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MSc Engineering and Policy Analysis

The influence of national culture on safety incident reporting in a hazardous industry

Final report of graduation project at Safety Science Group

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PRELUDE

After spending two years in TU Delft, The Netherlands, and HIT, China, and also after attending a series of MSc courses dealing with cross-cultural management, I became fascinated by a discipline that I had not been aware of before of its existence. My academic interests had always made it difficult for me to deal with anything else than computer networks, algorithms and source code.

Understanding cultural differences was something more than an MSc thesis course for me and my fellow students at TU Delft. Thanks to Dr. Martin De Jong, cultural differences became a game between us. Almost all of us, Dutch, Greeks, Italians and Chinese, were participants in numerous peaceful debates on whose culture is better (although we learned that cultures cannot be compared normatively, they are just different). Dealing with those differences taught us that our behavior in all aspects of life can be explained to a great extent by culture.

Being a potential TU Delft graduate, I wanted to go a step further and apply what I learned at TU Delft and HIT classes in a field that was closer to my engineering background. Thanks to the crucial interventions of my first supervisor Dr. Frank Guldenmund and the selfless support of my fellow engineer from The Company, a Greek worldwide cement distributor that operates in my hometown in Greece, I managed to arrange this MSc thesis research project.

This research and consequently my graduation from TU Delft could not happen without the self-motivated and continuous feedback, and of course the patience, from Dr. Frank Guldenmund, whose high level of scientific support made me eligible for being a candidate for graduation from this great academic institute.

This work is dedicated to both my parents, but especially my father. This is not only because they have supported me throughout my student life, but mainly because I know that I have made them truly happy with my academic progress.

Charalampos Kaklamanos, Delft, 2010

SUMMARY

Lack of relevant research has motivated the initiation of this MSc thesis project with the fundamental objective to contribute to the knowledge about a direct or indirect influence of national culture on safety incident reporting in a hazardous industry.

The relevance of this topic is related mainly to the fact that the literature review on national culture frameworks stresses the influence of culture on several aspects of social life, including the workplace, where incident reporting is, or should be taking place. It is hypothesized that incident reporting will be influenced, amongst others, by national culture. This hypothesis is supported by the literature review of safety science, which reveals a set of cultural barriers to effective incident reporting. Besides, various studies indicate that underreporting is pervasive in hazardous industries. At the same time, cement industry worldwide admits low safety performance; therefore, an Hellenic based cement producer and worldwide distributor was approached to participate in the study in order to identify the factors that can describe best the workers' attitudes towards incident reporting and the statistical correlations of those factors with the selected cultural dimensions.

For the purpose of this study, Hofstede's Values Survey Module '94 and an additional set of questions, which was used in order to identify the respondents' attitudes towards incident reporting, were delivered and answered by the employees of a cement plant based in Greece. Although the number of responses marginally met the requirements for the selected statistical techniques, the data was analyzed using the Statistical Package for Social Science (SPSS).

According to the results of the data analysis, the research sample was found to represent the research population, apart from the number of the production department employees, which was found to be statistically higher than the one in the research population. The scores on Hofstede's cultural dimensions were also calculated and compared to those found in literature. As it was expected, a deviation between the empirical and theoretical scores was found; however, the results revealed similar patterns between the calculated and the original indices reported by Hofstede. Next, the data analysis revealed two components that describe the

perceptions and attitudes of the sample towards incident reporting: *“Safety participation, awareness and trust”* and *“Motivation to compromise safety”*. According to the responses, the employees that answered the questionnaire understand the existing safety rules in the plant, know what to do in order to follow those rules, understand that they carry personal responsibility for an accurate implementation and believe in the importance and effectiveness of incident reporting and safety procedures within the plant. At the same time, the respondents show low motivation to compromise safety vis-à-vis other occupational tasks, since they do not believe that it is acceptable to break safety rules and they trust the way management manages safety.

In the final phase of data analysis, the strength and direction of the relationships between each of the selected cultural dimensions items and the safety attitude components were explored, in order to evaluate the formulated hypotheses regarding the influence of each cultural dimension on incident reporting behavior. All the hypotheses were rejected. The employees’ perceptions and values towards incident reporting were not related to their cultural values; therefore, any kind of direct or indirect influence of national culture on safety incident reporting was not found to be plausible.

Given the fact that the literature review revealed a lack of research on the influence of national culture on safety incident reporting, this research has added a small but important amount of knowledge to safety management in hazardous industries. Considering the limitations that apply to this study, which are also discussed in detail, the proposed methodology can serve as a starting point for a more thorough research project on safety behavior discipline.

Chapter One begins with an introduction to national culture, safety culture and incident reporting. Next, it outlines the research questions that the study attempts to answer in order to achieve the fundamental objective, which was to contribute to the knowledge about a direct or indirect influence (if any) of Greek national culture on safety incident reporting in a hazardous industry.

Chapter Two reviews literature on existing national culture frameworks in order to obtain a deeper understanding of them and selecting an appropriate measuring framework for this

study. Hofstede's cultural framework and dimensions, on which the current study is based, are discussed in detail. A brief discussion on additional cultural frameworks shows that culture researchers' findings are often overlapping.

Chapter Three reviews literature on occupational safety incident reporting across various industries and explores the factors that may hinder it. Next to an introduction on incident reporting, the literature review identifies several barriers for effective implementation. Those barriers are found to be mostly of cultural nature. A visual representation of the above barriers is also proposed.

Chapter Four combines the acquired knowledge in order to explore the theoretical implications of national culture for incident reporting. The meaning of Hofstede's cultural dimensions for the work field, and consequently for incident reporting are discussed, and the hypotheses regarding their influence on it are formulated.

Chapter Five discusses the research methodology that was followed, the research strategies, the tools that were used and the phases and processes of this research.

Chapter Six presents the statistical analysis of the collected data. Firstly, the representativeness of the research sample is assessed. Next, the index scores of the selected cultural dimensions are calculated and validated with the index scores provided by literature. Then, the components that summarize and describe best the employees' safety incident reporting attitudes and beliefs are extracted. Finally, the strength of the statistical relationships between them and the selected cultural dimensions items is calculated in order to contribute towards the achievement of the thesis fundamental objective.

Chapter Seven answers the research questions of the study and evaluates the extent to which this study contributed towards the existing knowledge. It concludes with a discussion on the limitations of the study and recommendations for further research.

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1 Introduction

Multinational organizations often require from their overseas branches to apply their head office's policies, systems and practices, despite the fact that they operate in a different cultural context. This is also usually the case for companies that transfer their facilities to developing countries. When a company is not fully globalized, the national element of the home country is dominant at various levels of their management hierarchy and operations. Therefore, managers should pay special attention to the influence of the domestic national culture on their operations.

Regarding health and safety management, unsafe behaviors in hazardous industries, which can be encouraged by poorly designed equipment or operations, are inevitable. At the same time, the attitudes and the values of the people that are involved in industrial operations are important factors that influence the approach to work, and ultimately to an organization's health and safety performance (Institution of Occupational Safety and Health 2008). As a result, culture's role on safety operations seems to be imperative. Besides, sustainable development is a hot issue and safety management is constantly receiving growing attention at a global level. Therefore, it is essential for multinationals to adapt their safety planning to the cultural context in which they operate.

1.1 Safety culture

Most research studies that deal with the concept of safety culture are not accompanied by a valid theoretical framework that stresses the validity of the construct. At any case, a majority of researchers that deal with the notion of safety culture agree that it is of significant importance for an organization's safety performance and it can be assessed in a qualitative way (Guldenmund 2000). Such assessments can serve as the starting point for making further developments and build up a so called "culture of safety". Reason (1997) has defined the term as follows:

“The safety culture of an organization is the product of individual and group values, attitudes, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization’s health and safety programs. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measure.”

Exploring the construct of safety culture independently is possible, but in any case, it is a product of the organizational culture (Guldenmund 2000). Hofstede (2001) defines organizational culture as *“the collective mental programming of otherwise similar persons from different organizations”*. The term “otherwise similar” includes, amongst others, country and/or region of origin (national culture), occupation (occupational culture), gender, age and level of education. Similarly, organizational culture is directly influenced by national culture which is defined as *“the collective mental programming of otherwise similar persons from different nations”* (Hofstede 2001). Consequently, an influence of national culture on safety culture seems to be plausible. This can be better understood, if one considers how employees from different nations can differ in their attitudes and perceptions towards hazards and risk, but also how differently local societies, legal systems, safety regulation bodies and institutions, understand and interpret them.

Next, safety incident reporting and its importance in safety management are introduced.

1.2 Introduction to safety incident reporting

In the name of sustainable development, proper safety planning and commitment towards a healthy and safe working environment is a must for hazardous organizations. In order to develop and maintain a “safety culture”, collecting appropriate information is at the top of a successful safety agenda. Extracting, maintaining and exchanging safety data and information is a core activity of safety management (Weiner, Hobgood et al. 2008). As part of this activity, the main objective of incident reporting it is to collect safety incidents, that is, information about near misses, errors and adverse events (Weiner, Hobgood et al. 2008).

The importance of the presence of a “reporting culture” has been stressed in numerous research studies. In one of them, Reason (2000) attributes the Chernobyl disaster to the complete absence of such a “reporting culture”. The Institution of Occupational Safety and Health (2008) and Reason (1997) agree that organizations which have developed a “*culture of safety*” are definitely informed organizations. The Institution of Occupational Safety and Health (2008) defines an informed culture as “*the one in which the members of the organization understand and respect the hazards of their operations, and are alert to the many ways in which the system’s defenses can be breached or bypassed. Without the proper information, it is not possible for organizations to develop improvement plans by learning from the reported information. A major means of obtaining, retrieving, exchanging and interpreting information is the incident reporting system of the company*”.

At a more practical level, standardization bodies that outline the requirements of complete safety management systems, present incident reporting practice as a core element of such a system. The Occupational Health and Safety Assessment Series (OHSAS 18001:1999), which is a safety management system standard developed by the British Standards Institution and is being applied in numerous countries, including Greece, stresses explicitly the importance of safety information extraction, maintenance and exchange, and defines how reporting policies should be implemented in order to comply with the standard. According to the OHSAS standard an incident is defined as “*an event that gave rise to an accident or had a potential to give rise to an accident. An incident with no ill health, injury, damage, or other loss occurs is also referred to as a near miss. The term incident includes also near misses*” (British Standards Institution 1999).

1.2.1 Incident reporting across various industries

Incident reporting has gained particular attention across various hazardous industries, including medical, aviation, oil and gas and chemical industry.

Regarding the hospitals, most studies stress the importance of incident reporting and the technical, social and cultural problems associated with it. Medical professionals operate in an extremely fragile working environment where medical errors are deemed as unavoidable. The need for accurate, honest and comprehensive reporting is imperative. However, several

barriers, such as the culture of blame and the apprehension of doctors about the potential for managers and non-medical professionals to engage in the regulation of medical quality through the use of reporting data, seem to hinder the reporting procedures (Waring 2005). Besides, a review on studies regarding incident reporting in the health care industry by Weiner, Hobgood and Lewis (2008), shows that underreporting is pervasive.

Mearns and Yule (2008), who have conducted a cross cultural study in order to explore the influence of national culture on safety performance in the oil and gas industry, suggest that more proximal influences such as perceived management commitment to safety and efficiency of safety measures exert more impact on workforce behavior and subsequent accident rates than more fundamental national values. Nevertheless, this does not imply that national culture does not have any effect on safety culture and performance. When it comes to incident reporting, which is the basis for safety improvement, the same study shows that the formal safety performance of various countries, based on the reported Loss Time Injury (LTI) rates, is the same. However, it is argued that the rates are lower in some Asian countries, compared to North America and Europe, due to underreporting, which is possibly related to differences in the interpretation of what constitutes a reportable injury in different cultures or due to fear of losing their job, which is less the case in more developed countries. Therefore, national culture seems to exert a certain level of influence on reporting behavior.

Besides, one could argue that regulatory structures could also exert influence on the reporting behavior across various industries in different countries. Exploring this kind of influence is out of the scope of this research; however, regulatory bodies across nations are influenced by national culture, which supports the argument that reporting behavior seems to be influenced at a certain level by national culture.

1.3 Incident reporting and national culture

It is believed that the causes of occupational accidents are not purely due to human errors or just technological failures. The underlying causes are often deeply embedded in an organization. Pidgeon (1997) states that an understanding of disasters has to focus on a range of deep-seated organizational preconditions and patterns which have been shown to pre-date catastrophic

events. National culture may be one factor that exerts direct influence on those organizational preconditions. In their Man-Made Disasters model, Pidgeon and Turner (1997) define a disaster as a significant disruption or collapse of the existing cultural beliefs and norms about hazards. This refers to a great extent to the culture of safety that an organization has developed. However, as it was previously discussed, national culture is a factor that may influence safety culture.

According to Pidgeon's (1997) theory on organizational culture, culture is positioned at the heart of the system's vulnerability problem, because of its role in shaping blindness to certain forms of hazards. In other words, *"culture is a way of seeing that is simultaneously a way of not seeing"*. Furthermore, in the same study, it is stated that it is not yet clear how the beliefs and norms of a safety culture stand in relation to an organization's wider culture and values, let alone to those of the wider society: such things as beliefs about security, achievement, benevolence and justice. In the next chapter, where national culture is discussed, it is argued that incident reporting is a procedure that highly depends on the cultural beliefs of the involved stakeholders.

The next paragraph introduces the cement industry, a hazardous industry with self-reported safety performance facts, on which the initiation of the research study was based.

1.4 Cement industry

Cement is one the most widely used substances on the planet. It has been estimated that each person on the planet consumes three tonnes of concrete, which contains 10 to 15% cement (Cement Sustainability Initiative 2005).

1.4.1 Multinational character

Cement industry has a multinational nature. The cost of cement transportation is extremely high compared to the value of cement itself, despite the fact that its production is an energy and resource intensive process (Titan Cement, 2008). As a result, cement industry players that opt

for distributing their products at a global level, may either establish new facilities in other countries or they may acquire cement companies that already operate in foreign local markets.

Therefore, it can be the case that a particular cement plant is located in Egypt, Africa and operated at the front line by local workers, but the management of the plant may be held by European managers. Besides, the contractors that support the operations of the company also belong to the local culture and they may employ workers that come from any country, usually from Eastern nations. The produced cement may be distributed in the country of origin, but it may also be transported to any other possible destination in Africa or Europe, usually by sea. The above argument shows that cement industry is of an apparent multinational nature.

1.4.2 Safety performance

According to the Cement Sustainability Initiative (CSI) (2005), which is a program that is sponsored by sixteen cement companies worldwide, the incident and injury rate in the cement industry is higher than in petrochemical and petroleum refining industry. These sixteen companies represent more than half of the industry worldwide, excluding the Chinese cement producers. Another problem outlined by the Initiative's report is that, although companies have their own reporting systems for illness and injury rates, it is in general difficult to provide industry-wide figures. CSI's research has shown that it is difficult to find public information in this area. This problem could have two reasons. Firstly, a universal way of reporting is lacking between the various cement industries; therefore, it is difficult to extract universal reporting results. Secondly, underreporting, which is pervasive in various other industries as well (Weiner, Hobgood et al. 2008), hinders the process of reporting universal results.

The CSI has attempted to overcome the first difficulty by providing a cross company standard to measure, monitor and report health and safety performance. As described in the next paragraphs, this attempt has various cultural implications. Each culture may have a different way of interpreting such a safety reporting standard due to different mental programs, i.e. the people's "*software of the mind*" (Hofstede and Hofstede 2005). As part of the process of globalization, in the case of workforces with different nationalities that work for the same multinational, there are cultural issues that should be addressed.

1.5 Knowledge gaps and research rationale

Although there is consensus amongst safety researchers that incident reporting is of significant importance for effective safety management, multiple studies have shown that underreporting is pervasive throughout various industries (Weiner, Hobgood et al. 2008). Therefore, several research studies have attempted to explore the factors that may hinder incident reporting in a hazardous organization. However, the literature review has revealed a lack of relevant research regarding the direct or indirect influence of national culture on safety incident reporting in particular. Besides, in his cultural framework theory, Hofstede (Hofstede and Hofstede 2005), analyzes the meaning of each of his cultural dimensions for various aspects of social life, including the workplace. Incident reporting is an activity undertaken at the workplace; therefore, it is probably influenced by cultural differences. The facts mentioned above motivated the initiation of this project and supported the relevance of the research rationale.

This study attempts to investigate the extent to which national culture may influence the attitude of employees towards incident reporting, which may influence their reporting behavior. Given the multinational character of the cement industry and the fact that its worldwide representatives agree that it suffers from low rates of safety performance (Cement Sustainability Initiative 2005), a Greek multinational cement producer and distributor was approached to participate in this study. The study's area of interest is the exploration of the cultural background of individuals that work in a Hellenic based cement company and the possible influence on their safety reporting perceptions, attitudes and behavior. At a more practical level, this research project attempts to identify the factors that can describe best the workers' attitudes towards incident reporting and the statistical correlations of those factors with selected national cultural dimensions.

1.6 Research objective

In the light of the above considerations, this research project aims to bridge the identified knowledge gap by achieving the following fundamental objective:

“Contribute to the knowledge about a direct or indirect influence (if there is any) of national culture on safety incident reporting in a hazardous industry.”

The achievement of the above objective would be fulfilled by the following sub-objectives:

- Gain deeper understanding about the notion of national culture and selecting an appropriate measuring framework,
- Investigate the factors that may hinder incident reporting
- Analyze data from a research sample which is representative of the research population, and
- Find the components that describe best and in the most compact manner the perceptions and attitudes of the sample towards incident reporting

1.7 Research questions

In order to contribute to the achievement of the above objective, the research will attempt to answer the following research question:

“What is the relationship between national culture and safety incident reporting behavior of employees in a Greek cement plant?”

and subsequently the following research sub-questions:

- To what extent does the research sample represent the research population?
- How much does the research sample score on each cultural dimension and to what extent do those scores match with those provided by literature?
- What are the components that can describe best the perceptions and attitudes of the sample towards incident reporting?

- What is the strength and direction of the statistical relationships between cultural dimensions and the above-mentioned components?

1.8 Research design

Baskerville (2003) argues that a steadily increasing number of disciplines (mostly including management related and psychology disciplines) uses Geert Hofstede's cultural dimensions framework. Nevertheless, Baskerville (2003) argues that the use of this framework has major limitations, an issue that is discussed further in the last chapter. This research study has been based on the often cited but also controversial cultural framework developed by Geert Hofstede. The framework was based on a cross-cultural research stemming back to 1966 with a scope that covered a wide range of social life, including the influence of national culture on the behavior of individuals within their workplace. Regarding safety incident reporting, a variety of scientific literature was consulted, in order to analyze the possible factors that may hinder its effective implementation. Next to a literature review, a survey questionnaire was developed in order to collect the data regarding the safety reporting behavior and attitude of The Company's employees. These data were then analyzed using the Statistical Package for the Social Sciences (SPSS 2009), hereafter called SPSS. Being a Master of Science (MSc) thesis project, the available time and budget were limited. This fact and the nature of the research objectives were the reasons for choosing the survey questionnaire as the main data collection tool. The data were collected at a cement plant which is operated by The Company in Greece.

1.9 What comes next

Chapter Two discusses existing theories on national culture, with more emphasis on Hofstede's framework, on which the research study was based. **Chapter Three** reviews existing scientific literature on incident reporting in various industries in order to gain to a deeper understanding on those factors that may hinder it. **Chapter Four** combines the knowledge gained from previous chapters and discusses how national culture, which influences organizational culture, may influence incident reporting. In that chapter the research hypotheses are formulated. The research methodology is discussed in detail in **Chapter Five**. The statistical techniques that were

used to analyze the collected data and the accompanying results are presented in **Chapter Six**. Finally, **Chapter Seven** discusses the extent to which the research was able to answer the main research question in order to achieve the fundamental objective of the thesis. The thesis report concludes with a discussion on the limitations of this study and recommendations for further research.

2 National culture

Chapter Two focuses on national culture. It begins with the analysis of Hofstede's (2001) theoretical framework and cultural dimensions. Next, other cultural theories are presented, showing that, in many cases, culture researchers have overlapping findings.

2.1 Introduction to Hofstede's definition of culture

In order to develop his cultural framework, Hofstede (2003) conducted a comprehensive research project among IBM business employees' samples, covering more than 70 countries. His research has been confirmed by several replications and extensions conducted by him and other scientists. In his best known book *"Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations"* (Hofstede 2001), he explains the extent to which human behavior is predictable, by introducing the term *software of the mind*, which is defined as the people's mental programming. Mental programming is a simple way of referring to people's mental reality. It is a model of three levels that differ in the extent to which they are unique or shared with other people.

