe that their company size is too small for such big dangers. The detailed work of Sorensen et al. (2007) comes to argue for the need of Micros to be aware that they might indeed be in constant risks by providing sufficient evidence and emphasizing that smaller SMEs, that is usually Micro enterprises, have to deal with higher risks in their daily activities.

This study, considering that the available literature on Micro firms using chemicals safely does not actually exist, introduces a new approach with a first-time used research tool in order to investigate the safety awareness through a very detailed questionnaire for employees and owner/managers between Micro SMEs. Since the majority of the micro companies share same key characteristics, the validity of the outcomes of this research projects will be high, as the researcher is investigating three (3) European Member States, Cyprus – Greece – Romania, with a business sector structure that is no different to the rest EU Member States. A thoroughly detailed study of the comparison of the three (3) countries that were investigated during the first part of this research suggested clearly that there are always differences between countries using chemical products in similar business areas, no matter if these countries of interest are neighboring in the same geographical region or if they are speaking the same language. This fact comes to raise some further questions and considerations placing other country-specific factors in the framework of
future research, such as the organization of the country’s business sectors (i.e. services centered, manufacturing centered), the availability of skilled labour, the presence of public controlling and auditing mechanisms (i.e. Labour inspectors doing frequent and random checks to the companies) etc. The same survey approach of this project could be applied in most of the cases of a Micro enterprise using hazardous chemicals in their daily activities, so as to check for differences or similarities when compared with other countries in a future similar research scenario. Furthermore, the same questionnaires could be applied within a same country, in the event that a researcher would like to check for safety standards and awareness between different business sectors.

At this point it would be wise to highlight the second and most important and value adding part of this research project, which is the measuring of the Safety Performance in Micro firms using chemicals. This was a cross-sectional survey taking place in the main business sectors of a country’s business environment, that is the sector of services, primary production, processing and manufacturing. This approach gave apparently a wider field of research in the Micro SMEs environment, which was critical to establish some solid results. As it has been mentioned previously, there was no available model that has been used previously to measure the Safety Performance for the correct use and management of chemicals, especially in the Micro firms environment that is the center of interest in this project, the researcher had to amend a previous approach used recently by Boustras et al. (2015) and Hadjimanolis and Boustras (2015) in a comparable research efforts to measure Health and Safety and Ergonomical issues in Micro enterprises. Following this example, the survey tool has been designed and amended accordingly before delivered to the companies, starting initially with Micro enterprises from Cyprus Boustras et al. (2015). Even though the two main parts of the questionnaire were used in the first part of this research that included the comparison of the three (3) EU Member States, for the measurement of
the total Safety Performance of the companies, the third part of the questionnaire that was the part of the Labour Inspectors, was the critical one. By using the feedback of the Inspectors on every company that participated in the research, a new model has been developed:

\[
SPLC = b_0 + b_1 \times \text{sector} + b_2 \times \text{willingness of employees to use PPE} + b_3 \times \text{years of the company doing business} + b_4 \times \text{actual use of PPE} + b_5 \times \text{participation in the decision-making process} + b_6 \times \text{participation in Safety information}.
\]

After the application of this model in the cases of the two countries of interest, that is Cyprus and Greece, it became evident that there are indeed differences in the total Safety Performance of the Micros in both cases, even though Cyprus and Greece are two closely related countries with ties and bonds that range from their common language and history to their common policies in many sectors. Nevertheless, these two countries have obvious differences in the safety performance of their enterprises when it comes to the use of chemicals.

Therefore, at this point it should be noted that, even though the available chemicals in the European but also in the International market are the same, the fact that EU legislations exist amongst the European Union of the 27 this is not enough to vouch for and guarantee a proper, secure, safe and with limited risks management of chemical substances in the environment of the Micro SMEs throughout the Union. This research came to highlight from a simple point of view the differences present in the daily actions and perceptions between employees and owner/managers of Micro firms of three (3) different European Countries, to a more focused, structured and, finally modelled approach, of comparing two distinct European Countries sharing many similar societal and public
administration characteristics that clearly showed the discrete differences they exist in the Safety Performance of the use of chemicals between the cross-sectional Micro firms in these territories.