The first level is called universal and it is the most basic and least unique of the three. This level is the part of people's mental programs that is shared by all human beings. Hofstede (2001) describes it as the biological operating system of the human body, which is the reason for our expressive behaviors, such as laughing and crying. The second level is called collective of mental programming and it is shared with some but not all other people. The collective level is common to people belonging to a certain group or category, but different from people belonging to other groups or categories. For instance, people whose mental programming shares the same collective level, speak the same language and perceive general activities such as eating, making love and ceremonies in the same way. Finally, the third level is called individual and it a truly unique level of our mental programming. Every individual has a unique personality and it is therefore not possible for two people to have the same *software of the mind*. This

differentiation is determined by the individual level which is what makes people from similar cultures to have different values and behavior towards the same situations.

Furthermore, Hofstede (2001) has argued that there are two ways in which the *software of the mind* can be “installed” to an individual. Mental programs can be either inherited or learned after birth. The universal level is most likely entirely inherited. It is the part of our genetic information that is common to the entire human species. On the other hand, the individual level of people’s mental programming is almost completely inherited. This can be explained by the differences in capabilities and temperament between children of the same parents raised in very similar environments. The collective level is, according to Hofstede (2001), almost all learned. This is shown by the fact that we share it with people who have gone through the same learning processes but do not have the same genetic makeup. For instance, people that live in the same country may come from different genes or race; however, because of the same learning processes while growing up in the same culture, they learn and share the same collective level of mental programming. Learning through the transfer of collective mental programs goes on during our entire lives, but as most of it deals with fundamental facts of life, we learn most when we are very young.

Next to the definition of culture according to Hofstede (2001) is discussed.

2.1.1 The “collective software of the mind”

Culture is defined by Hofstede (2001) as follows:

“Culture is the collective programming of the mind that distinguishes the members of one group or category of people from another”.

At the core of Hofstede’s definition of culture one will find values, which is the key notion for describing people’s mental programming. A value is “a broad tendency to prefer certain states of affairs over others” (Hofstede 2001). Those states of affairs are related to issues such as what is good or bad, ugly or beautiful, paradoxical or logical, moral or immoral. People with different values have different perceptions on the above dilemmas. Hofstede (ibid) asserts that values are

programmed early in our lives and they determine the subjective definition of rationality for each individual. In other words, what is good for one individual, it may be bad for another; however, both are expected to believe that their preference is absolutely rational. Values are held by individuals as well as by collectivities. What differentiates values from culture, is that the latter presupposes a collectivity.

According to Hofstede (2001), culture includes values which are the core element of culture. However, values are invisible until they become explicit through people's behavior and visible elements. Those elements, together with values, constitute the notion of culture. Those elements are the *symbols*, the *heroes* and the *rituals* of a collectivity. *Symbols* are words, gestures, pictures and objects that are recognized in the same way only by people that share the same culture. An example of such a symbol is a flag. The meaning of a flag and its importance can only be understood and believed in by people who share common values. *Heroes* are persons, dead or alive, who own characteristics that are highly appreciated in a certain culture, but not in another one. Each culture has its own hero, who represents certain characteristic of the people that belong to it. *Rituals* are collective activities which are considered socially essential within a culture, keeping the individual bound within the norms of the collectivity. The way people greet each other, for instance handshaking versus bowing, is different among different cultures. All the above elements are summarized by Hofstede in the term *practices*. *Practices* are culture's visible elements and are determined by values which are not explicit.

Another approach that may help the understanding of culture is that culture is to human collectivity what personality is to an individual, because it determines the uniqueness of a human group in the same way personality determines the uniqueness of an individual. Both personality and culture are formulated by the individual's and group's values. As a result, the above theory attributes the existence of different cultures to the fact that cultural groups hold divergent values.

The above cultural framework implies that the notion of culture can be applied to any human collectivity or category. In the context of corporations and organizations, people in different industries, or people in different companies within the same industry, or people with different profession within the same company, or people with different age and gender within the same

profession may share the same collective level of mental programming, therefore, share common cultural values. Chapter Four explains the meaning of culture in the workplace, on which this research project has been based.

2.1.2 Cultural dimensions

Hofstede measures culture on the basis of five empirically identified cultural dimensions: *Power Distance Index (PDI)*, *Uncertainty Avoidance Index (UAI)*, *Individualism versus Collectivism (IDV)*, *Masculinity versus Femininity (MAS)* and *Long-term versus Short-term Orientation (LTO)*. Each dimension corresponds to a fundamental problem of society that people have to cope with. It can be expected that people from different cultures cope with each problem in a different way. The last dimension was last added to the theoretical framework and is out of the scope of this study. This is further explained in Chapter Five.

The first four cultural dimensions were used in this study in order to measure the corresponding cultural index scores of the research sample and draw conclusions about the influence of national culture on safety incident reporting. As it was argued in the previous chapter, Hofstede's research, although controversial, has been widely used and cited in a high number of management and psychology related studies. His data analysis covers more than 70 countries, between 1967 and 1973 (Hofstede 2003). His research has been later replicated and validated by himself and other researchers as well. According to Hofstede (Hofstede 2001), the biggest advantage of his project is that research was conducted on a wide population sample of 116,000 employees working worldwide, but in the same corporation (IBM). As a result, the organizational culture that can influence the IBM employee's values and attitudes remains the same; therefore, it could be asserted that the differences in values and attitudes among the respondents from different countries can be attributed to national culture differences.

Next, the first four cultural dimensions are explained in more detail.

2.1.2.1 Human inequality: Power Distance Index (PDI)

The PDI dimension deals with the problem of human inequality, which is handled differently by various cultures. Inequality is inevitable in all groups of people and can exist in social status,

wealth and power. Also, it may occur in various forms of groups, such as family, school, work and society in general. In an organizational environment, employees are unequal, which is not only an inherent fact, but also a regime that helps organizations to function. Inequality in organizations is essential to avoid chaos between people's relationships and facilitate decision making. It is expressed by organizational hierarchies (Hofstede 2001). Taking the example of a company like The Company, the front-line workers are subordinates of front-line managers. The former report to and are supervised by the latter. The front-line managers report to middle managers. Those are subordinates of the corporation's top management. The higher an employee is located in the organization's hierarchy, the more decision making power he has, the more money he earns and the more status he acquires. Of course, this is quite common in most companies, not only The Company.

PDI dimension measures *"the extent to which the less powerful members of a group accept and expect that power is distributed unequally"*. This definition of power distance is defined from below, meaning that it is defined from the viewpoint of inferior group members, but it presupposes also that the existence of inequality is approved by the inferiors as much as by the superiors. Hofstede (2001) stresses the point that unequal distribution of power in various aspects of life is a fundamental fact of societies and that anybody with some international experience is aware that *"all societies are unequal, but some are more unequal than others"*.

In cultures with a high PDI, the various forms of power are distributed more unequally among people and individuals expect and desire those inequalities. Skills, wealth, power and status go together and the most powerful are accepted to have privileges. Regarding the workplace, in cultures with a high PDI, the centralization of power is a common practice and hierarchy reflects existential inequality and not inequality in roles. Subordinates expect to be told what to do and superiors do not usually involve subordinates in decision making processes. In Chapter Four, the meaning of power distance in the workplace is being further elaborated.

2.1.2.2 The face of an unknown future: Uncertainty Avoidance Index (UAI)

The UAI dimension deals with the fundamental problem of how much anxiety people feel in the face of an unknown future. Uncertainty about an unknown future is a basic fact of life and people cope with it in various ways. People use technology in order to cope with the uncertainty

of natural phenomena, they set up informal and formal law institutions in order to cope with the uncertainty of other people's behavior and they have a religion in order to cope with uncertainties that are unbeatable, such as illness and death.

Uncertainty avoidance is not risk avoidance and Hofstede (2001) stresses explicitly the difference between them by drawing a parallel between anxiety and fear. Uncertainty is to risk what anxiety is to fear. Fear and risk focus on something specific. Once one has taken a risk in his life, it means that one has assigned a probability to an event and expects that this event is more or less probable to happen. Fear refers to something that can actually happen or exist. For instance, when a businessman starts up a new business, he takes certain market and/or technological risks. Those risks can be calculated and if the risk is high, he may fear to fail. Uncertainty and anxiety are different emotions. They are diffuse feelings with no object, because what makes one anxious is something unknown, often an unknown future. Uncertainty is the situation in which anything can happen, no one has any idea what might happen and a probability cannot be assigned to it. As soon as uncertainty is interpreted as risk, it stops being a source of anxiety, and becomes a fear. In the case of hazardous organizations dealing with risks is part of the game. The organizations accept risks as routines and deal with them by making risk assessments and take measures to minimize them.

UAI measures *"the extent to which the members of a society feel threatened by uncertain or unknown situations"*. A culture's UAI score shows how much people in this culture are programmed and used to feel either uncomfortable or comfortable in unstructured situations that are unknown, surprising and different from usual. In highly uncertainty avoidant cultures, people try to minimize the possibility of such situations by strict laws, rules and safety and security measures. At the religious level, people believe in the absolute Truth. In low uncertainty avoidant cultures, people are more tolerant towards situations and opinions different from what they are used to; they try to have as few rules as possible, and at the religious level they are relativist and allow many currents to flow side by side. Regarding the workplace, in cultures with high UAI, employees prefer to work for larger organizations and the average duration of employment is longer due to the uncertainty that comes with unemployment, a highly unstructured situation and a source of anxiety. What is more, top managers tend to be more involved in operations and the power of superiors depends on the control of uncertainties

(Hofstede 2003). In Chapter Four, the meaning of uncertainty avoidance in the workplace is being further elaborated.

2.1.2.3 The integration of the individuals into primary groups: Individualism versus Collectivism (IDV)

The Individualism versus Collectivism dimension is related to the fundamental issue of the integration of individuals into primary groups and the relationship between the individual and these groups. A group can be the family, classmates, colleagues or the working organization as a whole. In individualistic cultures it can be expected that the ties between individuals are loose: everyone is expected to look after him/herself and his/her immediate family. Contrary to that, in collectivistic cultures, people tend to be integrated into strong, cohesive in-groups, often extended families (with uncles, aunts and grandparents) which continue protecting them in exchange for unquestioning loyalty.

Regarding the workplace behavior, this dimension is reflected in the way people work together and the extent to which their working style and decision making takes into account the group interest versus self-interest. In collectivist cultures employees are members of in-groups who will pursue their in-group interest, including the company interest. This is generally not the case for individualistic cultures, where the employees will pursue the employer's interest only if it coincides with their self-interest. What is more, work related decision making in collectivistic cultures, such as hiring and promotion decisions, take an employee's in-group into account, but in individualistic cultures skills and rules are dominant in such decision making. In general, in collectivistic cultures the relationships between individuals, such as employees, customers, affiliates prevail over tasks (Hofstede 2003). In Chapter Four, the meaning of individualism in the workplace is being further elaborated.

2.1.2.4 The division of emotional roles between men and women: Masculinity versus Femininity

The Masculinity versus Femininity dimension deals with the fundamental issue of the social and emotional implications within a particular society of having been born as a male or female. Masculinity stands for a society in which social gender roles are clearly distinct. In such societies,

men are supposed to be assertive, tough and focused on material success. Women are supposed to be more modest, tender and concerned with quality of life. In feminine cultures social gender roles more overlap and both men and women are supposed to be modest, tender and concerned with the quality of life (Hofstede 2001).

The Masculinity versus Femininity dimension measures *the extent to which society expects and accepts the above overlap of gender roles*.

Regarding the workplace, in masculine societies, management is decisive and aggressive, and money and career advancement is generally preferred over more leisure time. The percentage of women in professional jobs is lower and challenge and recognition are the most important values in jobs (Hofstede 2003). In Chapter 4, the meaning of masculinity in the workplace is being further elaborated.

2.2 More theoretical frameworks of culture

In the following paragraphs, some additional theoretical frameworks of culture are briefly presented. When applicable, similarities with Hofstede's framework are noted.

2.2.1 "How people solve their problems"

Trompenaars and Hampden-Turner (1997) have developed their framework in order to explain and measure culture. Their theory was based on a 15 years research, where approximately 30,000 employees from 30 different companies and 50 countries participated. This framework shares several common characteristics with Hofstede's theory and it is not a coincidence that it has borrowed some of Hofstede's theory in order to define culture. According to it, culture "*is the way in which a group of people solves problems and reconciles dilemmas*".

2.2.1.1 The cultural onion

Trompenaars and Hampden-Turner (1997) conceptualize culture as an onion with layers, which have to be unpeeled in order to understand it. Similarly to the *cultural practices* of Hofstede, the

outer layer is constituted by the products and artifacts of culture, which can be directly observed by the one who explores a certain culture, because it is an explicit layer. Language, food, art and monuments belong to this layer. Those explicit products of culture are the consequence of the second cultural layer, which is constituted by the cultural norms and values. Those are deeper, not explicit and more difficult to explore and understand at first sight. A norm may express what is right or wrong for one culture, whereas the values express what is good or bad. The most inner layer of the cultural onion is implicit and is related to the fundamental assumptions of people that belong to the same culture. In this layer one may find the things that people take for granted and go unquestioned within their culture. This is the core part of the onion and answers questions about the basic differences in values between cultures.

2.2.1.2 Dimensions

According to the above framework, culture can be measured with seven fundamental dimensions, which are briefly discussed below.

The first five dimensions have to do with the problems and dilemmas that arise from our relationships with other people.

1) *Universalism versus Particularism*: According to the universalist approach the good and the right can always be defined and applied. There are always rules that apply and help people doing things right. The particularist approach stresses more emphasis on the obligations of relationships and the unique circumstances of each case. This means that less attention is given to abstract societal codes.

2) *Individualism versus Communitarianism*: The two approaches differ in the way people regards themselves as individuals or as part of a group. The individualistic approach focuses on the individual, who can contribute to the community as and if he wishes. On the other hand, according to the communitarian approach, the group is more important since it is shared by many individuals.

3) *Neutral versus Emotional*: The two approaches differ in the extent to which it is acceptable for individuals to express their emotions and not. People from neutral cultures interact in an

objective and detached manner, in a context in which the brain always checks emotions and relationships are instrumental. On the contrary, people coming from emotional cultures accept that in any type of relationship, people should express their emotions in an explicit manner.

4) *Specific versus Diffuse*: The two approaches differ in the extent to which individuals engage others in specific areas of life and single levels of personality, or engage them diffusely in multiple areas of their lives and at several levels of personality at the same time. Individuals that belong to specific cultures insulate any task relationships that they have with other people from other dealings. For instance, when a manager and a subordinate interact in an area different than their working environment, their working relationship will not play any significant role. Each area other than the work is considered apart from the latter, a specific case. On the contrary, in diffuse cultures every life space and every level of personality tends to permeate all others. A manager's reputation always leaks to some extent into other areas of life.

5) *Achievement versus Ascription*: What differentiates those two cultural approaches is the way status is accorded to the members of a society. In the first case, status is accorded on the basis of peoples achievements, whereas in the second case other factors such as age, class, gender and education are more important. In other words, status is accorded for what an individual is and not for what he has achieved.

The sixth dimension has to do with the way in which different cultures look at time.

6) *Sequential versus Synchronic culture*: Those two approaches differ in the way they recognize and manage time. Different cultures have different orientations to past, present and future. In sequential cultures past achievements of people are less important than their plans for the future, whereas synchronic cultures emphasize more on past accomplishments. What is more, the way activities are organized in the time space differs between sequential and synchronic cultures. In the first case individuals only do one activity at a time, whereas in the second case they may do more than one activity at a time.

The seventh dimension has to do with the extent to which a culture believes that people control their environment or they are controlled by it.

7) *Internal versus External control culture*: The attitude towards the environment is the differentiating factor in this case. Internal control cultures see the major focus affecting their lives and the origins of vice and virtue as residing within the individual. In this case, motivations and values are derived from within. External control cultures see that the environment is more powerful than individuals and nature is something that is feared or emulated.

After exploring Trompenaars and Hampden-Turner's cultural framework, one can identify several overlaps with Hofstede's cultural dimensions. In the case of *Particularism versus Universalism* dimension, one may argue that individualistic cultures tend to be more universal, meaning that particular relationships should not be counted, whereas collectivist cultures are more particular, because value systems take into account particular relationship systems of the actors into account (Hofstede 2001). Similarly, a culture with a high score in PDI, where people expect and accept that other people are less or more powerful, is a diffuse culture, where every level of personality tends to permeate all others. The expected and accepted differences between individuals play a significant role in a wide range of life activities.

2.2.2 “How people communicate”

In earlier times, Edward Hall was the one who founded the scholarly field of intercultural communication and the first to develop a theoretical framework about culture (Rogers, Hart et al. 2002). For Hall, “*culture is communication and communication is culture*”, which means that the way in which different groups communicate, is the determinant factor that shapes their culture (Hall and Hall 1990). According to him, every culture operates in its internal dynamics, principles and laws. He names “silent language” a vast unexplored region of human behavior that exists outside the range of people's conscious awareness. Studying this “silent language” provides insights into the underlying principles of our lives, which formulate our culture.

Hall has identified ten primary kinds of human activity, which are equivalent to the dimensions that have been empirically identified by the researchers (Missana 2006). Each activity is rooted in biology and is an independent aspect of culture. Those activities are the following: *interaction, association, subsistence, bisexuality, territoriality, temporality, learning and*

acquisition, play, defense and exploitation. Bisexuality is an example of a Hall's dimension that overlaps with Hofstede's framework (*Masculinity versus Femininity*).

Since Hall attributed the formulation of a culture to the way its members communicate, he has separated some principles of communication messages within cultures. Every message can be broken down into three parts: *sets*, what we perceive first (for example, words); *isolates*, the components that make up the sets (sounds); and *patterns*, the way in which sets are strung together in order to give them meaning (grammar, syntax) (Missana 2006). The above description of communication messages is in correspondence with both Hofstede's layer description and Trompenaars onion description of culture, where the outer layers of culture are more explicit than the inner. For instance, Hofstede's cultural practices and Trompenaars culture products and artifacts correspond with the communication message part that Hall calls *sets*.

2.2.2.1 High versus low context cultures

In his research, Hall made the distinction between high and low context cultures (Missana 2006). A high context culture refers to a culture's tendency to cater towards in-groups, an in-group being a group that has similar experiences and expectations, from which inferences during communication are drawn. In a high context culture, many things are left unsaid during communication, letting the culture explain. Cultures where the group is valued over the individual, promote the in-groups and group reliance that favor high context cultures. A low context culture explains things further, because those in a low context culture have a wide variety of backgrounds. Furthermore, high context cultures have a strong sense of tradition and history, and change little over time. High context cultures expect small close knit groups, and reliance on that group. Usually, professional and personal lives intertwine. On the other hand, a low context culture demands independence, and expects many relationships, but few intimate ones.

According to Hofstede (2001), the above cultural distinction can be considered as an aspect of collectivism versus individualism. High context communication fits the collectivistic society. There are many things that in collectivistic cultures are self-evident, but in individualistic cultures must be said explicitly.

2.2.2.2 Monochronic versus polychronic cultures

In addition, Hall (Missana 2006) suggests that the handling of time is a key element of culture and he distinguishes between the monochronic and polychronic cultures. In the first case, mainly in Western cultures, people tend to think of time as something fixed in nature. Their view of time is characterized by discreteness, linearity, necessity for scheduling and orientation toward the future. Among others, an informal isolate of a monochronic culture is monochronism, meaning doing one thing at a time. Monochronic time is a characteristic of low-involvement people, who tend to compartmentalize time. On the other hand, polychronic people, who are more involved people, tend to have several operations going at the same time, which is the case in the context of the sequential versus synchronic cultures distinction.

2.2.3 Shame versus guilt cultures

Another interesting cultural distinction is the one that deals with the way individuals perceive the rules about responsibility and blame in different cultures. In order to articulate this difference in perceptions, Dodds has used the term *shame versus guilt* culture (Atherton 2003). Shame and personal guilt are two different feelings that correspond to the above distinction and are typical feelings in cases when people have done something wrong.

In order to understand the distinction, one may think that when something wrong has been done, there are two entities in this process: the individual, who did the wrong thing, and other people. When both the individual and the other people, believe that either the individual did not do anything wrong or he/she did something wrong, there is no confusion between cultures. Issues arise when there is disagreement about the above.

In a guilt culture, when other people believe that the individual has done something wrong, but the individual does not think this him/herself, the individual is expected to defend himself/herself and fight the accusation. In case that the individual has done something wrong but the rest not, he/she is expected to feel internal guiltiness regardless. In both cases, the internal and individualistic judgment of the person is what counts more. In a shame culture, the judgment of other people is the one that prevails. The individual's priority is to preserve his/her

honor and/or avoid shame when something wrong has been done. Seeming innocent is more important than actually being innocent. When an individual does not believe that he/she has done something wrong, but others believe so, he/she is expected to feel ashamed and dishonored. When he/she believes to have done something wrong, but others not, he/she does not feel shame, because no one else knows.

Both Atherton (2003) and Hofstede (2001) agree that shame cultures are present in collectivistic societies, especially in Eastern countries. Guilt cultures do exist in individualistic societies, especially in Western countries.

2.3 What comes next

In this chapter the literature review on existing national culture frameworks was discussed. Hofstede's cultural framework, on which the current study is based, was discussed in more detail. Hofstede's findings were extracted from the usage of VSM '94 (Values Survey Module '94) on which this research study was also based. The main reason for choosing this framework for the purpose of this study is that it has been very often cited and used in several disciplines (Baskerville 2003). Although it has received severe criticism as well, an issue further discussed in the last chapter, the framework offers a handy quantitative tool for exploring the cultural values of the selected research objects.

What is more, the literature review and brief discussion on additional cultural frameworks showed that culture researchers' findings are often overlapping. However, none of them provide a 'ready to use' research tool for conducting similar research.

Next chapter discusses in detail the notion of safety incident reporting. This was essential in order to combine this knowledge with Hofstede's cultural framework and draw conclusions about the influence of culture on safety incident reporting.

3 Incident Reporting

Chapter Two dealt with several theoretical frameworks of culture. In order to draw conclusions about the influence of culture on safety incident reporting, deeper understanding on the scope of incident reporting should be gained. Scientific studies from various hazardous industries were reviewed, in order to seek for factors that may hinder the effective implementation of reporting. Those factors are referred to as *the barriers to incident reporting*.

3.1 What is incident reporting

The objective of incident reporting is to collect, manage and manipulate information about potential hazards, near misses and accidents, in order to analyze them, identify risky situations from latent conditions, seek for underlying causes, take corrective action and implement prevention efforts (Weiner, Hobgood et al. 2008). In a wider context, incident reporting's fundamental objective is to detect and respond to health and safety failures before they develop into major accidents (Johnson 2002).

As it was argued in Chapter One, incident reporting is a core task of safety management and is implemented in two levels: the industry and the corporate level.

3.1.1 Levels of reporting

In the industry level, the reported data represent the safety performance figures of an industry as a whole. Those figures can be utilized in order to compare the performance of the industry with other industries and monitor its own safety progress through time. The members of a particular industry, either in the national or international level, should firstly agree upon the scope of reporting, meaning the rates that may be included in the industry's safety performance reports. An inter-corporate agreement is made on what should be considered as a reportable event and what not. Regarding the international cement industry, the draft report of the Cement Sustainability Initiative (CSI), published in 2003, includes the following indicators:

number of Loss Time Injuries (LTI) for directly and indirectly employed workers, *number of fatalities* for directly and indirectly employed workers, *logistic fatalities* and *LTI frequency rates*. The CSI publishes the exact definitions of the above indicators and a list of guidelines about which accidents are work related and which are not (Cement Sustainability Initiative 2005). The industry level of incident reporting is beyond the scope of this study, which focuses on the corporate level.

In the corporate level, when an occupational health and safety related event has occurred, an authorized employee completes the corresponding report. This report could refer to a potential hazard, a near miss, an incident or an accident. In Chapter One, a definition of the three latter terms was given according to the OHSAS 18001:1999 specification. This study also introduces the first term, potential incident reporting, which refers to reporting of a situation which has been identified by an employee and suggests that an unusual condition is present in the front line of a plant and it is deemed by the reporter as a potential source of hazard. The nature of the industry and specific protocols and policy of the organization determine what should be reported and what not in the corporate level.

What is more, it is not only important to know what to report, but also the way it should be reported. The way a safety engineer fills a report may significantly vary among different industries and organizations. Again, this depends on the organization's policy, the nature of the industry, and apparently, on the person that makes the report. A safety report is usually a narrative, open ended description of what happened during an incident or accident. Once completed, the reports are forwarded to the authorized management staff that is responsible for initiating corrective and prevention action plans.

3.1.2 Reported data as safety performance measurement

The annual reported data constitute the basis for an organization's safety performance measurements. Performance indicators, such as the number of LTI's, LTI frequency rates and number of fatalities, but also potential hazards, near misses and safety training hours define the level of safety performance achievement. For an organization that is committed to continuous safety improvement, every year is a year with new safety targets.

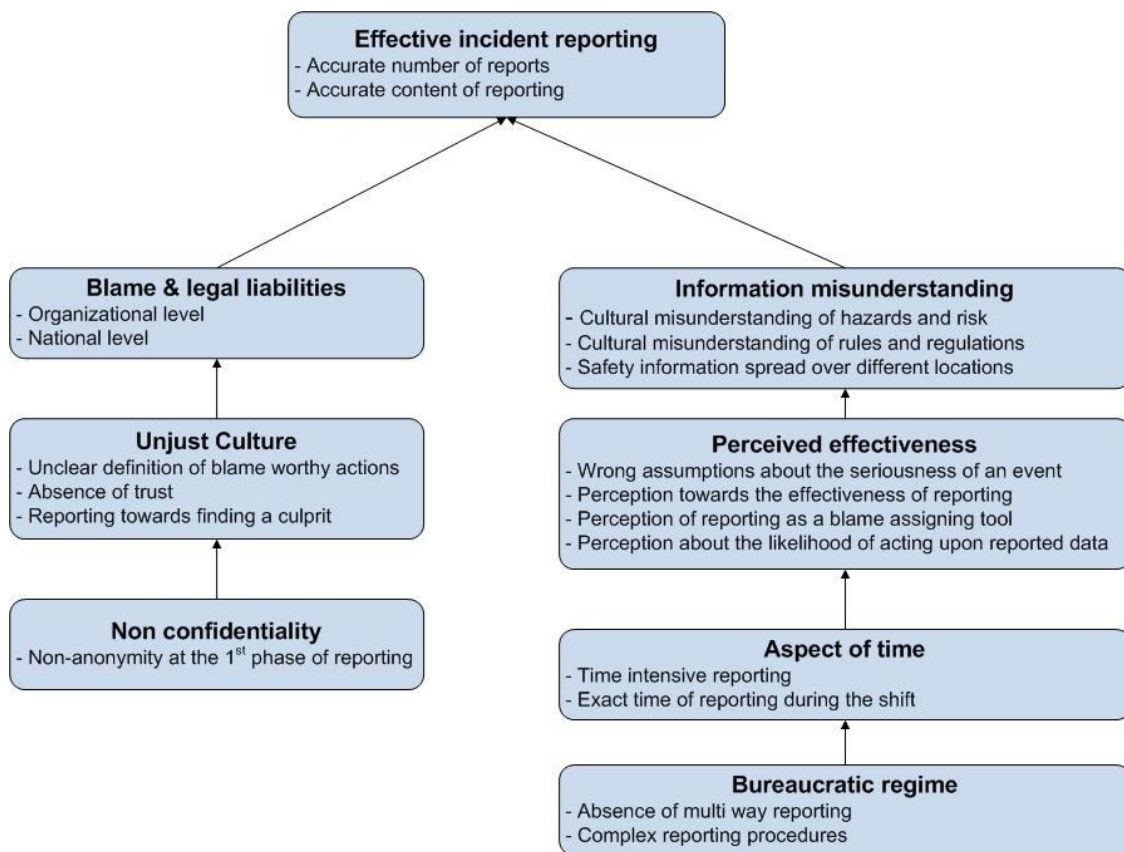
However, research studies show that it is not always trustworthy to base safety targets on performance indicators, due to underreporting. In Chapter One, the paradigms of the health care, oil and gas industry were given, where underreporting is deemed to be present. Apparently, if the safety experts of those industries are not sure that the correct amount of incidents has been reported, safety improvement plans may be condemned to be inadequate.

Next, the factors that may hinder incident reporting are analyzed.

3.2 The barriers to incident reporting

One could assert that a corporate reporting policy is effective when it motivates employees to report all the incidents that are indeed worthwhile reporting. Furthermore, the success of such policies depends on the ability of the authorized staff to report the right content. However, achieving a state of perfect reporting is not easy. Reason (Reason 1997) argues that human reaction to making mistakes can take various forms, and usually, frank confession of errors is not high on the list. It is difficult to motivate people to report honestly and accurately, because reporting behavior is ruled by several cultural and organizational factors. Those factors interact with the inherent tendency of individuals to avoid inculping themselves and the people around them.

There are several barriers that reporting systems may suffer from. In the following section the identified barriers are discussed. The following barrier theory is applicable in several hazardous industries, since it is dependant mostly on cultural organizational factors that are present in every industry and society. The findings are visually presented in the following graph.



3.2.1 Blame and legal liabilities

Despite the positive possibilities that blame and legal liability can bring to safety, most researchers in the field of safety culture agree that they are the most important barriers to incident reporting. When people know that responsibility brings accountability and legal liabilities, blame can positively motivate people to act carefully in order to avoid unsafe acts. However, if a guilty person has always to be found, people may emphasize more on avoiding blame rather than being honest and analytic in their safety reports. Therefore, the application of blame may be self defeating, resulting in the very state of poor or incomplete incident reporting, which is a precondition to organizational vulnerability (Pidgeon 1997).

Wagner et al (2006), in their study regarding the nursing homes industry, present the fear of blame and legal liability as the most important barriers to reporting. In the health care industry, it is normal that the reported information is documented and can be used as evidence in a legal

case, after a serious safety event has aroused. This discourages staff to report any type of event and there is evidence of many cases where reports remained unused or were destroyed, due to the belief that this will reduce the employees' liability risk. Weiner et al (2008) also attribute underreporting in the health care industry to the punitive approach that organizations may take with regards to safety incidents.

Similar conclusions can be drawn for other hazardous industries as well. For instance, Pidgeon (1997) mentions the example of the US aviation industry during the 1960's, where pilots tripled their reporting rates as soon as the US Federal Aviation Authority gave immunity from prosecution. As soon as the immunity was invoked, the reporting figures returned to the initial state. For Pidgeon (1997), the institutional dilemma of blame is at the heart of faulty reporting. He argues that danger and blame have been ubiquitous features of societies over the years and ensure that a culprit must be found after a serious safety event. Apparently, this does not only refer to the liabilities within the context of an organization, but also within society as a whole. When serious accidents occur, the higher national legal authorities take action in order deliver legal judgment over the incident. Therefore, even when individuals operate in a blame free corporate environment, there are higher institutions where they have to account for safety incidents. At the same time, national culture may influence the perceptions of higher authorities towards risk, hazards and punishment.

3.2.1.1 To blame or not to blame

Indeed, blame may corrupt organizational learning through hindering the reporting procedures. This does not mean that a non blame approach is the solution to the problem of underreporting. A blame approach is usually unavoidable at both the corporate and society level, where higher legal and regulation bodies exist and attribute liability on unacceptable safety failures. Possible non blame policy would be opposed to the idea of natural justice, which is represented by those bodies. Actually, a blame approach in an organization is essential, in order to protect the organization from losing credibility in the eyes of the workforce (Reason 1997).

When blame is present, organizational justice is the key element of a reporting culture (Reason 2000). Justice stands between blame and non blame. While blame is unavoidable, a "culture of justice" is an organizational context within professionals feel assured that they will receive fair

treatment when they report safety incidents (Weiner, Hobgood et al. 2008). In a true just environment, employees know what behavior is not acceptable and are encouraged, even rewarded, to report safety-related information.

3.2.2 The absence of justice

In an unjust organizational environment, employees do not share common perceptions regarding the line that separates blameless from blameworthy errors (Reason 2000). Without this line being clear, there is no way for a just culture to exist, because justice implies that there is a clearly defined set of actions that are blameworthy and people know that they will be punished if they commit them. Therefore, employees may hesitate to report safety incidents because of misunderstanding the blameworthy actions.

Furthermore, in a non just culture, an atmosphere of trust between safety reporters and managers that evaluate the reports is lacking. This means that employees do not feel sure that they will receive fair treatment when they report safety incidents or that they will be blamed unfairly. This maximizes the unavoidable effect of blame. Incident reporting always creates a sense of uncertainty and vulnerability, for those involved in an incident. Research has shown that people are reluctant to report safety incidents or other organizational problems if they believe that doing so exposes them to retaliation, ostracism or other unjustified negative consequences. When organizational justice is pervasive and trust has been established, employees feel protected from the undeserved and are less afraid of reporting their own mistakes in an explicit way (Weiner, Hobgood et al. 2008).

Finally, in an unjust corporate environment, managers may exert more emphasis upon assigning liabilities to culprits, rather than seeking for learning for mistakes. This is because an unjust culture does not entirely accept the belief that errors are inevitable. Taking the example of the health care industry, a common view of doctors when they refer to their extremely dynamic and fragile working environment, is that human errors cannot be entirely avoided. Safety evaluators, who may be managers with no health background, do not always agree with this belief (Ibid.).

Next to blame and organizational justice, effective incident reporting cannot be achieved in the absence of confidentiality. In the following paragraph, the absence of confidentiality is presented as the next barrier to incident reporting.

3.2.3 Non confidentiality

In order to enhance the feeling of justice and trust, the establishment of confidentiality during reporting is essential. This can be achieved through anonymous reporting. Anonymity can assure that the judgment of faulty actions is based only on the action itself; not on other circumstances, such as the level of hierarchy and authority within the organization, job position, nationality, gender and/or age. Comparing to the situation of personal data protection, maintaining anonymity until the evaluation of the seriousness of an event, can encourage employees to report their errors and near misses (Reason 1997).

However, total anonymity is not desirable, because it does not allow for constructive feedback from reporters. This is the case when an error has been evaluated as serious and needs to be further investigated. What is more, staff is expected to be more encouraged to report when they feel that they participate in the safety planning improvement; therefore, anonymity has to be removed at a certain point of incident investigations. When anonymity is removed, the establishment of the feeling of confidentiality is of significant importance, because it can motivate people to participate in safety reporting and improvement. Johnson (2002), who has conducted research on software tools that support incident reporting, agrees with the above and argues that such tools seem to facilitate a confidential incident reporting system.

The review of literature on incident reporting has shown that the sequence of blame, absence of justice and non-confidentiality are major barriers to effective incident reporting. Beyond blame, there are more barriers to effective reporting. Those are discussed in the next paragraphs.

3.2.4 Cultural misunderstandings of safety information

Incident reporting may be negatively affected due to preconditions that influence the way staff interpret safety information and risky situations. Pidgeon (1997) refers to those preconditions as information difficulties which can lead to critical misunderstandings.

Firstly, there may potential hazards and near misses, which are misunderstood because of wrong assumptions about their meaning and significance. Thus, a potential safety issue may not be outlined correctly and the corresponding report may not be accurate or not filled in at all. Apparently, corrective actions that are based on such information are misleading. This kind of information distortion may arise through an organizational as well as a cultural rigidity of beliefs about what is and what is not a hazard, and consequently what is report worthy and what not (Pidgeon 1997). Regarding cultural differences, there may be uncertainty about the interpretation and violation of regulations. Different cultures assign different level of importance on the ultimate goals of a working organization. For instance, regulations may be more easily violated in a culture where bigger or faster production is deemed more important than maintaining a totally healthy and safe environment. Hence, when cultural beliefs towards risks and hazards do not assign the appropriate significance on safety, the process of incident reporting is negatively affected. Incidents that may be significant for one culture may not be deemed report-worthy in another. Similarly, the rules of incident reporting may be easily misinterpreted, because of the different attitude that individuals from different cultures may have towards regulation and fixed rules.

A similar kind of information distortion can arise when potential hazards and near misses go unnoticed because of inherent organizational difficulties in handling information, especially in the case of a company that is spread over different regions (Pidgeon 1997). When safety information, including reports, is dispersed among different locations, then employees with different cultural background may interpret it differently.

Next to the cultural misunderstandings of safety information, another barrier is the perceived effectiveness of incident reporting.

3.2.5 The perceived effectiveness of incident reporting

According to Wagner et al (2006), the potential perception of staff that reporting a particular event will not improve any situation in the organization's safety, can encourage underreporting. According to the above research in the medical industry, doctors, who operate in a highly uncertain and versatile working environment, claim that they have more important things to do instead of reporting incidents. Obviously, they underestimate the effectiveness of reporting and this misperception may arise due to a number of reasons.

Firstly, as it was mentioned in the previous paragraph, the perceived effectiveness of incident reporting may differ amongst individuals due to cultural misunderstanding of information. This misunderstanding may influence the perceived effectiveness of incident reporting and demotivate individuals to report an event, due a wrong assumption that an event is negligible or unworthy to report. Consequently, the potential reporter does not believe that reporting such an event may improve safety performance.

Secondly, it is a false common practice among organizations that safety reports are used only to monitor liability rather than improve safety. For instance, in the health care industry it has been found that medical professionals are more likely to report events when the outcome seems to be negative from the liability point of view (Weiner, Hobgood et al. 2008). In this case, the reporters do not value the importance of reporting as a tool to improve safety, but as a tool to assign blame.

Similarly, employees may be skeptical about the usefulness of reporting and the likelihood of management acting upon reported information. This results in the perception that reporting is a useless procedure, so the incentive to report is low.

The aspect of time is another potential barrier to incident reporting, which is discussed in the next paragraph.

3.2.6 The aspect of time

Normally, it is difficult for people to confess that the time during their shift is enough to allow for an additional reporting session, especially in the case when reporting is not perceived to be effective. Reporting requires from employees a considerable amount of time and they may invoke time constraints and work pressure as a reason for not reporting a hazard or incident.

An additional time aspect that may hinder reporting is the exact time during the working day that reports should be filled. The organization's policy defines if employees are free to report safety events at any time during their shift or at a specified time. In some industries, such as the health care industry, is common for employees to devote the last period of their working day to reporting. However, research has identified cases of reluctance to report incidents in the end of the working day (Wagner, Capezuti et al. 2006). In the case that reporting can be freely fulfilled at any time of the worker's shift, it depends on the individuals how they may manage this opportunity. As it has been discussed in Chapter 2, in monochronic cultures, people tend to avoid keeping themselves busy with more than one task a time (Missana 2006). In this case, making a report during any time of the day may be inconvenient, hence, postponed or canceled by the potential reporter.

Time is a universally valuable good, but different cultures perceive it differently. The effect of time on incident reporting may be maximized if the reporting system is complex and not clear to potential reporters. In the next paragraph, the bureaucratic regime of incident reporting is presented as the next barrier to incident reporting.

3.2.7 Bureaucratic regime

An effective reporting system should not only motivate staff to report as much as possible, but also report the correct information. There are numerous reporting systems that may be used. The most common means is doing it by filling a form. Ideally, a reporting system provides numerous alternatives to potential reporters. For instance, the UK Health and Safety Executive organization (2008) implements a multi-way incident reporting system, in which employees

have different alternatives to report a workplace incident. The easiest and faster way of reporting, according to the Executive, is by telephone. The advantage of reporting via telephone is that the reporter has direct contact with an administration appointee, who can ask questions and take down appropriate details in real time, ensuring that all the relevant information is documented. The next alternative is filling reporting forms. Different forms may be available according to the nature of the reported incident. The forms can be filled in online via a web interface or sent to the authorities by email or by regular mail service (Health and Safety Executive, 2008). Deciding the ideal reporting schema is not a trivial task. Filling online reports may sound fast and efficient; however, this highly depends on the level of proficiency of the reporters regarding the usage of computer systems. Highly educated professionals may positively respond towards an electronic reporting system, but front line workers in a hazardous industry may be unable to use such a reporting means. At all cases, the means of reporting should facilitate the reporting procedure and encourage individuals to report events, without making them feeling that they go into complex bureaucratic procedures.

Apparently, the reporting schema should ensure that the reporting process should only take a few minutes. A complicated documentation system contributes to reluctance among employees to use it.

4 Culture, organizations and incident reporting

Cultural dimensions have several implications for the way people behave in their working environment. In this chapter, the meaning of Hofstede's (2001) dimensions for the work field and consequently, for incident reporting, are discussed. Only three cultural dimensions of Hofstede were utilized for the purpose of this study; Power distance (PDI), Uncertainty avoidance (UAI) and Individualism versus Collectivism (IDV). Masculinity (MAS) dimension was not deemed to influence incident reporting in one or another way. Unlike the above mentioned dimensions, it did not reveal enough bases in order to formulate any kind of hypotheses regarding its influence on safety incident reporting. Long term orientation (LTO) dimension was also decided to be left out of this research because it was the newest and less validated dimension of all the rest. LTO dimension was extracted from a research based on student samples from (only) 23 countries and was added in Hofstede's framework in order to identify the cultural differences between the East and the West. Thus, it was not deemed to be relevant for this research study.

4.1 Power distance

In Chapter Two, it was argued that power distance deals with the fundamental issue of human inequality. In a corporate environment, human inequalities are represented by the relationship between subordinates and superiors, which is influenced, among others by power distance. Subordinates from different cultures show different behavior towards their superiors and vice versa. Power distance may affect the extent to which subordinates feel free to disagree with managers and the preferred decision making style of the latter. In corporations that operate in high PDI cultures the authority is usually concentrated at the top of the hierarchy, whereas in low PDI cultures it is more distributed to lower levels of hierarchy. This hierarchy represents the actual difference in power and not just the difference in the roles, which is the case in lower PDI cultures. What is more, managers tend to rely on formal rules and subordinates usually expect

to be told what to do, rather than be consulted. The salary range between bottom and higher levels members of the hierarchy is wider than in low PDI cultures and employees tend to feel underpaid and dissatisfied with their careers.