Finally, in order to make it more clear and to better capture the fact of the lack of homogeneity in the Safety Performance of Micros using and managing hazardous substances for their daily practice, the approach and the model could be implemented in future research efforts in other countries as well, either for academic or for business-oriented interest, or for both.
8. Conclusions

This project has introduced a lengthy yet innovative way to approach face-to-face Micro SMEs and gather valuable data from them. Even though someone could argue that a face-to-face interview with companies might be time-consuming both for the researcher and for the company itself, as it is evident from the literature but mainly from the real-life business activities and connections on the market, the interpersonal communication is the one proven to be more productive and fruitful and to allow an easier access to this type of companies. Micro enterprises tend to have a family character and they want to follow and abide by all legislations and instructions and guidelines that are referring to them. The owner/managers believe that due to their small size it is easier for them to make mistakes and/or to be in the target of the authorities for extensive controlling and auditing. Micro SMEs tend to live under the shadow of the SMEs, and this sometimes makes them either extra careful or a bit careless. Based on these perceptions, owner/managers and employees are not usually open to respond or to take part in surveys, because they are afraid of the impact of their feedback and the possibility that it might jeopardize their longevity in case there are any flaws to be found. And this widespread belief was a major obstacle that the author had to overcome daily during the process of interviewing.

Taking all the above into consideration, this research project focused on accessing this sensitive business category and on investigating as fully as possible all the aspects of the safe use and management of chemical substances that can potentially be of severe dangers in any business environment, irrelevant to its size. Hence, the analysis has been based on this newly structured and introduced survey tool. The available literature on critical issues such as safety culture, risk perception, risk communication, health and safety management, EU legislation on chemical safety
etc. is available unfortunately only on the level of Small- and Medium-sized Enterprises. As a result, the accessible literature on the specific topics is limited and scarce when it comes to Micro SMEs. Consequently, it is left on the researcher, the reader and/or the business manager who would like to draw and design a new strategy engulfing any of the above aspects, to assume that whatever is valid for the SMEs is automatically valid for the Micros as well. However, the evidence from the real market internationally showed that this cannot be the case. For this reason, the initiation of this research project has been stimulated by the need to investigate and analyze as deep and wide as possible the environment of safety in the use of chemicals in the daily business of Micro firms. Even though one might argue that the investigative target of this effort has been too narrowed down, the argument against this statement would be that in an under-researched and under-investigated wide field, such as the one for the Micro companies, it is one possible, and proven to be effective through this effort, strategy to start exploring something within a very narrow perspective and based on the feedback to make it wider according to the research hypotheses and questions in further, future steps.

Thus, through this research project there are two attempts, in different stages of exploration, to address known problems in areas where there was no previous approach of that level. Basic knowledge of statistics would suggest that the very nature of this well-orchestrated and unique effort can lead to objective and acceptable first-time, newly introduced evidence. As this extensive study is focusing on a neglected, by the literature, area even though it is of great importance, any findings, underlining the differences in the ideas, awareness, participation and/or perception of employees and of owner/managers in different countries towards hazardous chemicals’ safety issues, as well as any findings that significantly relate or not the total safety performance to crucial factors like safety training/education, safety culture and perception etc., will act in support of the
need, and shall stimulate the notion for, further research on this field. It is true that flexible solutions are needed to analyze new data and measure chemical safety performance in Micro companies but only in the European Union but also internationally.

Lastly, another major argument for the need of future research is the fact that, after the unprecedented times the world has witnessed and is still witnessing in the fight against the pandemic of Covid-19, chemical substances will start playing a vital part in our daily lives along with the use of Personal Protective Equipment, not only in the company environments -irrelevant to their size- but also in the daily lives of every individual and every citizen around the world. Consequently, the more we know about the proper use of chemicals and the better we use them following instructions, guidelines and proper training sessions, the better we will be equipped as a whole to use the potential hazardous chemicals so as to protect the businesses, the employees, their families, the clients and indirectly the whole world against any biological hazards. Based on that, further research in the future should be focused separately on each sector of Micro firms in any given country using our model in order to get specific feedback on the safety performance of the companies. Additionally, a very promising research effort could be a cross-sectional comparison, like the one introduced in the present paper, including a larger group of European Member States to capture the differences and/or the common grounds between them, which would be explained by the particular characteristics of each economy under investigation. Moreover, using this model and enhancing it with some further indicators/variables available in the literature the researcher could focus on examining larger SMEs, either within the same business sector or cross-sectional. One last research effort for the future could entail the approach of carcinogens, toxic or explosive substances and amend the proposed model accordingly to measure the safety performance of the companies based on the needs of any future proposed investigation.
In general after all the years of both academic as well as real-life field research in the area of occupational health and safety for chemical substances it is easy to understand the reasons, as some are already mentioned in other parts of this research, why the Micro enterprises are a very difficult sector to get access to and gather data from. It is understandable that different countries have different safety cultures, different risk perception and different philosophy in gathering or supplying data on their daily business activities. It is also true that the existence of a more structured, country based, modern format of data collection and availability would make research easier and bring more value and better results. However, in the European Union of the 27 it is understandable that some countries might be lagging behind in the implementation of such initiatives, even if they are organized centrally by the EU.
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Appendix I – The Research tool used (English version)