4.1.1 Power distance and incident reporting

In his book, *Culture's Consequences* (2001), Hofstede refers to various studies that replicate his research and that might have various implications for incident reporting.

In one of those (Kipnis 1972), it is shown that in high PDI cultures the more powerful individuals tend to devalue the value of the performance of the less powerful. In another study among students of 12 different countries, Furnham (1993) has measured the attitudes of the respondents towards the idea of a just world. It was concluded that in societies with a higher PDI, students tend to perceive the world as an unjust place. In the context of safety incident reporting in hazardous organizations, where the fear of blame and the absence of a “culture of justice” are major barriers to effective reporting, it can be argued that in cultures with high PDI, individuals are more likely to feel discouraged from accurate reporting of safety incidents.

Another study referring to Latin America and India (Negandhi and Prasad 1971), suggests that in high PDI cultures the underdog, the inferior, is usually the first to be blamed when something wrong has occurred in the system, whereas in low PDI cultures the system is blamed instead. Hofstede (2001) supports the above finding by pointing out similar findings in his research in some European countries. He argues that in high PDI cultures there is a constant and latent conflict between the powerful and the powerless, some kind of a basic mistrust that is always present. Such feelings of mistrust may definitely undermine the evolution of a “culture of justice” in organizations, which is again considered as a major barrier to effective incident reporting.

Besides, in low PDI cultures the management system is more participative. This implies a more consultative management style, where both subordinates and bosses tend to collaborate more in decision making and accomplishing of tasks, rather than that the subordinate waits to be told what to do. Under these circumstances, subordinates are usually more motivated to take

initiatives in their working environment. Reporting safety incidents requires from potential reporters to have such motivations to take initiatives, so that they would not rely on their bosses or colleagues when a potential hazard has to be reported. Thus, it can be argued that in high PDI cultures, employees are expected to be more hesitant to report safety events in their working environment.

Regarding the influence of power distance on incident reporting the following hypotheses were formulated.

- *“The higher the power distance is, the more likely it is that the employees will perceive incident reporting as a means to attribute blame and will attempt to avoid blame by not reporting a safety incident”*
- *“The higher the power distance is, the more likely it is that the employees will believe that safety investigations are not objective and just”*
- *“The higher the power distance is, the more likely it is that the employees will be more reluctant to take reporting initiatives.”*

4.2 Uncertainty avoidance

Uncertainty avoidance deals with the fundamental problem of how much anxiety people feel in the face of an unknown future. Organizations deal with the uncertainties of an unknown future by exploiting opportunities offered by technology, setting up behavioral rules and following corporate rituals.

Rules and rituals are of significant importance for safety management. Safety plans are based on rules and rituals and demand total obedience by operators in order to perform tasks in a healthy and safe manner. In general, rules and rituals help reducing the uncertainties caused by the unpredictability of employees' and external stakeholders' behavior, by making it predictable.

Rituals, such as safety training programs, intend to ensure that the people who participate in these programs are fully aware of how they should follow safety rules and plans.

Although it may sound paradoxical, according to Hofstede (2001) people from uncertainty avoiding cultures are often prepared to engage in risky behavior in order to reduce ambiguities. All cultures imply that people take risks, but in high UAI cultures, they are limited to known risks. If UAI is low, risk taking includes the acceptance of also unknown risks, such as changing employers. At work high UAI is associated with employment stability. Such stable employer-employee relations are of course a way for both sides to avoid employment uncertainties.

4.2.1 Uncertainty avoidance and incident reporting

The review on uncertainty avoidance revealed interesting outcomes regarding possible influences on incident reporting.

The potential of blame and legal liabilities when engaging in an occupational accident can be definitely seen as a source of uncertainty for employees. Thus, it can be expected that the higher the uncertainty avoidance in a culture, more employees are expected to be reluctant to report in order to avoid blame.

Furthermore, employees with different cultural (occupational or national) backgrounds respond to rules in different ways. In general, the stronger a culture's tendency to avoid uncertainty is, the greater its need for rules and legislation. Regarding safety management, it can be expected that uncertainty avoidant individuals are more likely to be (or have the need to be) aware of the importance of understanding and following rules, due to their inherent need for such systems. However, this need does not essentially mean that a high level of rule awareness is existent. Also, the need for rules does not mean that uncertainty avoiding people have confidence in the rules as well. Hofstede (2001) has identified a negative correlation between high uncertainty avoidance and confidence in rules. It can be expected that highly uncertainty avoidant people will not show the same level of trust to the incident reporting and investigation systems, which can hinder effective incident reporting, as discussed previously. This mistrust could lead to

people breaking safety rules and laws easier. If the rules are not considered to be fair or correct, it can be the case that employees believe that they should break them.

Regarding the influence of uncertainty avoidance on incident reporting the following hypotheses were formulated.

“The higher the uncertainty avoidance is, the more likely it is that employees will be reluctant to report incidents, which is a major source of uncertainty.”

“The higher the uncertainty avoidance is, the more likely it is that employees will be or will have the willingness to be fully aware of liabilities and safety and reporting procedures.”

“The higher the uncertainty avoidance is, the more likely it is that employees will prioritize core operational tasks vis a vis reporting.”

4.3 Individualism versus Collectivism

Individualism versus Collectivism dimension deals with the fundamental issue of the integration of individuals into primary groups and the relationship between the individual and the group. When considering organizations, the term ‘individual’ refers to the employee and the term ‘group’ refers to work mates/team seen as a group entity and the organization as a whole. An individualistic employee usually acts according to his/her own self-interest, in a way that it will overlap with the interest of the employers. In collectivist cultures, employees are not dealt with as sole individuals, but as individuals that are members of a group. Taking the in-group into account when hiring people, is a common practice in collectivistic cultures. Choosing people that are from a known social network (relatives, friendship and occupational networks) reduces the risk of the unknown. People that accompanied with appropriate references from a trustworthy appointee can be trusted more easily by the employer. This is usually undesirable in individualistic cultures, because in such cultures people perceive such practices as nepotism.

4.3.1 Individualism versus collectivism and incident reporting

The review on the Individualism cultural dimension revealed interesting outcomes regarding the influences that it may exert on safety incident reporting.

In Chapter Two, the distinction between *shame* and *guilt* cultures, together with the correlation of this dimension with *Collectivism versus Individualism* respectively, was discussed. Regarding safety reporting, it can be argued that in shame cultures operators may show more tendencies to break safety rules as long as they keep it unnoticed from other colleagues and the company, and of course falsely believe that it will not end to an occupational accident. The perception of going unnoticed by the group may be stronger than safety directives.

Taking the in-group into account in the corporate environment may also have a negative influence on incident reporting due to group bias. Safety reporting should be objective and free of any kind of bias. The inherent incorporation of the group interest automatically distracts reporters from accurate reporting.

Regarding the influence of *Individualism versus Collectivism* cultural dimensions on incident reporting the following hypotheses were formulated.

“The higher collectivism is, the more likely it is that employees will take in-groups interest into account when evaluating an incident.”

“The higher collectivism is, the more likely it is that employees will attempt to protect the interests of the in-group when making safety reports.”

“The higher collectivism is, the more the fact of going unnoticed by the group when braking a safety rule will prevail safety directives, and the more likely it is that employees will brake a safety rule, if they believe that their action will not result into a safety incident.”

5 Research methodology

Next to the discussion on the literature review and the hypotheses that were formulated regarding the influence of cultural dimensions on safety incident reporting, Chapter Five discusses the research methodology that was followed during this study.

5.1 Research strategies

Literature shows that there are various approaches that a researcher may adopt in order to collect the data that are going to be analyzed and give the answers to his/her research questions. Doorewaard et al. (2005) distinguish between five strategies that one may follow in order to conduct a research project. Those strategies are survey, experiment, case study, grounded theory approach and desk research. The final choice of the strategy depends on whether the researcher wants to obtain a broad overview of a selected discipline or phenomenon or whether he/she is more interested in a detailed investigation of certain aspects of a phenomenon spread out over a period of time and space. In other words, this is a choice between breadth and depth. A choice that partially fulfills both of the above requirements is also possible and popular. What is more, according to Doorewaard et al. (2005), when choosing a strategy, a second related central question concerns whether the researcher prefers quantification or prefers a qualitative and interpreting approach in his/her research. Finally, the researcher has to choose between an empirical and a desk research study. In the first case, the data is gathered by him/her; the conclusions are drawn by the analysis of the collected data. In the second case, existing literature and data already gathered by others are used in order to answer the research questions. Again, the researcher may choose to select an approach that combines empirical and desk research.

This study was conducted using a combination of the desk research and survey strategy. The experiment approach would require setting up field experiments in the test site, in close cooperation with employees that are exposed to industrial hazards and are potential reporters

of potential hazards, near misses and accidents. This would require numerous visits to the plant, observation and recording of the employees reporting behavior. Apparently, the time and budget constraints did not allow considering such an approach. The case study approach was rejected for the same reason. A case study would again require selecting a test site, following it closely, interviewing the employees involved in hazardous operations and drawing qualitative conclusions about the research questions. Finally, the grounded theory approach is not suitable for the particular project. The purpose of this study' is not to develop a new theory; but to gather data about The Company's employee's attitude towards incident reporting and attempt to predict their reporting behavior according to their answers and index scores on cultural dimensions. The chosen methodology was based on the already developed, validated and replicated framework of Hofstede, and existing literature in the domain of Safety Science.

Most importantly, the focus on the particular project was on breadth rather than depth. The main purpose was to gain insight on facts and opinions within the context of safety reporting in hazardous industries in general, not in the particular industry, with regard to national cultural dimensions. The survey methodology is the most appropriate for this purpose and it is a common practice in social and management sciences, where description of current practices and behavior prediction is being sought for.

5.2 The methodology

The methodology that was followed in order to explore the influence of national culture on the reporting behavior of employees in hazardous industries is outlined below. The research methodology is presented in logical sections, each of which corresponds to a separate research activity. The research activities were the following:

- **Phase 1**
 - Desk research and review of relevant literature
 - Informal face to face and telephone interviews
 - Compilation of the acquired knowledge
- **Phase 2**
 - Selection of the data collection tool
 - Development of the data collection tool

- Data Collection
 - Selection of the sample
 - Data collection process
- **Phase 3**
 - Data analysis
 - Calculation of index scores of the cultural dimensions according to the formulas provided by the corresponding literature
 - Extraction of the factors that summarize the independent variables of research, that is to say the factors that represent The Company's employees' attitude towards the factors that are candidates to strongly influence the reporting performance. Those attitude factors may be used to predict the incident reporting behavior of the research units
 - Exploration of the possible correlations between The Company's employees' reporting behavior and
 - cultural dimensions, and
 - demographic characteristics of the sample

More details on the above are discussed in the following paragraphs.

5.2.1 Phase 1

5.2.1.1 Desk research and review of relevant literature

The first phase of this study started with a desk research and review of existing literature on the domains of safety science and national culture frameworks. Literature on safety management systems, safety culture frameworks, safety inspection tools, incident reporting practices and incident reporting barriers were used in order to gain insight on what incident reporting is, its importance for safety management and the nature of the factors that may hinder its effective implementation. Next, a literature review on already established national culture frameworks was conducted. The purpose of this phase was dual; firstly, to understand in depth the notion of culture and the ways it can be measured, if it can be measured, and secondly, choose one of the frameworks to incorporate in this research project.

5.2.1.2 Face to face and telephone interviews

Two face to face and several telephone interviews with the Safety Engineer of the selected test site were conducted during the research project. The interviews with the Safety Engineer contributed to deeper understanding on how incident reporting is implemented in the particular cement plant and what role it plays for the overall safety management and performance. There are several incident reporting policies that a company may adopt. Understanding how reporting works in the particular plant of The Company was essential in order to develop the question survey on reporting.

5.2.1.3 Compilation of the acquired knowledge

The last part of Phase 1 was dedicated to the compilation of the above knowledge in order to explore what are the possible effects of national culture on human behavior in the workplace, and consequently, on safety reporting behavior of employees in hazardous industries. The desk research concluded with the formulation of the hypotheses for the influence of each cultural dimension on incident reporting.

5.2.2 Phase 2

5.2.2.1 Selection of the data collection tool

Provided that the survey strategy was chosen, the next concern was the type of survey that should be used. A questionnaire survey can be done either by organizing thorough open interviews with front line employees and managers in the plant or by developing a broader questionnaire survey with closed questions, aiming at a greater audience within the selected test site. The second option, which was chosen, offered the opportunity to obtain the desired information from a wider audience and with less administrative and time costs. The perspective of reaching a large number of research units and measuring its behavior pattern through closed opinion questions was deemed as more suitable, rather than doing specialized discussions with a significantly smaller sample. The closed questionnaire survey approach offered the possibility to explore in a broad way the reporting behavioral patterns of an as large as possible number of industry employees.

5.2.2.2 Development of the data collection tool

The questionnaire survey was developed in order to serve as the data collection instrument. A questionnaire survey is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. The use of closed questionnaire surveys is a common practice in social sciences. Questionnaires have advantages over some other types of surveys in that they are cost-effective, do not require as much effort from the questioner as verbal or telephone surveys, and often have standardized answers that make it simple to compile data. However, such standardized answers may frustrate users and limit their answering options, especially when using closed-ended questions, which has been the case for this study. Indeed, closed-ended questions are quick to answer and easy to code; however, one may stress the fact that they can draw misleading conclusions because of limited range of options that they provide. The use of a 5 level Likert scale for the answers was deemed enough to cover a good range of possible answers. At any case, the size of the sample is far too big for open-ended questions.

During the development of the questionnaire special attention was paid on the following:

- Simple wording of questions in order to be clear and easy to interpret
- Simple and clean 'look and feel' of the final paper format
- Use of a balanced number of questionnaire items representing each of the independent variables
- Use of the appropriate scale for the answers of the opinion questions

Regarding the answer scales, the use of the Likert scale was decided as the most appropriate. A Likert scale is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement or disagreement to a statement.

The typical five point Likert scale, which is also used in this questionnaire, consists of five possible answers: *Strongly agree, Disagree, Neither agree, nor disagree, Agree, Strongly agree*. Such a Likert scale was used by Hofstede in his Values Survey Module '94 (Hofstede 2001). In order to avoid distortion due to acquiescence bias, a scale with odd rather than even number of scale items was used. In the case of even scale items, the "neither agree, nor disagree" item is

missing, meaning that the respondent is forced to give an opinion, positive or negative, which may be the cause for unreliable response data.

Additionally, the final questionnaire survey had to be translated into Greek. It is common that cross-cultural research faces the problem of translating surveys from one language to another. Performing translations in such a case is not a trivial task, because there is a high possibility of missing important concepts when translating the questions. This is due to the inherent contextual differences of languages, and the unavoidable language bias of the translators, even in the case of them being bilingual (Hofstede 2001). Hofstede (Ibid.) proposes a two way translation of his survey by two bilinguals. The potential differences between the original text and the back translated text may be resolved through discussion between the two translators. In order to ensure the integrity of the translation, the questionnaire of this study has been first translated by the author into Greek. Following, the Safety Engineer of the selected plant was requested to translate it back into English. Before the final text confirmation, the differences between the two translations were discussed and resolved. Finally, a professional translator-interpreter was consulted in order to fine tune the translated text.

In the following paragraphs, the development of the questionnaire is explained. The questionnaire can be divided into four sections.

5.2.2.2.1 Section 1: Introductory page

The purpose of the first page of the questionnaire was to introduce the research project to the respondents, by explaining in a brief and concise way the project participants, its scope and the significance of the respondent's participation in it. The page concludes with the filling in instructions, with special emphasis on the importance of filling in all the provided questions.

5.2.2.2.2 Section 2: National values module (questions 1-16)

This is the part where the question set begins. It consists of 16 questions, retrieved by Hofstede's Values Survey Module (VSM) '94 (Hofstede 2001). The purpose of this part is to calculate the index scores of the sample, regarding Hofstede's four cultural dimensions.

Hofstede conducted the first international questionnaire survey in 1966. Since then, he has developed several improved versions of the VSM. The questionnaire, on which his literature has been based, consists of 80 questions and was standardized in 1971. In a later edition, VSM '82 served as an improved research instrument by leaving out some questions and adding some new ones. VSM '82 contains 47 content and 6 demographic questions. Only 13, of the 47, questions intended to calculate the four cultural dimensions (PDI, UAI, IDV and MAS). The rest were not needed for calculating index scores and they have been included for experimental purposes. VSM '94, on which the particular research study has been based, contains 20 content questions (4 items per dimension). The last cultural dimension, LTO, was added for the first time in that module. VSM '94 is the result of adapting the previous versions of the VSM, according to the research requirements that arose during the whole project. It is more compact, containing only 20 content questions, and more robust, pointing also to respondents other than typical employees, such as entrepreneurs, students and housewives. Thus, VSM '94 was chosen for this research project.

Besides, the questions that VSM '94 uses to calculate the index scores for the LTO dimension have been omitted. The first reason is that the validity and reliability of those items are still under question. Hofstede added the LTO dimension into his theoretical framework after conducting an international study with a survey instrument developed with Chinese employees and managers. It has been applied only to 23 countries, mainly coming from Eastern cultures, but also some major Western countries, such as the USA. Respondents from Greece, and a lot more Western countries, have not been consulted to answer the corresponding question items and LTO index scores for those countries have not been published at all.

As a result, the questionnaire of this study contains 16 questions of VSM '94. A number of questions needed to be slightly changed or paraphrased, in order to ensure that they would be clear to the respondents of the selected sample. In the following table, the original VSM '94 questions that have been changed are presented.

VSM 94 (original question)		Modified question
Introductory text of questions 1 to 8	Please think of an ideal job, disregarding your present job, if	Please think of an ideal job, not necessarily your present job. In

	you have one. In choosing the ideal job, how important would it be to you,	choosing an ideal job, how important would it be to you,
Question 1	to have sufficient time for your personal or family life?	to have sufficient personal time next to your job?
Question 5	to work with people who cooperate well with one another	to work together with people who cooperate well with one another?
Question 8	to have an element of variety and adventure in the job	to have an element of variety and challenges in your job?
Questions 9-12	LTO questions	Omitted
Question 13	How often do you feel nervous or tense at work?	At your work at Company A, how often do you feel nervous or tense at work?
Question 17	An organizational structure in which certain subordinates have two bosses should be avoided at all costs.	An organizational structure with two bosses in which employees have to report to both of them, should be avoided at all cost.
Question 19	A company's or organization's rules should not be broken-not even when the employee thinks it is in the company's best interest.	A company's rules should not be broken; not even when the employee thinks it is in the company's best interest.

5.2.2.2.3 Section 3: Incident reporting module (questions 17-30)

In the third section of the questionnaire, the respondents are requested to answer the questions about their attitude towards safety incident reporting in their company. The data collected by this part were used in order to predict their reporting behavior and explore the possible correlations with cultural dimensions and demographic characteristics of the respondents. Each question item represents a dependent variable of the research study. All dependant variables have been used in the factor analysis, in order to extract those factors that represent the employees' attitude towards incident reporting.

The development of questions 17-30 has been based on:

- the barriers to incident reporting, as they have been identified by literature review on the domain of Safety Science, Safety Management and incident reporting (Chapter Three), and
- the already developed and validated safety culture inspection toolkit, developed by Human Engineering Limited (Human Engineering Ltd, 2008) for the UK Health and Safety Executive (Health and Safety Executive, 2005).

The toolkit was developed in order to inspect safety culture in UK rail companies. According to the research report, the toolkit focuses on the following indicators that are known to influence an organization's safety culture:

- Leadership
- Two-Way Communication
- Employee involvement
- Learning Culture
- Attitude towards blame

The inspection toolkit consists of open questions that have been developed for use in open interview surveys. They are scenario based, meaning that each set of questions is based on a certain safety scenario in the railway industry. Among others, the questions aim at assessing the following criteria:

- Safety concern reporting
- Awareness and adherence to personal accountabilities
- Presence of just culture
- Safety concern investigation
- Incident investigation
- Individual ownership of safety responsibilities

The compilation of literature review and safety culture inspection toolkit led to the development of the 14 incident reporting questions. Each question requests the opinion of the respondent regarding a certain aspect of incident reporting.

5.2.2.2.4 Section 4: Demographics

In the last section of the questionnaire (questions 31 to 37), the respondents are requested to fill in the demographic questions, regarding their gender, age, education level, level of job, job department and their employment duration in The Company. Those items were essential in order to analyze the sample of the respondents, categorize it into groups and interpret the results of data analysis according to those groups. The development of this section was based on the demographics section of VSM '94. Some questions needed to be slightly changed in order to fit with the context of The Company. The nationality origin questions were omitted, because they were irrelevant for the specific sample.

5.2.2.3 Data Collection

5.2.2.3.1 Selection of the sample

The main objective of this research study was to explore the influence of national culture on incident reporting, by collecting data regarding the reporting behavior of a hazardous industry's employees. As a result, the site that should be selected for the survey execution should fulfill the following requirements:

- A plant with a large enough number of employees (research units), in order to ensure a large enough sample size
- A plant with an integrated set of industry activities, in order to ensure that it is a representative plant for the specific industry
- A plant in which the co-operation with the Safety Engineer would be guaranteed, in order to ensure the formation of the appropriate response groups.

The selected plant fulfilled all the above requirements. It is one of the largest plants of The Company in Greece. Apart from the main cement production activities, the plant serves as a major distribution point, by earth and sea (company owned port) and produces concrete as well. The selected plant employs 203 people in total.

5.2.2.3.2 Data collection process

Prior to the survey execution, management permission from The Company was requested in order to proceed in the respondents' group formation. Given the fact that the survey was confined to a local area and The Company was willing and able to constitute groups of

employees to respond to the questionnaire inside the particular plant, the administration process of the survey execution was assigned to the Safety Engineer of the plant. He was responsible for distributing the questionnaire in paper format and introducing the research topic to the respondents. When needed he motivated participation and answered to questions that arised during the filling in procedure.

5.2.3 Phase 3

5.2.3.1 Data analysis

In the last phase of the research, the analysis of the collected data was conducted using the Statistical Package for Social Sciences (SPSS) version 16. In the following chapter, the procedures and results of the data analysis are presented.

6 Data analysis and results

Chapter Six discusses the statistical analysis of the collected data, together with the related tables, graphs and results.

6.1 Phase 1: Data file preparation

The data file was prepared in order to be ready for analysis with SPSS. Each variable was defined and labeled with an identification number and a descriptive label. Next, each of the possible responses was assigned a number. All the above were documented in the codebook, which is presented in Appendix B. Thereupon, the collected data were manually entered into a data (SPSS) file.

6.1.1 Data screening and cleaning

During the data entry process, various input (e.g. typing or reading) errors were made. Furthermore, the data set itself contained unfitting or missing values, possibly due to negligence on the side of the respondent. Not identifying or treating such errors as if they are correct would result in a wrong data analysis and equally wrong results. Thus, the data set was cleaned and screened first, in order to enhance its integrity and reliability.

6.1.1.1 Error identification and correction

The error identification process involves the check for values that fall outside the range of possible values for a variable. Errors were checked by using *Frequencies* analysis (categorical variables) and *Descriptive* analysis (continuous variables) in SPSS. The minimum and maximum values of variables were checked, in order to make sure that all values did make sense, and the number of missing values per variable was examined. Several errors were identified and corrected.

6.2 Phase 2: Preliminary analyses

At the time of the research study, a total of 198 people were employed in the cement plant. This set of people constitutes the research population of the study. The invitation to participate in the survey was sent to the Safety Engineer of the plant, who distributed the questionnaires amongst the employees. A total of 51 employees responded. Those employees constitute the sample of the research study.

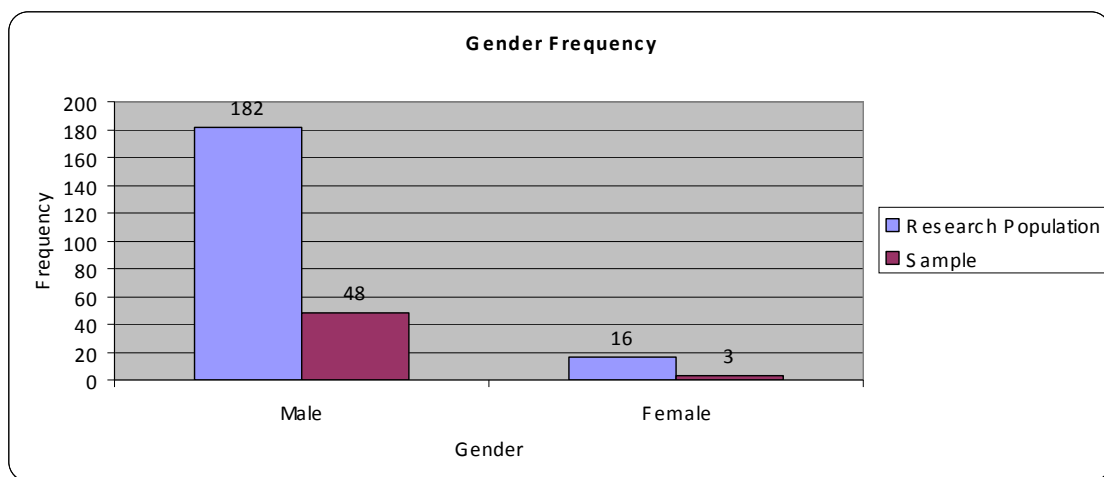
6.2.1 Descriptive statistics

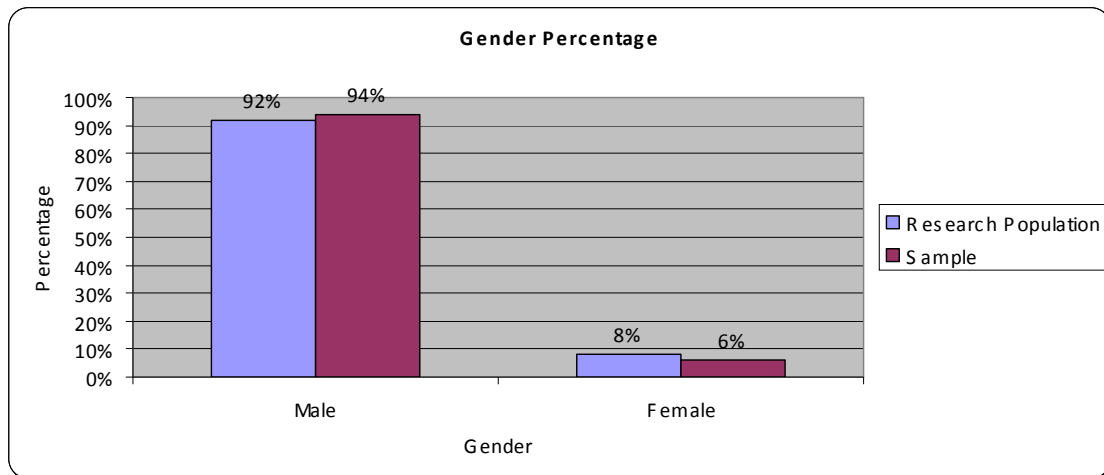
In this paragraph, an overview of the results, regarding the individual characteristics of the survey respondents, is presented. Firstly, the descriptive statistical analysis for categorical variables (*Gender, Level of education, Job level, Job department, Self reporting in previous year*) is discussed. Next, the descriptive statistics for continuous variables (*Age, Employment duration*) are discussed.

6.2.1.1 Categorical variables

6.2.1.1.1 Gender

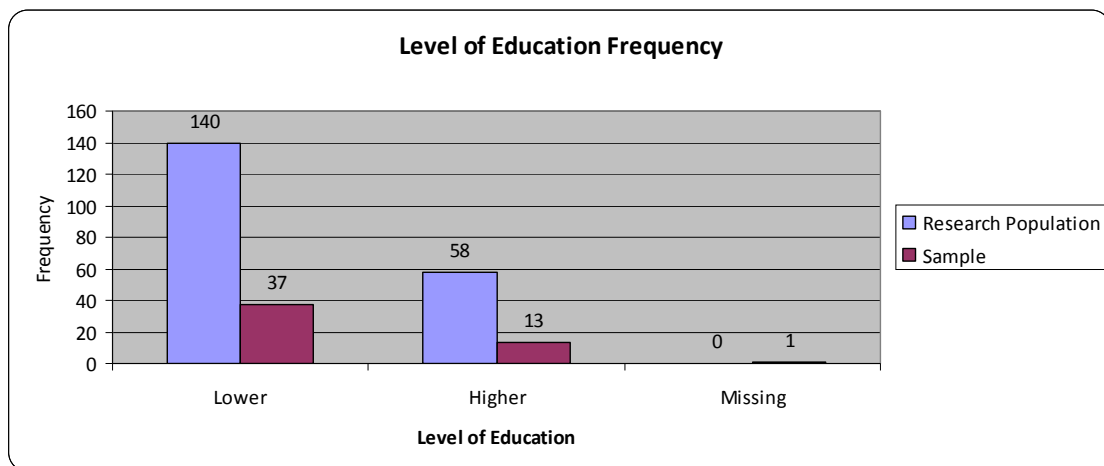
The respondents were provided with two options (*Male, Female*) in order to indicate their gender. The following graphs show the frequency and the percentage of *Male* and *Female* employees in the research population and the sample.

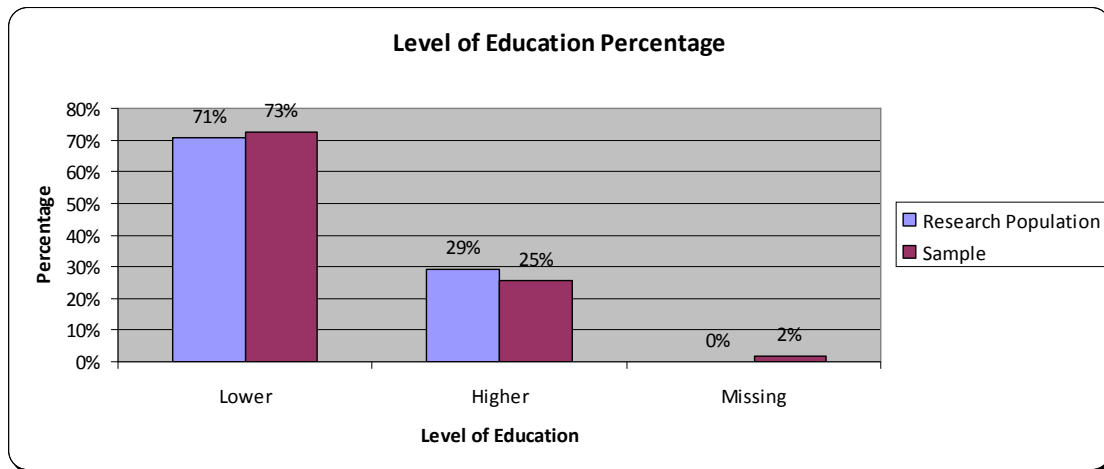




6.2.1.1.2 Level of Education

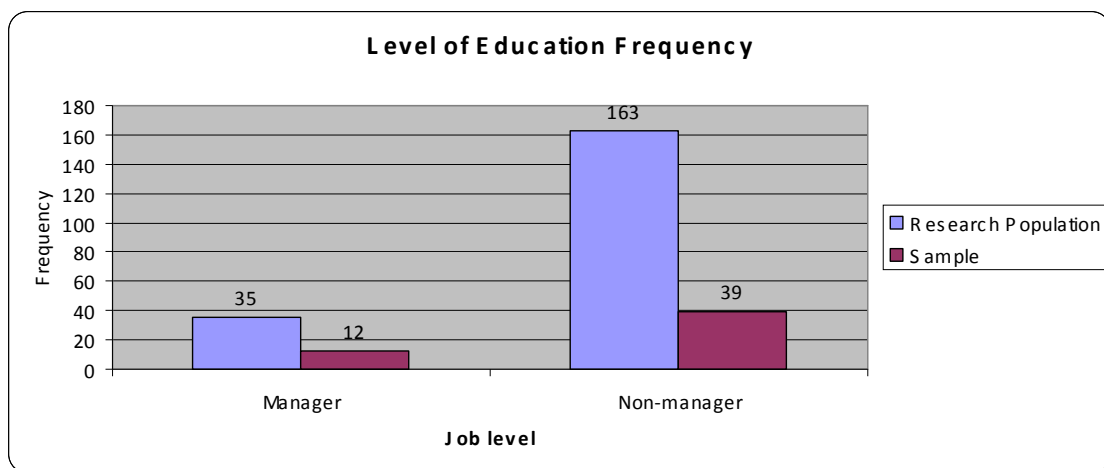
The respondents were provided with five options (*High school, Lower HBO, HBO, University and Postgraduate*) in order to fill in their level of education. SPSS was used in order to collapse those categories into two new categories, *Basic education* (including *High school* and *Lower HBO* options) and *Higher education* (including *HBO, University and Postgraduate* options). The new categorical variable was called *q33_edu_collapsed* and labeled *33: Education level (2 categories)*. The following graphs show the frequency and the percentage of *Basic education* and *Higher education* employees in the research population and the sample.

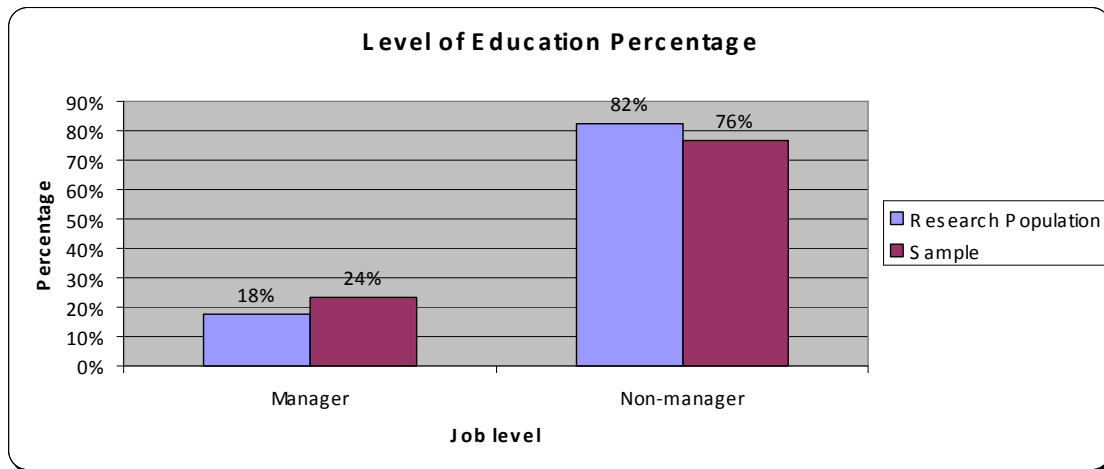




6.2.1.1.3 Job Level

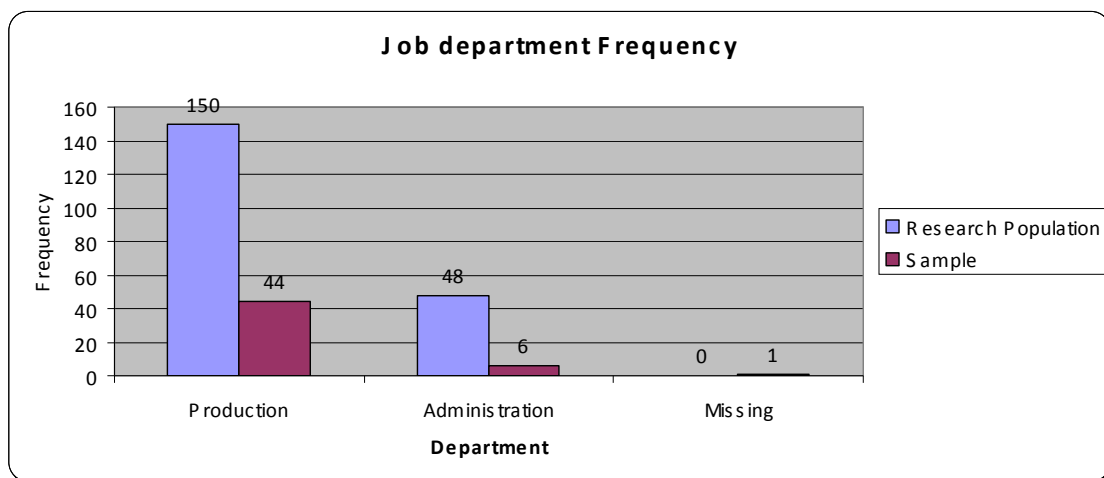
The respondents were provided with five options (*Higher department manager, Department manager, Department foreman, Office Worker and Frontline worker/technician*) in order to fill in their job level. SPSS was used in order to collapse those categories into two new categories, *Manager* (including *Higher department manager, Department manager and Department foreman* options) and *Non-manager* (including *Office Worker and Frontline worker/technician* options). The new categorical variable was called *q34_lev_collapsed* and labeled 34: *Job level (2 categories)*. The following graphs show the frequency and percentage of *Managers* and *Non-managers* in the sample and the research population.

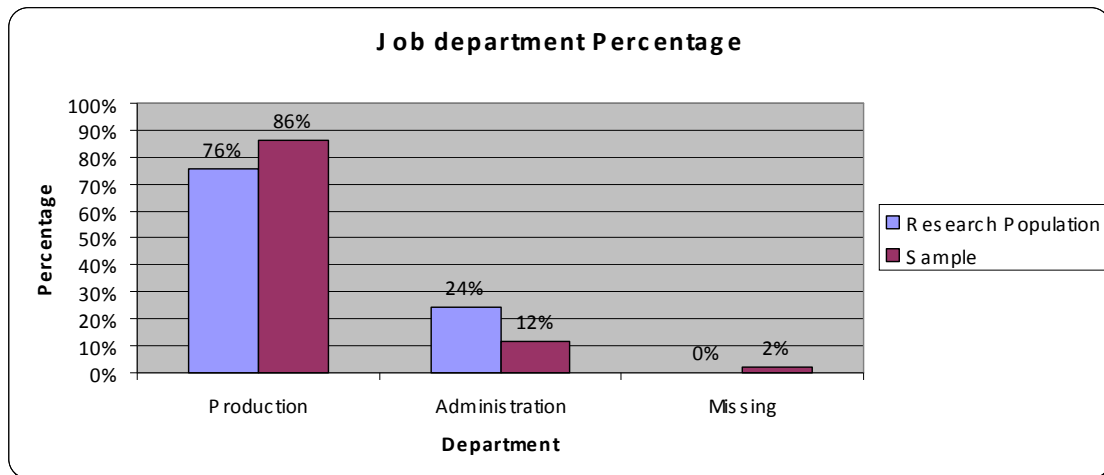




6.2.1.1.4 Job department

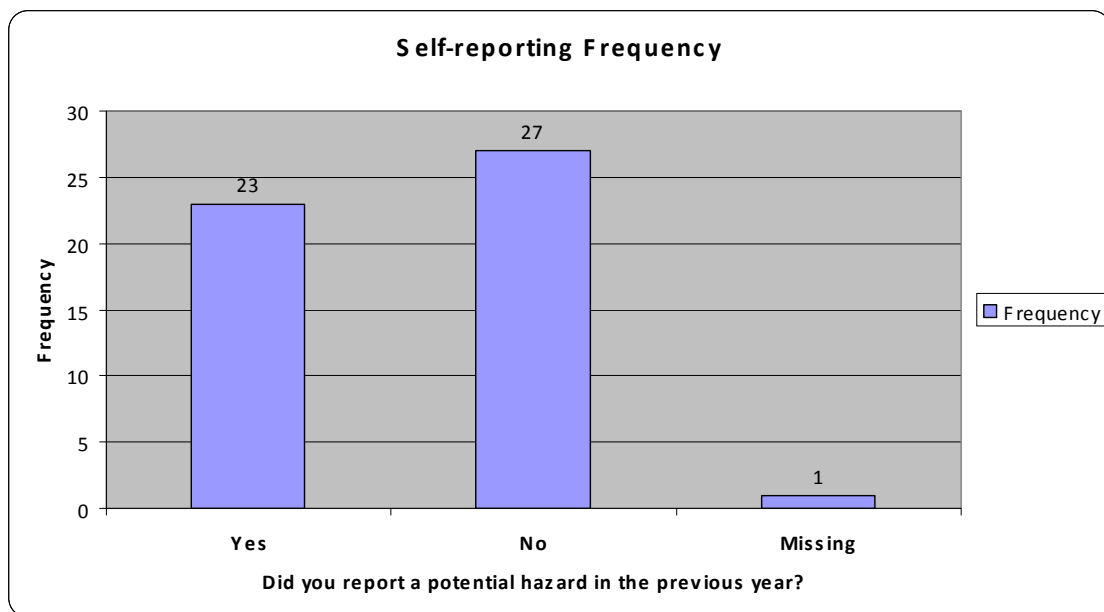
The respondents were provided with two options (*Production department* and *Administration department*) in order to fill in the department in which they work in the cement plant. The following graphs show the frequency and percentage of *Production* and *Administration department* employees in the sample and the research population.