PhD Research: Nationwide survey on the safe storage, use and management of chemical substances in Micro Companies (<= 10 employees)

Part I: Employees

Q1 – Age group: 18-25  26-45  46-60  60+

Q2 – Gender: Male  Female

Q3 – Years working in the company: 0-1  2-4  5-10  10+

Q4 – Education Level: Basic education  High School  University  Post-graduate

Q5 – Your position: Worker  Chemist  Administration  Other

Q6 – Any chemicals produced in your company?: Yes  No

Q7 – Any chemicals used in your company during the production/doing business?: Yes  No

Q8 – If Yes in Q7, how many hours have you been trained for the correct use of the chemicals?: Wasn’t trained  5-10  10-20  >20

Q9 – Your trainer was a company staff or external collaborator?

Existing staff  External collaborator

Q10 – My Employer is consulting me on the correct management of chemicals

Not at all  Little  Moderate  Very  Very much

Q11 – My Employer is interested in the protection of the employees from chemicals’ exposure
Q12 – I am aware of the ideas of my Employer regarding the correct control and management of chemicals: Yes  No

Q13 – My opinion on issues regarding the correct management of chemicals is being taken into consideration by the management of the company

Not at all  Little  Moderate  Very  Very much

Q14 – My company has Safety Data Sheets for the chemicals it is using

Yes  No  Partly  I do not know

Q15 – Can I access the Safety Data Sheets?

Not at all  Little  Moderate  Very  Very much

Q16 – Do I feel exposed to the chemical at my work?

Not at all  Little  Moderate  Very  Very much

Q17 – I would like to have better controls in place for the chemicals we produce/use

Not at all  Little  Moderate  Very  Very much

Q18 – I discuss the problems I am facing at work due to chemicals with other people

Not at all  Little  Moderate  Very  Very much

Q19 – The chemical products being used in our company have safety labelling in the country’s language (ie. Greek, Romanian)

Not at all  Little  Moderate  Very  Very much
Q20 – In my opinion, the chemical products being used in our company have all the necessary safety description/labelling

Not at all  Little  Moderate  Very  Very much

Q21 – Can I flag any problems due to the lack of enough information for the chemicals I use

Not at all  Little  Moderate  Very  Very much

Q22 – In general, I am satisfied with the way that my remarks/flags are being managed in terms of the management of the chemical substances

Not at all  Little  Moderate  Very  Very much

Q23 – In order for us to reach the company’s targets we do not abide by the relevant legislation for the proper information of the chemical products

Not at all  Little  Moderate  Very  Very much

Q24 – I have been informed for the dangers from the use of chemical products

Yes  No

Q25 – If No, Why?

Personal Negligence  Lack of Time  No Need  Employer doesn’t think is necessary  Other

Q26 – Am I willing to follow all the instructions I might be given?

Yes  No

Q27 – If No, why?

Personal Negligence  Not the appropriate means of Instructions  Lack of Time  Other
Q28 – Have you requested medical care in the past 12mo for problems related to your work?

Yes   No

Q29 – If Yes, the diagnosis was related to

Dermatological problems   Respiratory Problems   Cancer   Other

Q30 – Any occupational accident during the last year?: Yes  No

Q31 – My works requires daily use of chemical substances: Yes  No

Q32 – Chemical products I use are labelled in the local language (ie Greek, Romanian)

Yes   No

Q33 – I have studied during the last year at least once the Safety Data Sheets for the chemical products, I use: Yes  No

Q34 – I read the labels of the products that are of my interest

Not at all   Little   Moderate   Very   Very much

Q35 – I am provided with the necessary protection from chemicals: Yes  No

Q36 – My Employer provides us with the necessary PPE: Yes  No

Q37 – Have you been briefed on the written Occupational Risk Assessment?: Yes  No

Part II: Employers/Management

Q1 – Years of Company doing business: 0-1   2-3   4-5   6-10   10+

Q2 – Sector: Processing   Chemical Industry   Services   Primary Sector   Other
Q3 – Company has a Safety Technician: Yes  No

Q4 – If No, who acts as the Safety Technician

Employers  External Collaborator  External Services Provider for the Protection & Prevention of Risks (ΕΞΥΠΠ)

Q5 – Is there an Occupational Risk Assessment in place that is being regularly updated?