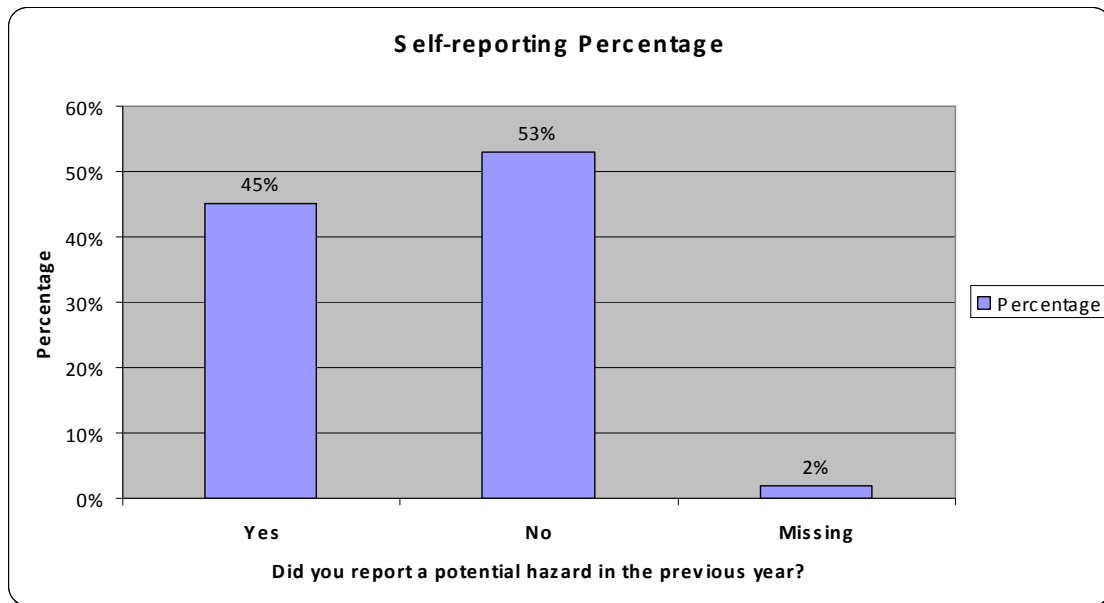




6.2.1.1.5 Self reporting in previous year

The respondents were provided with two options (*Yes* and *No*) in order to answer if they had reported a potential hazard in the previous year. No data were reported for the research population regarding this variable. The following graph shows the frequency and percentage of each of the provided answers.





6.2.1.1.6 Sample and research population data comparison

SPSS was used in order to conduct a chi-square goodness of fit test, in order to determine whether the sample frequencies differ significantly from the research population frequencies.

The null hypothesis for this test took the following form:

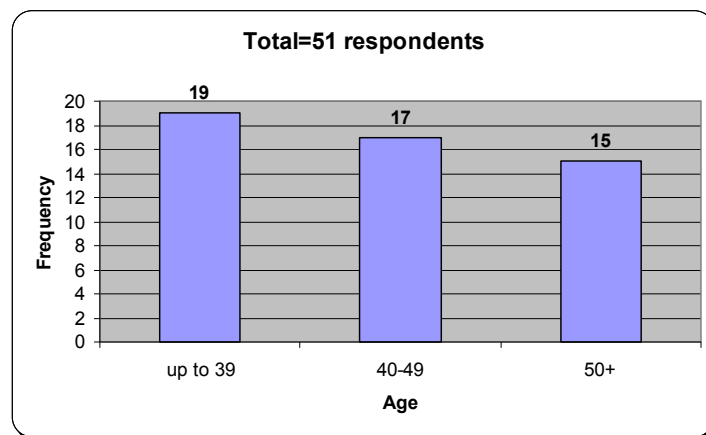
“H₀: The sample data frequencies for each one of the categorical variables are consistent with the research population data frequencies”

The chosen significance level was 0,05. If the p value is calculated lower than the significance level, the null hypothesis should be rejected. The results of the chi-square goodness of fit test for each categorical variable are presented in Appendix B. The null hypothesis was accepted for all categorical variables apart from *Job department*, where the ratio of Production and Administration department employees in the sample was concluded to differ significantly from that in the research population.

6.2.1.2 Continuous variables

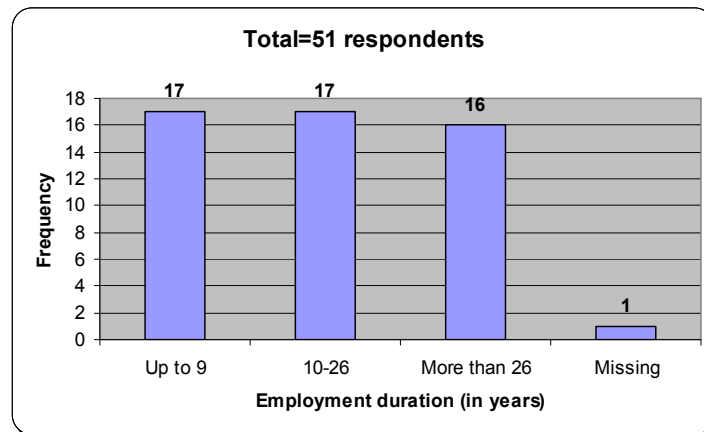
6.2.1.2.1 Age

The respondents were asked to fill in their age. The mean age of the employees in the sample is 43,1 years, with a standard deviation of 8,92. SPSS was used in order to collapse the age variable into three equal groups (*up to 39 years old, 40-49 years old and older than 50 years old*). The new categorical variable was called *q32_age_collapsed* and labeled *32: Age (into categories)*. No data were reported for the research population regarding this variable. The following graph shows the frequency for each age category.



6.2.1.2.2 Employment duration

The respondents were asked to fill in the number of years that they have been working for the cement company. The mean value of employment duration in the sample is 18 years, with a standard deviation of 11,55. SPSS was used in order to collapse the *Employment duration* variable into three equal groups (*up to 9 years, 10 to 26 years and more than 26 years*). The new categorical variable was called *q36_dur_collapsed* and labeled *36: Employment duration (into categories)*. No data were available for the research population regarding this variable. In the following graph the frequencies for each Employment duration category are shown.



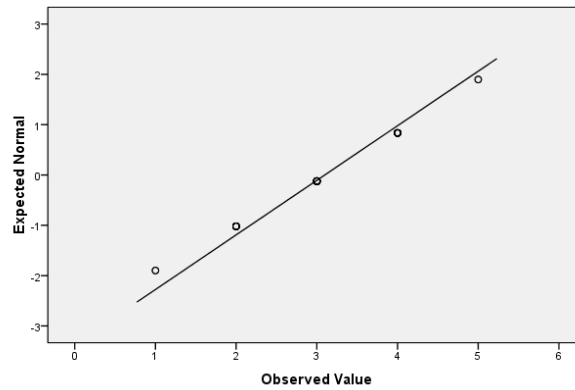
6.2.2 Inspection of variables distributions

The next step of the preliminary data analysis involved the inspection of the variables distributions.

The Kolmogorov-Smirnov test, which compares a variable with a reference distribution, was conducted in order to assess if the variables distributions differ significantly from the normal distribution. As it is being argued later in this chapter, data normality is a prerequisite in order to be able to conduct parametric statistical tests. The Sig. value of the statistic was reported 0,00 for each variable, which is less than 0,05. This suggested a significant result and a violation of the assumption that the distributions of the variables were normal. The descriptive statistics results (mean, skewness, kurtosis and histograms) for the cultural dimensions items and the results of the Kolmogorov-Smirnov test are presented in Appendix B.

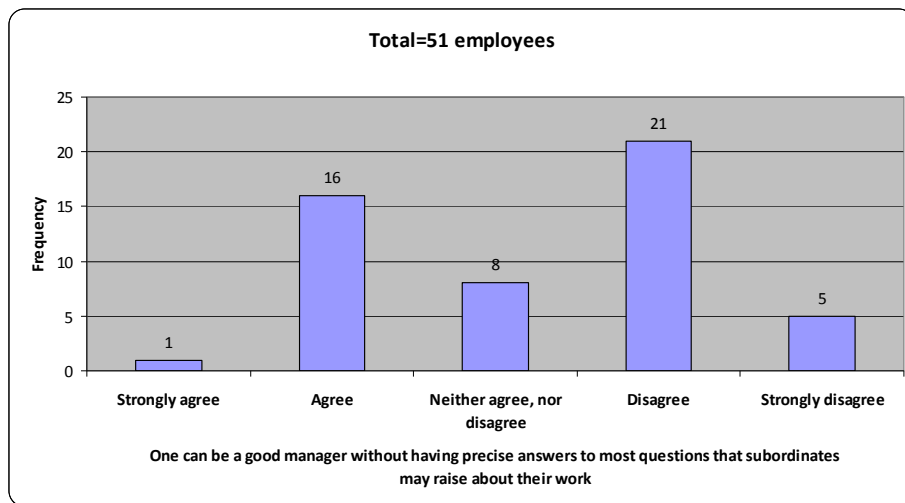
A further inspection of the variable histograms suggested that most of the results did not deviate too much from normality. This was also supported by an inspection of the normal probability plots. In this plot, the observed value for each item is plotted against the expected value from the normal distribution. In the case of a perfectly normal distribution, the observed values points should form a straight line, with a direction from the lower left part of the graph to the upper right part. Since obtaining a normal distribution is impossible, when the observed values points do not deviate too much from the straight line, it can be assumed that the distribution does not deviate too much from normality. An example of such a normal probability

plot is shown in the following graph. The plot refers to Item No 11: “*Most people can be trusted*”. The graph confirms that the (observed) dots do not deviate too much from the (expected) straight line.



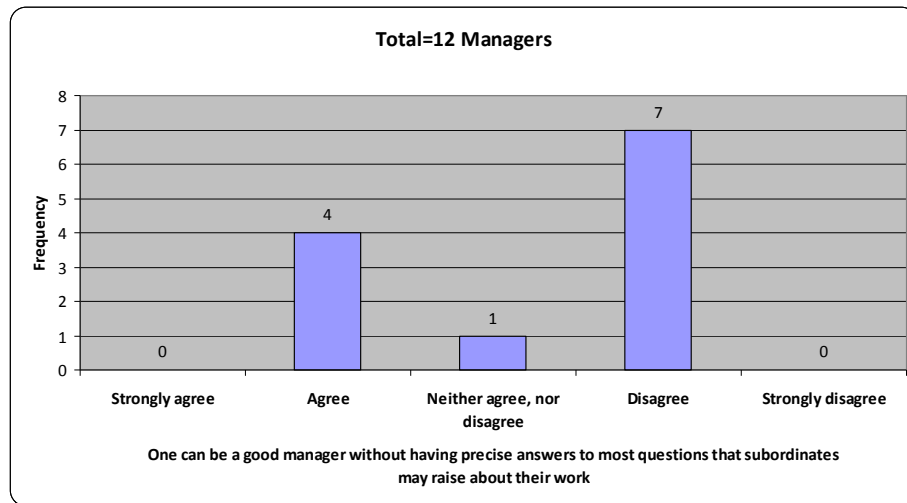
Normal probability plot of Item No 11: “*Most people can be trusted*”

The analysis also revealed that most of the items were unimodal and skewed either to the left or to the right, meaning that most of the answers to specific items were clustered either to the left towards lower values (positive skewness) or to the right (negative skewness). Among the questionnaire items, Item No 12: “*One can be a good manager without having precise answers to most questions that subordinates may raise about their work.*” had a bimodal distribution, suggesting a “strangely” distributed variable.

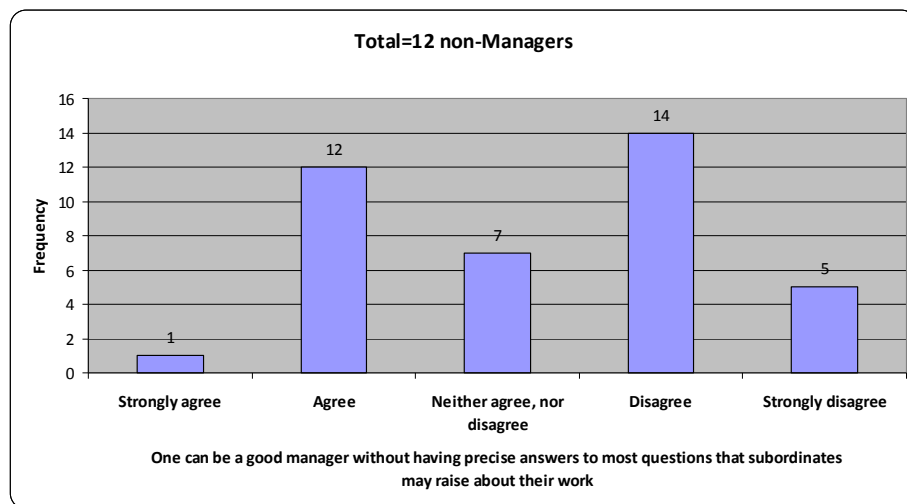


Sample frequencies of Item No 12: “*One can be a good manager without having precise answers to most questions that subordinates may raise about their work*”

In order to explain the above behavior, it was assumed that managers were expected to have responded differently from non-managers in this question. The new variable 34: *Job level (2 categories)* was used in order to inspect the validity of this assumption. The frequencies of each of the responses for each new category (*Manager, Non-manager*) are presented in the following graphs.



Managers frequencies of Item No 12: *"One can be a good manager without having precise answers to most questions that subordinates may raise about their work"*



Non-managers frequencies of Item No 12: *"One can be a good manager without having precise answers to most questions that subordinates may raise about their work"*

The above graphs do not validate the assumption that managers responded differently from non-managers in Item No 12. Both graphs are bimodal as well, suggesting that the variable has an inherent grouping functionality.

6.2.3 Data transformation

Prior to performing factor and scale reliability analysis, it was essential to ensure that all questionnaire items pointed towards the same direction. During the questionnaire development, some scales were deliberately worded in a certain direction in order to prevent response bias. Preserving the validity of further analysis required that the items that were worded in the negative direction were reversed. In the next paragraph, examples of the negatively worded items are given. Next to this example, the entire set of the reversed items is reported.

6.2.3.1 Cultural dimensions questionnaire items

The questionnaire consists of sixteen items that were derived from the VSM '94. Those items represent the four cultural dimensions of Hofstede.

Originally, *Item No 3* was worded negatively, meaning that answers of high score (Of very little or no importance=5) indicate low power distance. This was also the case for *Item No 13* in which a high score (Strongly disagree=5) means low PDI. On the contrary, *Item No 6* and *Item No 10* were worded in the positive direction, meaning that high scores indicated high PDI. Similarly, it has been concluded that *Items No 1, 7, 8, 14, 15* and *16* have been worded in the negative direction and *Items No 1, 2, 4, 5, 9* and *11* in the positive direction.

In order to ensure that all items have a similar interpretation, that is to say a high score in each item indicates high endorsement of the corresponding scale, those items were reversed using SPSS.

6.2.3.2 Incident reporting questionnaire items

The second part of the questionnaire consisted of 14 items exploring the attitude of employees towards safety and incident reporting. *Items No 17, 18, 19, 20, 21, 22, 23, 25, 26* and *29* have been worded in a way that a high score in each of the variables means that the respondent (strongly) disagrees with the statement. This implies a low score in safety attitude and beliefs, which is the measure that the survey attempts to compute. Therefore, the items were reversed

as well. After the reversion, a highly scored response would imply a high score in the measurement of safety attitudes and beliefs scale.

6.2.4 Cultural dimensions index calculation

In this paragraph, the index scores for Hofstede's cultural dimensions are calculated. All questions are scored on a five-point scale (1, 2, 3, 4, 5). Index scores on Hofstede's dimensions are derived from the mean scores on each question, according to the following formulas. The formulas are accompanied with the corresponding score calculation (m(x) is the mean score for question x).

Power Distance Index (PDI) calculation formula and score

$$\text{PDI} = -35 * \text{mean}(03) + 35 * \text{mean}(06) + 25 * \text{mean}(14) - 20 * \text{mean}(17) - 20 = \mathbf{30.02}$$

Individualism Index (IDV) calculation formula and score

$$\text{IDV} = -50 * \text{mean}(01) + 30 * \text{mean}(02) + 20 * \text{mean}(04) - 25 * \text{mean}(08) + 130 = \mathbf{73.53}$$

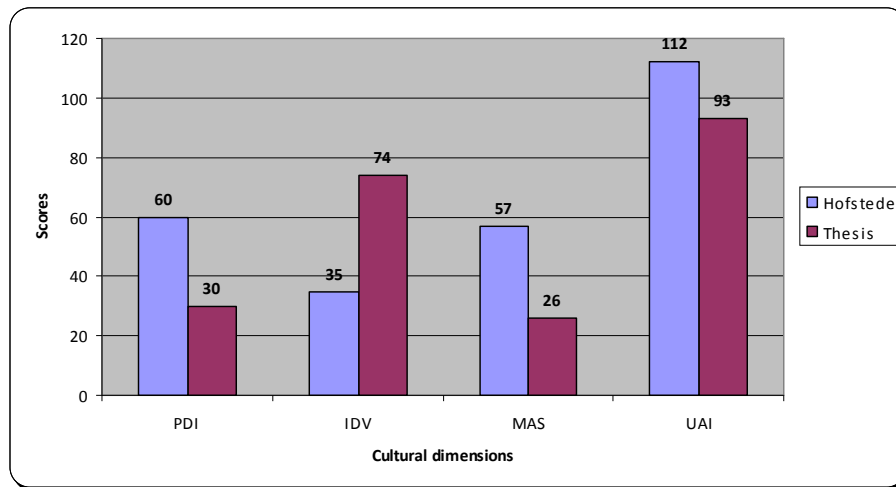
Masculinity Index (MAS) calculation formula and score

$$\text{MAS} = 60 * \text{mean}(05) - 20 * \text{mean}(07) + 20 * \text{mean}(15) - 70 * \text{mean}(20) + 100 = \mathbf{26.13}$$

Uncertainty Avoidance Index (UAI) calculation formula and score

$$\text{UAI} = 25 * \text{mean}(13) + 20 * \text{mean}(16) - 50 * \text{mean}(18) - 15 * \text{mean}(19) + 120 = \mathbf{92.65}$$

In the following graph, the indices that were calculated using the sample means are presented together with the indices calculated by Hofstede.



The scores that were calculated using the sample data deviate from Hofstede's scores, coming from his IBM research data. The calculated IDV sample score (74) is significantly higher than the original IDV (35) score for Greek culture. The survey respondents answered the IDV questions pointing into the individualistic direction, contrary to Hofstede's survey results, which indicate that Greek culture is highly collectivistic. Regarding PDI, MAS and UAI scores, all calculated scores are lower than the Hofstede scores. However, they follow a similar pattern compared to these. The sample UAI score is much higher than the other indices scores and also still high enough in order to assume that it complies with the original results, where Greek culture is found at the very top of the scale. PDI and MAS scores are both lower than the original, but, interestingly, both of them show similar levels of deviation from the original results.

6.2.4.1 The usage of VSM'94

The VSM '94 was developed for comparing culturally determined values of people from two or more countries or regions and it allows scores to be computed on five dimensions of national or regional culture. However, its usage is limited by several assumptions and findings.

The scores interpretation is based on the finding that the answers to the questions vary substantially between nationalities. This neither means that the respondents of one nationality would always give the same answers, nor that all respondents from different nationalities would always give different answers. It means that on average a sample of respondents from one nationality is expected to score lower or higher than a comparable sample of people from

another nationality.¹ In the context of this study, it is impossible to draw any definite conclusions regarding the cultural values of the sample, since no data from another sample, with similar characteristics and from another culture, were available. As a result, comparing the sample data scores with the originally calculated scores is not warranted. Nevertheless, the index calculation did reveal some analogies with the original results, i.e. a high score on UAI.

Although the VSM '94 questionnaire is meant for use at the country (national) level, it can be used to compare responses from individuals sharing another common characteristic, i.e. other than nationality, such as occupation, employers, industries etc. Apparently, such usage of the questionnaire would reveal different scores for cultural dimensions. Hofstede recommends that if this is the case, the answers should be examined question by question and not combined into cultural dimensions, since they are not expected to form the same five clusters of cultural dimensions scales. More details about the possibilities to explore the same five clusters of cultural dimensions are discussed later in this chapter. Principal Components Analysis statistical technique was used in order to summarize the questionnaire items into a smaller number of scales. Given the sample, it was not possible to form any set of robust summarizing variables.

6.2.5 Principal Components Analysis

Principal Components Analysis (PCA) is a data reduction technique that has as its purpose the reduction of a number of variables into a number of components that summarize and describe the initial variable set in a more compact way. It involves a mathematical procedure which transforms a number of possibly correlated variables into a smaller number of uncorrelated variables, the components.

A known limitation of the current research study is the fact that the sample size (51 respondents) is considered to be relatively small for PCA. The size of the sample is one of the main issues to consider before performing this technique in order to receive a robust set of summarizing components. Pallant (2005) suggests that the larger the sample size is, the higher

¹ This is a statistical expectation. Besides, there are additional requirements to the composition of the sample (Hofstede, 2001).

the suitability of the data for PCA is and the higher the robustness of the final model is. Besides, she cites several rules suggested by scientists regarding the recommended data size, and argues that there is little agreement amongst them concerning how large a sample should be.

6.2.5.1 Hofstede variables

Firstly, the sixteen items of the first part of the questionnaire, which were extracted from the VSM' 94, were subjected to Principal Components Analysis (PCA) using SPSS.

Besides the sample size, the main issue to assess prior to performing PCA is the strength of the inter-correlations among the analyzed items. This strength is assessed by the inspection of the correlation matrix for evidence of coefficients greater than 0,3. The inspection of the correlation matrix revealed a low number of coefficients (51 out of 256) which were greater than 0,3. In addition, SPSS generated two more statistical measures in order to help assess the factorability of the data; Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Pallant (2005) suggests that the first measure should reach statistical significance, which is the case for the particular items, and the second should be greater than 0,6, which is marginally higher than the measure found in the particular test (0,594). The above results did not provide an adequate basis for proceeding to the next level of PCA. Nevertheless, several SPSS runs were conducted in order to explore the extracted components. The components formed a different cluster of scales than Hofstede's original cultural dimensions. However, those components were later subjected to reliability analysis and did not show adequate internal consistency. This supported the suggestion that in a context other than Hofstede's original research study, those items should be treated one by one.

6.2.5.2 Items questioning the attitude towards incident reporting

The fourteen items that were included in the second part of the questionnaire and canvas the attitude of the respondents towards incident reporting and occupational safety were subjected to PCA, in order to attempt to summarize them into a smaller set of extracted components, which would be used for further analysis.

6.2.5.2.1 Data suitability assessment

During the inspection of the inter-correlation between the analyzed items, the correlation matrix revealed the presence of a reasonable number of correlation coefficients (78 out of 196) which are greater than 0,3. The KMO value was 0,697, exceeding the recommended value of 0,6 and the Bartlett's Test of Sphericity reached statistical significance. According to Pallant (2005), the above findings support the factorability of the correlation matrix.

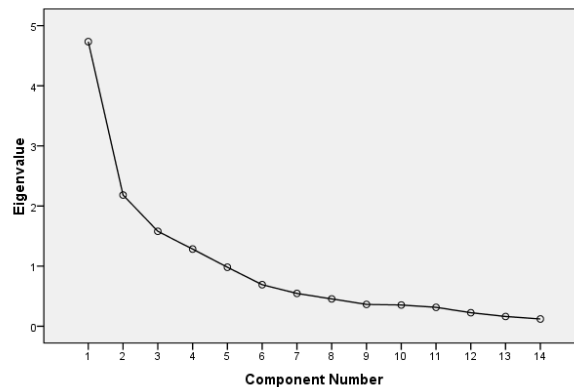
6.2.5.2.2 Components extraction

The goal of this analysis was to find a simple and robust solution. The first means a solution with as few factors as possible and the latter a solution that reveals components which explain the most possible variance in the original data set. Several attempts and SPSS runs were conducted in order to come to an acceptable final solution.

Firstly, the Kaiser's criterion technique was used in order to assist in the decision concerning the number of components to extract. According to this criterion, only components with an eigenvalue greater than 1 should be retained for further investigation. The eigenvalue of a factor represents the amount of the total variance explained by that factor. PCA revealed the presence of four components with eigenvalues greater than 1. The following table shows the eigenvalues for each component, the percentage of the variance explained by each of them and the cumulative percentage.

Component No	Eigenvalue	% of Variance	Cumulative %
1	4.733	33.810	33.810
2	2.183	15.593	49.403
3	1.580	11.283	60.686
4	1.284	9.173	69.859

Next, the scree test technique was used in order to decide which factors should be retained. SPSS plots each of the eigenvalues of the factors. The plot output was inspected in order to find a point at which the shape of the curve changes direction radically and becomes horizontal.



According to this technique, all the factors above the break in the plot should be retained, because those are the factors that contribute the most to the explanation of the variance in the data set. The inspection of the scree plot revealed a most radical change in the shape of the plot after the second component. Therefore, two components or (at the most) three should be kept for further investigation.

Finally, the Component Matrix, provided by the SPSS output, showed the loadings of each of the items on the extracted components. SPSS uses the eigenvalue criterion in order to compose this matrix. The following table presents the loadings on the four components that were extracted.

Item no	Component			
	1	2	3	4
20: I believe that reporting every single potential hazard, near miss or accident is worthwhile, because it really helps improving safety conditions at my workplace	.808			
19: At my work, it is easy for somebody to report a potential hazard	.765		-.439	
18: I know what to do, in order to report a potential hazard at my workplace	.752			
23: Near miss and accident investigations are carried out in order to improve the safety conditions	.674			
21: I know that I have certain safety responsibilities, which I should not break at any case	.618	-.443	.438	
17: The safety rules at my work are clear to all employees	.613	-.531		
25: Near miss and accident investigations at my workplace are always objective and fair	.581	-.363		-.456
30: As long as one of my colleagues does not get an occupational accident, it is acceptable for me to break a safety rule	.521	.646	.313	
27: Reporting a potential hazard at my work wastes too much valuable time from my job	.379	.643		-.473
28: In case that reporting a potential hazard or investigating a near miss or an accident is against the interest of my colleagues, I will definitely NOT report it	.408	.627	.490	
24: Near miss and accident investigations are carried out in order to attribute blame to the employees involved	.486	.340	-.618	
22: I am completely aware of the fact that breaking safety rules may find their way to my personal employment records	.446	-.421	.573	
26: If I notice a potential hazard, I will report it immediately, not wait for my colleagues or manager to do it instead	.425			.658
29: If I get an occupational accident, it will probably be my own fault, not somebody else's fault	.426			.514

The above table shows that most of the items load quite strongly (above 0,4) on the first two components. Less items load on the third component and even less on the fourth. Those loadings are lower as well. This supports the conclusion from the scree plot criterion to retain two or (at most) three components from the analysis.

In order to find a simple and robust solution, several unsuccessful attempts were made in order to come to a final acceptable model. These attempts revealed a final two components solution. The final solution was arrived at by using the component rotation technique. Rotation presents the patterns of item loadings in a manner that is easier to interpret, without changing the underlying component model.

The fourteen items were subjected again to PCA, but this time only two components were chosen to be extracted. Also, a Varimax rotation was performed.

The following table shows the eigenvalues for each component, the percentage of the variance explained by each of them and the cumulative percentage.

Component	Eigenvalue	% of Variance	Cumulative %
1	3.886	27.756	27.756
2	3.031	21.647	49.403

The total variance explained by the two factors did not change after rotation, however the way the explained variance is distributed between the two components has changed.

The Rotated Component Matrix, provided by the SPSS output, shows the loadings of each of the items on the extracted components. The table shows that eight out of fourteen items have a substantial loading on the first component and five out of fourteen on the second component (loadings greater than 0,5) ². Besides, four out of fourteen items load on both components.

² This is an arbitrary criterion and has been chosen according to similar paradigms in the reviewed literature (Pallant, 2005)

Varimax Rotation		Component	
Item no		1	2
17: The safety rules at my work are clear to all employees		.807	
21: I know that I have certain safety responsibilities, which I should not break at any case		.761	
18: I know what to do, in order to report a potential hazard at my workplace		.703	.307
25: Near miss and accident investigations at my workplace are always objective and fair		.684	
19: At my work, it is easy for somebody to report a potential hazard		.616	.454
22: I am completely aware of the fact that breaking safety rules may find their way to my personal employment records		.607	
23: Near miss and accident investigations are carried out in order to improve the safety conditions		.570	.361
26: If I notice a potential hazard, I will report it immediately, not wait for my colleagues or manager to do it instead		.383	
30: As long as one of my colleagues does not get an occupational accident, it is acceptable for me to break a safety rule			.828
28: In case that reporting a potential hazard or investigating a near miss or an accident is against the interest of my colleagues, I will definitely NOT report it			.748
27: Reporting a potential hazard at my work wastes too much valuable time from my job			.744
20: I believe that reporting every single potential hazard, near miss or accident is worthwhile, because it really helps improving safety conditions at my workplace	.579	.581	
24: Near miss and accident investigations are carried out in order to attribute blame to the employees involved		.558	
29: If I get an occupational accident, it will probably be my own fault, not somebody else's fault		.314	

Next, the fourteen items were subjected to Oblimin rotation. Oblimin rotation allows the original orthogonal components to be correlated with one another. The Component Correlation Matrix revealed a value of 0,249 for the correlation of the two extracted components. This can be considered a quite low value, meaning that the relationship between the components is not particularly strong and that, perhaps, an orthogonal solution is more appropriate.

The Pattern Matrix, provided by the SPSS output, shows the loadings of each of the items on the extracted components. The results are presented in the following table.

Oblimin Rotation		Component	
Item no		1	2
17: The safety rules at my work are clear to all employees		.837	
21: I know that I have certain safety responsibilities, which I should not break at any case		.783	
25: Near miss and accident investigations at my workplace are always objective and fair		.700	
18: I know what to do, in order to report a potential hazard at my workplace		.695	
22: I am completely aware of the fact that breaking safety rules may find their way to my personal employment records		.632	
19: At my work, it is easy for somebody to report a potential hazard		.592	.360
23: Near miss and accident investigations are carried out in order to improve the safety conditions		.553	
20: I believe that reporting every single potential hazard, near miss or accident is worthwhile, because it really helps improving safety conditions at my workplace		.543	.495
26: If I notice a potential hazard, I will report it immediately, not wait for my colleagues or manager to do it instead		.377	
29: If I get an occupational accident, it will probably be my own fault, not somebody else's fault			
30: As long as one of my colleagues does not get an occupational accident, it is acceptable for me to break a safety rule			.835
27: Reporting a potential hazard at my work wastes too much valuable time from my job			.768
28: In case that reporting a potential hazard or investigating a near miss or an accident is against the interest of my colleagues, I will definitely NOT report it			.767
24: Near miss and accident investigations are carried out in order to attribute blame to the employees involved			.535

The table shows that Oblimin rotation provided a cleaner solution, since only two items load on two components at the same time. *Item No 19* loads on the first component stronger than it loads on the second. *Item No 20* loads almost the same on both components. Eight out of fourteen items load substantially on the first component and four out of fourteen on the second (loadings greater than 0,5). *Item No 29* (“If I get an occupational accident, it will probably be my own fault, not somebody else’s fault”) was identified to load on none of the two Components and was eliminated from any further analysis.

The items with the highest loading on each component were used in order to identify the latent variable underlying each component. The following table shows which items were eliminated from further analysis.

Component 1	Loadings
17: The safety rules at my work are clear to all employees	.837
21: I know that I have certain safety responsibilities, which I should not break at any case	.783
25: Near miss and accident investigations at my workplace are always objective and fair	.700
18: I know what to do, in order to report a potential hazard at my workplace	.695
22: I am completely aware of the fact that breaking safety rules may find their way to my personal employment records	.632
19: At my work, it is easy for somebody to report a potential hazard	.592
23: Near miss and accident investigations are carried out in order to improve the safety conditions	.553
20: I believe that reporting every single potential hazard, near miss or accident is worthwhile, because it really helps improving safety conditions at my workplace	.543
26: If I notice a potential hazard, I will report it immediately, not wait for my colleagues or manager to do it instead	.377
Component 2	Loadings
30: As long as one of my colleagues does not get an occupational accident, it is acceptable for me to break a safety rule	.835
27: Reporting a potential hazard at my work wastes too much valuable time from my job	.768
28: In case that reporting a potential hazard or investigating a near miss or an accident is against the interest of my colleagues, I will definitely NOT report it	.767
24: Near miss and accident investigations are carried out in order to attribute blame to the employees involved	.535
20: I believe that reporting every single potential hazard, near miss or accident is worthwhile, because it really helps improving safety conditions at my workplace	.495
19: At my work, it is easy for somebody to report a potential hazard	.360

Item No 26 is not considered to load highly on Component 1 (0,377) and was eliminated from any further analysis. *Items No 20* and *No 19* loaded on both components. It was decided to be eliminated from Component 2, on which both loadings are weaker. Especially for *Item No 19*, it is not considered to load high at all on Component 2.

The second part of the questionnaire consists of 14 items exploring the attitude of employees towards safety and incident reporting. *Items No 17, 18, 19, 20, 21, 22, 23, 25, 26* and *29* have been worded in a way that a high score in each of the variables means that the respondent

(strongly) disagrees with the statement. This implies a low score in safety attitude and beliefs, which is the measure that the survey attempts to compute. Therefore, the scores on the items were reversed as well. After the reversion, a high score in the response would imply a high score in the measurement of safety attitudes and beliefs scale.

Next, the scales that were made up by the items which were retained for further analysis were subjected to a reliability analysis using SPSS.

The scale that was made up from Component 1 showed a very good internal consistency, with a Cronbach alpha coefficient of 0,842. Pallant (2005) suggests a value greater than 0,700 in order to assume a good internal consistency. Regarding Component 2, the corresponding scale showed a good internal consistency as well, with a Cronbach alpha coefficient of 0,728.

6.2.5.2.3 Components labeling

Each scale that is made up by each extracted Component was then subjectively labeled. The labeling was conducted according to the items that constitute each scale and an attempt to reveal what is the scale that each of component measures.

Component 1

The statements that are presented in *Items No 17, 21, 18, 22 and 19* ask about the extent to which the respondents are aware of existing safety rules, procedures and their own safety responsibilities. Respondents that (strongly) agree with the above statements can be seen as employees who understand the existing safety rules, know what to do in order to follow those rules and understand that they carry personal responsibility for the accurate application of those rules and procedures. In other words, those employees are committed to obey and participate in safety procedures and at the same time understand their personal safety responsibilities.

The statements that are presented in *Items No 23 and 20* question the extent to which the respondents believe in the importance of safety reporting and the effectiveness of safety procedures. Respondents that (strongly) agree with the above statements can be seen as

employees who are safety conscious and believe in the importance and effectiveness of incident reporting and safety procedures inside the plant in general.

The statement that is presented in *Item No 25* questions the extent to which the respondents believe that safety incidents investigation procedures are carried out objectively, without the intention to assign unfair liabilities to employees that have participated in a safety incident. Respondents that (strongly) agree with the statement can be seen as employees who trust the way management plans safety schemas and manipulates safety incidents.

According to the above, the first Component was labeled '*Safety participation, awareness and trust*'.

Component 2

The statements that are presented in *Items No 30, 27 and 28* question the extent to which the respondents would compromise their commitment to safety procedures and management safety activities. Respondents that (strongly) agree with the above statements can be seen as employees who may believe that there may be special occasions, such as subjective hazard misunderstanding, workload and blame avoidance, when it is acceptable to break safety rules.

The statement that is presented in *Item No 24* questions the extent to which the respondents believe that safety investigators' main objective is to assign blame rather than improve safety conditions through their investigations. Respondents that (strongly) agree with the statement can be seen as employees who do not trust the way management manages safety and manipulates safety incidents.

All items that make up the scale represented by Component 2 have a negative connotation regarding safety. The wording that is being used in each of those items, such as '*break a safety rule*', '*wastes too much valuable time*', '*definitely NOT report it*' and '*attribute blame*' implies the association of safety with negative notions. What is more, those are the items that were not reversed in previous phase of data analysis, in order to keep the scores and the answers pointing at the same direction. It can be argued that those items attempt to identify what are

the negative aspects that may arise in an employee's working attitude when considering the notion of safety, which is a positive notion.

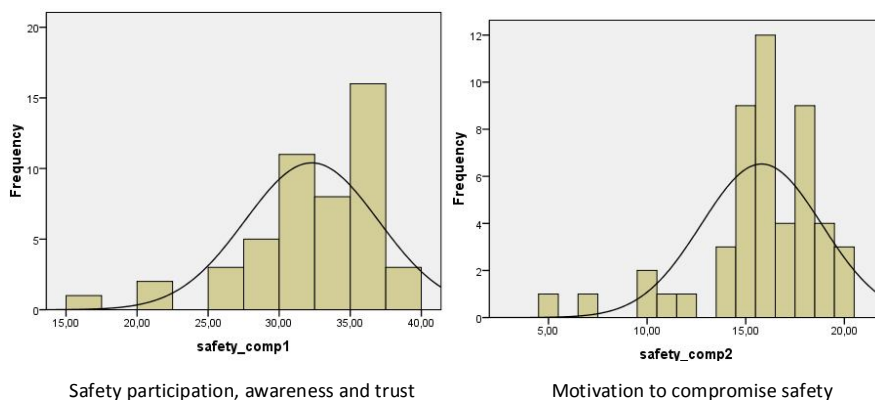
According to the above, the second Component was labeled '*Motivation to compromise safety*'. The word *compromise* reflects the negative connotation of the items wording, which was described above.

6.2.5.2.4 Descriptive statistics

SPSS has been used in order to explore the nature of the extracted variables. The new variables were named *safety_comp1* and *safety_comp2* and labeled '*Safety participation, awareness and trust*' and '*Motivation to compromise safety*' respectively.

The statistics and histograms for the above variables are shown below. Both distributions are negatively skewed.

Statistic		
safety_comp1	Mean	32,280
	Minimum	16,000
	Maximum	39,000
	Skewness	-1,314
	Kurtosis	2,196
safety_comp2	Mean	15,800
	Minimum	5,000
	Maximum	20,000
	Skewness	-1,535
	Kurtosis	3,200



The result of the Kolmogorov-Smirnov test of normality is shown in the following table.

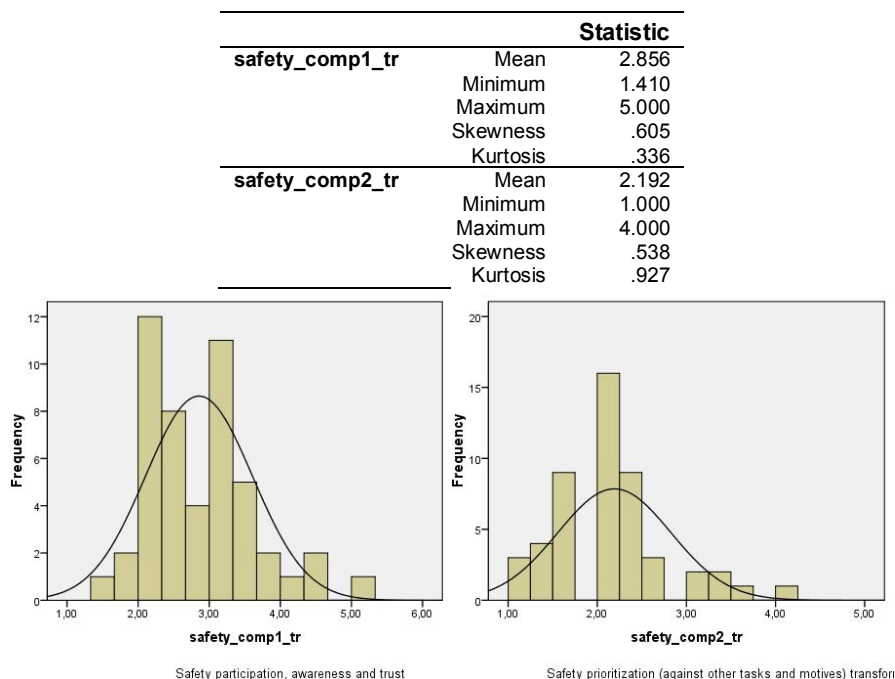
	Statistic	df	Sig
safety_comp1	.149	49	.008
safety_comp2	.217	50	.000

The Sig. value of the statistic was reported 0,008 and 0,000 respectively, which is less than 0,05, suggesting a significant result and a violation of the assumption that the distributions are normal. A mathematical transformation, suggested by Tabachnick (2001), was applied on both variables, in order to transform them into a more reasonably normally distributed variable, thus make them eligible for use in the next phases of statistical analysis. The following formula was used for both transformations:

$\text{NewVariable} = \text{SQRT}(K - \text{OldVariable})$, where $K = \text{largest possible value} + 1$

The new variables were named *safety_comp1_tr* and *safety_comp2_tr*, respectively

The statistics and histograms for the above variables are shown below.



The result of the Kolmogorov-Smirnov test of normality is shown in the following table.

	Statistic	df	Sig
safety_comp1_tr	.149	49	.200
safety_comp2_tr	.217	50	.002

The Sig. value of the statistic was reported 0.200 and 0.002 respectively, suggesting a non-significant result for first and a significant result for the second variable. The mathematical transformation resulted in a normally distributed variable for the first component.

6.3 Phase 3: Exploring the relationship between variables

In this paragraph, the strength and direction of the relationships between Hofstede's cultural dimensions items and the extracted safety components (*'Safety participation, awareness and trust'* and *'Motivation to compromise safety'*) and are further explored. Since it was not possible to perform PCA in order to extract components that summarize cultural dimensions items, they were used one by one. Next, an introduction to the used statistical techniques is provided.

6.3.1 Parametric versus non-parametric statistical techniques

Parametric statistics assume that the data come from a certain type of probability distribution and make inferences about its parameters. On the other side, non-parametric statistics use distribution free methods. Pallant (2005) discusses the general assumptions that apply for both techniques. Non-parametric statistics tend to be less sensitive than parametric; therefore, they may fail to produce significant results where parametric tests do and are less powerful. However, meeting the requirements of parametric techniques, such as data normality and sample size, is often difficult, which makes the use of non-parametric techniques sometimes obligatory. The dataset of the particular research study did not fully meet the assumptions for the execution of parametric statistical techniques. Pallant (2005) argues that in the case of not meeting the assumptions of the desired parametric statistic, the technique could be used anyway, hoping that it will not seriously violate the assumptions, since many of the approaches are fairly robust.