Yes  No

Q6 – I provide my employees with training on the correct use of chemicals: Yes  No

Q7 – If Yes, how many hours: 1  5-10  >10

Q8 – Do I have all necessary Safety Data Sheets in the company?: Yes  No

Q10 – I ask my employees’ opinion on issues related to correct management of chemicals?

Never  Sometimes  Often  Very Often  Always

Q11 – Do I give time to my employees to study the information of the chemicals used in the company?: Never  Sometimes  Often  Very Often  Always

Q12 – I give instructions/guidelines to my employees on the correct use of chemicals

Oral  Written  Through Signs  Other

Q13 – I provide my employees with the necessary protection from chemicals: Yes  No

Q14 – In the written Occupational Risk Assessment there is a specific part on the chemicals used: Yes  No
Q15 – If the employees’ mother language is not Greek/Romanian, do you provide them with information in a language they understand?: Yes  No

Q16 – I provide my employees with the relevant PPE: Yes  No

Q17 – I provide the general means for protection: Yes  No

Q18 – I believe I have the knowledge to work with matters of correct labelling and packaging of chemicals: Yes  No  Partly  Does Not Apply

Q19 – My incentive to abide by the Chemical Substances Legislation

No penalty for not following the legislation  Ethical Responsibility  Protection of company’s reputation

Q20 – Seek information for chemical substances management through

Supplier  Labor Inspectors  External Consultants  Safety Data Sheets  Internet  Other

Q21 – Are employees willing to use the PPE: Not at all  Little  Moderate  Very  Very much

Q22 – Are employees willing to follow the instructions given for the correct use of chemicals

Not at all  Little  Moderate  Very  Very much

Part III: Labor Inspectors

Q1 – Company abides by the Chemical Substances Legislation (1 lowest – 10 highest)

1 2 3 4 5 6 7 8 9 10

Q2 – Company abides by the Health & Safety Legislation (1 lowest – 10 highest)

1 2 3 4 5 6 7 8 9 10
Q3 – Company has Safety Technician: Yes  No

Q4 – Is there a written Occupation Risk Assessment that is getting regularly updated
Yes  No

Q5 – The company takes initiatives for correct storage of chemicals: Yes  No

Q6 – The company takes initiatives for the correct packaging of chemicals: Yes  No

Q7 – The company takes initiatives for the correct labelling of chemicals: Yes  No

Q8 – Company has Safety Data Sheets?: Yes  No

Q9 – The products of the company do have the appropriate safety labels in the local language?: Not at all  Little  Moderate  Very  Very much

Q10 – Are the information procedures in place in terms of the risks of chemicals?
Not at all  Little  Moderate  Very  Very much

Q11 – Employer has a knowledge of the Chemicals Legislation?
Not at all  Little  Moderate  Very  Very much

Q12 – Employer has a knowledge of the Health and Safety Legislation?
Not at all  Little  Moderate  Very  Very much

Q13 – Do employees abide by the information available in the Safety Data Sheets?
Not at all  Little  Moderate  Very  Very much

Q14 – Number of occupational accidents in the past 12mo in the company’s employees, related to chemicals, that took them off work for more than 3 consecutive days?
Appendix II – Layman’s Report

Layman’s Report on the Safe Management of Chemicals in Micro SMEs

Introduction

Occupational Safety and Health (OSH) is a multidisciplinary activity focused on the prevention of accidents in the working environment as well as on the well-being of employed populations. Its main target is to prevent rather than treat or cure any accidents or diseases than may rise in the workplace. Back in 1950s a joint committee of World Health Organization and International Labor Organization (ILO/WHO) highlighted a very accurate definition regarding OSH: “the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations”. The years followed the introduction of the EU Directive regarding OSH in 1989 have been of great importance in researching new measures and policies to be implemented in order to improve the health and safety of working personnel. There has been increased interest in trying to understand how organizational factors such as managerial practices may have an impact in workplace safety. Diseases and working accidents are common all over the world and in most cases they tend to have negative consequences for the workers, their families but also for the organizations they are working for. According to Cagno et al. (2014), “the enormous economic costs, associated with poor safety and health at work, inhibit economic growth and affect the competitiveness of the country”. As a result, the importance of safety in the working environment towards avoiding harming of human capital and the economy is widely recognized.

According to the European Commission, Small and Medium Enterprises (SMEs = less than 250 persons employed) are the backbone of the European economy and in 2015 92,8% of all European Companies were Micro-SMEs (<10 employees) (Eurostat, 2018).
As far as literature is concerned, there are still major gaps in the field of micro enterprises in general. Based on the above, the literature that is available to date, in terms of OSH and safety issues in the micro enterprises, can be characterized as limited if not scarce. Legg et al. (2015) stress this element by arguing that “to date, research on OSH and the work environment in SMEs has been relatively limited”.

**Research Project**

A questionnaire for a nationwide survey in Cyprus, Greece and Romania was designed and delivered to the Micro SMEs that are managing chemicals in these countries. The data obtained by the survey that took place in the three (3) EU Member States were analyzed by using the Statistical Package for Social Sciences software version 26 (SPSS, Chicago, IL, USA). A range of statistical techniques has been used. For univariate analysis, results for variables measured on the Likert scale or in a 10-scale measurement (considered as continuous), are presented with a measure of central tendency (mean) and measures of dispersion (standard deviation, min, and max). For nominal variables – categorical data (companies demographics and dichotomous variables), frequency of responses and relative frequency have been calculated.

For bivariate analysis (comparisons of two variables), differences in mean scores between two groups were tested using independent samples Student’s t-test. For more than two groups, one-way ANOVA with Tukey LSD post-hoc test has been employed. Chi square test of independence has been implemented to examine if there was any relation between two categorical variables (e.g. gender & country). Statistical correlations between the two-scale variables were evaluated by the Pearson correlation coefficient.

Since entering the environment of Micro firms is quite challenging and as the literature highlights it is quite difficult for this size of enterprises to show a positive attitude towards any research
focused on them, the response rates we received were 31%, 47% and 71% for Romania, Greece and Cyprus respectively. These numbers have been quite impressive considering the sector of Micro SMEs being investigated.

**Results**

By comparing the findings of the three (3) countries under investigation following conclusions came into light in terms of the correct management of chemicals in the micro companies. Even though the main ideas were the same, i.e. all Micro SMEs were offering training to the employees, they were keeping records of safety data sheets, they were providing the employees with the proper information regarding the chemicals they are using/storing/trading, and the provision of Personal Protective Equipment (PPE) as well as general means of protection against chemicals (ventilation, fire extinguishers, signs/labels on the hazardous/risky character of chemicals) it was proven that all three countries were scoring differently. In general, the vast majority of the micro firms was following the OHS legislation (safety) and the relevant chemical legislations CLP, REACH (on the information and correct labelling of chemicals). Nevertheless, each country had different results based on the feedback of the responders to our questionnaire. It was evident that Romania is the most industrialized country out of the three offering more training, having the most employees with chemical-related education and following all rules strictly. On the other hand, Cyprus is a less industrialized country focused more on the services and the trading sector rather than on the manufacturing of chemicals. This explains the difference in the educational background of the employees, in the use of PPE and in the training and education actions, which are present yet in a lesser extent compared to Romania and Greece. Lastly, Greece lies in between the other two countries, having a balanced Micro SMEs sector with chemicals in their daily activities; it has both a good manufacturing profile and a wide services profile within its Micro
enterprises using hazardous substances. Training and education actions are almost equal to Romania, as well as the provision of PPE. In general, the employees are weighted having chemical and administrative scientists in the Micro environment.

As a consequence, the initial Null Hypothesis that the average scores in the responses of the Micro enterprises of all three companies would be the same, considering all three of them belonged to the same business sector and in the same region, has been rejected.

**Added value to the Literature**

This is the first effort to compare how Micro SMEs using chemical respond to a proper safe management of this hazardous substances. The results showed that there are structural differences between the countries that can highlight the variations existing in their organizations in terms of their structure (educational level and/or academic background of employees), of their safety provisions, the safety climate and the safety management as a whole in these companies. These findings came to provide a stimulus for further research in the future, since the Micro enterprise is the most vital group of business organizations not only in the EU, but also globally.

**Contact**

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**References**


### Appendix III – HRA SPSS output

#### Collinearity Diagnostics

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#### Residuals Statistics

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Appendix IV – Conferences and/or Publications as a PhD researcher


**Bachtsetzis C.**, “Safe Management of Chemicals in Micro-Firms”, 1st Annual Symposium Nicosia Risk Forum, November 2018, EUC, Nicosia, Cyprus