Another option could be to manipulate the available data and mathematically transform the variables in order to meet the test's assumptions. Tabachnick (2001) recommends a type of mathematical transformation for a set of distributions that are received from survey data. For

example, for a positive skewed variable, with moderate kurtosis value, the following square root transformation is suggested: *Transformed variable*= $SQRT(Original\ Variable)$. All variables were subjected to transformation and normality re-assessment tests. Unfortunately, none of the attempts led to a successful transformation.

For this data analysis, it was decided to utilize the parametric techniques, since they provide more powerful results. Pallant (2005) discusses the general assumptions that apply to them. Firstly, the dependent variables should be measured using a continuous scale rather than discrete categories and it is assumed that the scores are obtained using a random sample from the population. Also, the observations that make up the data must be independent from one another, meaning that each observation or measurement should not be influenced by any other observation or measurement. It was assumed that the above preconditions were met in the particular research. Besides, the populations from which the samples are taken should be normally distributed, which was, however, not the case for the research sample variables. Regarding the parametric techniques that compare differences between groups, Pallant (2005) argues that most of them are reasonably robust or tolerant to violations of this assumption. What is more, the samples should be obtained from populations of equal variances, meaning that the variability of scores for each of the groups should be similar. In order to check this, SPSS performs the Levene test for equality of variances as part of the t-test. In this test, a significance value of less than 0,05 suggests that variances of the two groups are not equal and the assumption of homogeneity of variance is violated.

Next to parametric tests, several experimental runs of their non-parametric equivalents were conducted, in order to evaluate the degree to which the two approaches results differ substantially. Pallant (2005) also discusses the prerequisites of non-parametric techniques, which are looser than those of parametric. Firstly, the samples should be random, meaning that the set of respondents should not be chosen according to any pattern. Secondly, the observations should be independent, meaning that each person or case can be counted only once and cannot appear in more than one evaluated category.

6.3.2 The relationship between cultural dimensions variables and the extracted safety components

Pearson correlation (r) was used in order to explore the strength and the direction of the relationship between each one of the cultural dimensions items and the extracted safety components. Pallant (2005) suggests the following guidelines for determining the strength of the relationship between the variables:

Weak relationship: $10 < |r| < 0,29$

Moderate strength relationship: $0,30 < |r| < 0,49$

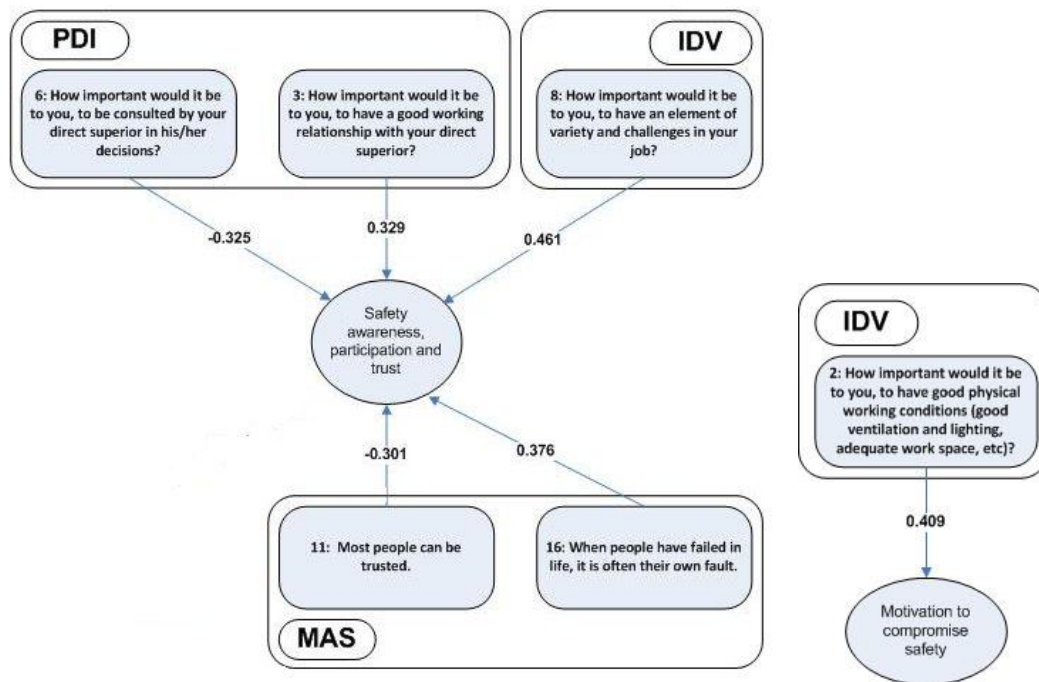
Strong relationship: $0,50 < |r| < 1$

The full set of results for each tested relationship, including the results for the non-parametric-equivalent (Spearman Rank Order Correlation, ρ) test, is presented in Appendix B. According to it, the following relationships were identified at the 0.05 or 0.01 significance level:

Dependent variable: 'Safety participation, awareness and trust'					
Item	Cult. Dim.	Cor.	Sh. Var.	Strength	Direction
3	PDI	0.329	10.82%	Moderate	Positive
6	PDI	0.325	10.56%	Moderate	Negative
8	IDV	0.436	19.01%	Moderate	Positive
11	MAS	0.301	9.06%	Moderate	Negative
16	MAS	0.404	14.14%	Moderate	Positive

Dependent variable: 'Motivation to compromise safety'					
Item	Cult. Dim.	Cor.	Sh. Var.	Strength	Direction
2	IDV	0.355	12.60%	Moderate	Negative

All the inspected correlations were of moderate strength. The above findings are visualized in the following graph, which presents a model of statistically significant predicted relationships between the Independent Variables (*Item No 3, 6, 2, 8, 11 and 16*) and the Dependent Variables (*'Safety participation, awareness and trust'* and *'Motivation to compromise safety'*).



According to the above model, the following statements were formulated and used in order to draw conclusions for the formulated hypotheses regarding the influence of cultural dimensions on safety incident reporting, in Chapter Four.

PDI scale

Item No 6 has a moderate and negative relationship with ‘*Safety, awareness participation and trust*’. The higher the *Item No 6* score is, the higher the PDI score is and the lower the ‘*Safety, awareness participation and trust*’ score is.

Item No 3 has a moderate and positive relationship with ‘*Safety, awareness participation and trust*’. The higher the *Item No 3* score is, the lower the non reversed (original) *Item No 3* score is, the higher the PDI score is and the higher the ‘*Safety, awareness participation and trust*’ score is.

The first statement is in agreement with the initial hypothesis regarding the influence of PDI on safety incident reporting, while the second is not. This did not make it possible to draw definite conclusions regarding the influence of PDI scale on incident reporting.

IDV scale

Item No 8 has a moderate and positive relationship with '*Safety, awareness participation and trust*'. The higher the *Item No 8* score is, the lower the non reversed (original) *Item No 8* score is, the higher the *IDV* score is and the higher the '*Safety, awareness participation and trust*' score is.

Item No 2 has a moderate and positive relationship with '*Motivation to compromise safety*'. The higher the *Item No 2* score is, the higher the *IDV* score is and the higher the '*Motivation to compromise safety*' score is.

The first statement is not relevant with the formulated hypotheses regarding the influence of *IDV* on safety incident reporting, while the second statement is not in agreement with them. The hypotheses should be rejected.

UAI scale

None of the *UAI* items resulted in a strong relationship with any of the extracted components. The hypotheses regarding the influence of *UAI* on safety incident reporting should be rejected.

MAS scale

Item No 11 has a moderate and negative relationship with '*Safety, awareness participation and trust*'. The higher the *Item No 11* score is, the higher the *MAS* score is and the lower the '*Safety, awareness participation and trust*' score is.

Item No 16 has a moderate and positive relationship with ‘*Safety, awareness participation and trust*’. The higher the *Item No 16* score is, the higher the MAS score is and the higher the ‘*Safety, awareness participation and trust*’ score is.

The above statements do not agree, meaning that they do not imply the same outcome for the influence of masculinity on ‘*Safety, awareness participation and trust*’. *Masculinity versus Femininity* dimension was not initially hypothesized to exert influence on safety incident reporting. The above statements did not either make it possible to draw definite conclusions regarding the influence of MAS scale on incident reporting.

6.4 Phase 4: Exploring the differences in cultural dimensions and safety related variables between respondents’ groups

Next, the perceived statistically significant differences in cultural dimensions and safety related variables between different groups of respondents were evaluated. Assessing differences between groups involves the usage of statistical techniques that compare the scores of two or more groups of people on one or more continuous dependent variables.

6.4.1.1 Independent samples t test and ANOVA

Independent samples t test is the parametric statistical technique that was used in order to compare the mean scores on safety related variables for the case of two different categories of subjects that constitute the sample. In other words, the test was used in order to evaluate the perceived statistical differences on the safety attitude components, between Male and Female employees (*Gender*), Basic and Higher Education employees (*Education level*), Managers and Non-managers (*Job level*), Production and Administration department employees (*Job department*), and employees that reported a potential hazard in the previous year and those who did not (*Self reporting in previous year*).

One-way analysis of variance (ANOVA) is the parametric statistical technique that was used in order to compare the mean scores on safety related variables for the case of more than two

different groups of subjects that constitute the sample, that is to say for the employees' age and employment duration categories.

The non-parametric equivalents for the above tests are discussed in this paragraph. Mann-Whitney U test is the non-parametric equivalent for independent samples t test. The test compares the medians of the dependent variable for each category of the independent variable and evaluates if they differ significantly. The Z value and the significance level SPSS outputs are interpreted in order to evaluate if the medians differ significantly. A probability value (Asymp. Sig (2-tailed)) larger than 0,05 means that the result is not significant. In other words, it means that there is no statistically significant difference in the scores between the two evaluated categories. Kruskal-Wallis test is the non-parametric equivalent of one-way between-groups analysis of variance. Like Mann-Whitney U test it compares the medians of the dependent variable for each category of the independent variable. However, it allows comparing more than just two categories. SPSS has been used in order to execute the test. The output consists of the Ranks table and the Test Statistics table. The first provides information about the cases that correspond to each category and the Mean Rank of each category. The second table provides the Chi-Square value, the degrees of freedom (df) and the significance level (Asymp. Sig.) . If the significance level is less than .05, then it can be concluded that there is a statistically significant difference in the dependent variable across the groups of respondents. If this is the case, the Mean Rank values are inspected in order to identify the category differences.

Similarly to previous analysis, it was decided to perform the parametric techniques, although the assumption of variables data normality was violated, since they are more powerful than their non-parametric equivalents.

6.4.2 Differences in safety variables between groups with two categories

An independent samples t test was executed to compare the differences in '*Safety participation, awareness and trust*' (Component 1) and '*Safety prioritization (against other tasks and motives)*' (Component 2) scores between groups with two categories (Gender, Education Level, Job Level,

Job department and Self reporting in previous year). The results are presented in detail in Appendix B. All t-test Sig. (2-tailed) values are greater than 0,05, which leads to the conclusion that there is no significant difference between the tested groups.

6.4.3 Differences in safety variables between groups with more than two categories

An ANOVA test was executed using SPSS in order to compare the differences in ‘*Safety participation, awareness and trust*’ (Component 1) and ‘*Motivation to compromise safety*’ (Component 2) scores between groups with more than two categories (Age and Employment duration). The results are presented in detail Appendix B.

There was not a statistically significant difference at the $p < 0,05$ level for the three age groups, since the Sig. value in the ANOVA table was found to be 0,652 for “*Safety awareness, participation and trust*” and 0,338 for “*Motivation to compromise safety*”. This means that the three age groups do not differ significantly.

Similarly, there was not a statistically significant difference at the $p < 0,05$ level for the three employment duration groups, since the Sig. value in the ANOVA table was found to be 0,910 for “*Safety awareness, participation and trust*” and 0,551 for “*Motivation to compromise safety*”. This means that the three employment duration groups do not differ significantly.

6.5 Exploring the differences in each of cultural dimensions items between respondents’ groups

An independent samples t test was also executed to compare the differences on each of the sixteen cultural dimensions items between groups with two categories (*Gender, Education Level, Job Level, Job department and Self reporting in previous year*) and ANOVA tests between groups with more than two categories. The detailed results of the above tests are presented in Appendix B.

For the case of gender groups, the *Items No 2 and 5*, differed for each gender group. However, the proportion between male and female respondents in the sample was highly unequal, making it impossible to draw definite conclusions regarding this outcome. According to the results, very few items resulted in differences between the explored groups.

7 Conclusion

The last chapter provides the answers to the research questions that were raised in Chapter One. Next to the research results, the achievement of the research objective is evaluated. Finally, the weaknesses of this study are discussed and possible directions for future research are proposed. The author's personal evaluation rounds off the thesis.

7.1 Research results

On the basis of the research questions raised in Chapter One, this paragraph presents the results of the study.

Research Question 1

"To what extent does the research sample represent the research population?"

As part of the preliminary data analysis (Chapter 6, Paragraph 2), the extent to which the research sample represents the research population was assessed. The sample frequencies did not differ significantly from those of the research population, apart from the case of the production and administration department employees. That is, the number of the production department employees in the sample was statistically higher than the one in the research population.

This could be attributed to the way that the Safety Engineer administered the distribution of the questionnaire within the plant. The Safety Engineer's core operation area is the production department. Since he was not subjected to any restriction regarding the occupation of the respondents, he mainly distributed the questionnaire amongst the employees of that department. This is not considered to be a limitation of the study, since the production department is the primary focus of safety management.

Research Question 2

“How much does the research sample score on each cultural dimension and to what extent do those scores match with those provided by literature?”

Based on the VSM '94 user guide, cultural dimension indices (PDI, IDV, UAI, MAS) for the research sample were calculated (Chapter 2, Paragraph 2.4). These results were compared to Hofstede's indices and were found to deviate significantly from them.

However, drawing definite conclusions regarding the sample's cultural dimensions is hard. The VSM '94 questionnaire was meant for use at the national level, meaning that the calculated dimensions were extracted by comparing data from samples with similar characteristics, but different cultures. This was not the case in this study, since no sample from any other culture than the Greek was available.

Nevertheless, as was discussed in Chapter 6, the results revealed rather similar patterns between the calculated and the original indices reported by Hofstede. PDI, MAS and UAI scores were all lower than Hofstede's original scores, but, interestingly, all of them showed equal levels of deviation from the original results. What is more, the sample's UAI score was much higher than the other scores and also high enough in order to assume that it is in agreement with Hofstede's finding that Greek culture is highly uncertainty avoidant.

Because of the absence of a multi-cultural research sample, the answers were examined question by question and were not combined into cultural dimensions. This is exactly what Hofstede (2003) recommends for similar designs. A Principal Components Analysis, which did not reveal any set of robust summarizing variables, supported this choice as well.

Research Question 3

“What are the components that can describe best the perceptions and attitudes of the sample towards incident reporting?”

The fourteen items that were included in the second part of the questionnaire were subjected to Principal Components Analysis, in order to extract those components that can describe best the perceptions and attitudes of the respondents towards incident reporting (Chapter 6, Paragraph 2). The preliminary analysis confirmed the suitability of the data for such an analysis. After several runs of the program two components were extracted: *"Safety participation, awareness and trust"* and *"Motivation to compromise safety"*. According to the results, the respondents understand the existing safety rules in the plant, know what to do in order to follow those rules, understand that they carry personal responsibility for an accurate implementation and believe in the importance and effectiveness of incident reporting and safety procedures within the plant. At the same time, the respondents show low motivation to compromise safety vis-à-vis other occupational tasks, since they do not believe that it is acceptable to break safety rules and they trust the way management manages safety.

Research Question 4

"What is the strength and direction of the statistical relationships between the cultural dimensions and the above mentioned components?"

The strength and direction of the relationships between each of the sixteen cultural dimensions items and the extracted safety attitude components were explored in the final phase of data analysis (Chapter 6, Paragraph 3), in order to evaluate the formulated hypotheses regarding the influence of each cultural dimension on incident reporting behavior (Chapter 4).

Two out of four PDI variables had a moderate statistical correlation with *'Safety participation, awareness and trust'*. However, the relationships did not point into the same direction, indicating that it was not possible to draw definite conclusions about the influence of the PDI scale on incident reporting. The hypotheses regarding the influence of PDI on safety incident reporting should be rejected.

One out of four IDV variables had a moderate statistical correlation with *'Safety participation, awareness and trust'* and one with *"Motivation to compromise safety"*. The first was not relevant for the formulated hypotheses regarding the influence of IDV on safety incident

reporting, while the second correlation was not in agreement with them. The corresponding hypotheses should be rejected.

None of the UAI items had a strong relationship with any of the extracted components. The hypotheses regarding the influence of UAI on safety incident reporting should be rejected.

Two out of four MAS variables had a moderate correlation with '*Safety participation, awareness and trust*'. This was in contrast with the initial hypothesis that the *Masculinity versus Femininity* dimension does not influence safety incident reporting. Since the extracted statistical relationships did not point into the same direction, it was not possible to draw definite conclusions about the influence of the MAS scale on incident reporting.

7.1.1 Research objective evaluation

As was discussed in Chapter One the fundamental objective of this research project was to:

“Contribute to the knowledge about a direct or indirect influence (if there is any) of national culture on safety incident reporting in a hazardous industry.”

In order to achieve this objective, the following research question was raised:

“What is the relationship between national culture and the safety incident reporting behavior of employees in a hazardous industry?”

According to the research results, The Company's employees' perceptions and values towards incident reporting were not related to their cultural values; therefore, any kind of direct or indirect influence of national culture on safety incident reporting was not found to be plausible.

Given the fact that the literature review revealed a lack of research on the influence of national culture on safety incident reporting, this research has added a small but important amount of knowledge to safety management in hazardous industries. Considering the limitations that apply to this study, which are discussed in the next paragraph, the proposed methodology can serve as a starting point for a more thorough research project on safety behavior discipline.

What is more, regarding the Greek cement industry, no research that deals with the influence of employees' cultural values in the workplace was identified as well. Given the fact that the cement industry is one of the few well-established and competitive industries in the country and that it (directly and indirectly) employs workers from several cultures, the proposed methodology could serve as a new basis for alternative research on human resources and safety management in the industry.

7.1.2 More results

In addition to the above results, the data analysis revealed several additional conclusions regarding the research sample.

Differences in safety attitude components between respondent groups

The differences in safety attitude between groups of respondents were tested for statistical significance. The groups were constructed on the basis of the items of the third section of the questionnaire (demographic questions). No significant differences between the respondents' groups were identified.

Differences in cultural dimensions items between respondent groups

Similarly, a statistical analysis was conducted in order to identify differences between groups in each one of the cultural dimensions items. A few statistically significant differences were identified, which do not support any kind of solid conclusion that cultural values vary depending on the demographics of the sample.

Self reporting in previous year

The respondents were also provided with two options (*Yes* or *No*) in order to answer if they had reported a potential hazard in the previous year. More than half of them (27 out of 51) gave a negative answer. Given the fact that incident reporting is a core activity for effective safety management, the result indicates a low reporting practice from the employees. Nevertheless, the quality level of safety management in the plant and the extent to which the incidents worth reporting are clear to all employees should be further assessed and reviewed, in order to draw definite conclusions about the reporting performance within the plant. For instance, in a perfectly managed working environment, hazards are expected to be few and incident reporting could also be rare. Under such circumstances, the above finding should not indicate poor reporting performance.

7.2 Limitations

Several limitations apply to the chosen research methodology, which indicate the need for further research.

Size and representativeness of the sample

The research sample did not differ significantly from the research population; however, the number of respondents was below a level at which statistical analyses provide reliable results. For instance, in the case of PCA, Pallant (2005) suggests several rules of thumb regarding the sample size, with the easiest one suggesting 5 cases for each item to be factor analyzed. This means that with the 14 items of the second part of the questionnaire, 90 responses should have been collected, which is almost double the amount compared to the 51 collected responses.

What is more, the scope of the study is limited by the fact that with the existing research sample, it is hard to generalize the case of the specific The Company's cement plant to a larger research population in Greece. In Chapter One, it was argued that the cement industry is of a multinational nature. Therefore, each distinct cement corporation in Greece may have its own organizational culture and possibly top management appointees from a different national

culture. Besides, their safety management systems and practices may differ significantly as well. When it comes to the applicability of the research results to the entire Hellenic cement industry, this is considered to be a limitation to the scope of this research.

Violation of statistical tests' assumptions

In order to conduct the statistical tests, several statistically invalid assumptions were made. For instance, the assumption that variables should be normally distributed to be able to conduct parametric tests was violated. However, Pallant (2005) suggests that most of the techniques are reasonably robust or tolerant to violation of this assumption. What is more, parametric statistics require perfect random samples, an assumption which is hard not to violate in real life. Finally, the observations that make up the data must be totally independent of one another, meaning that each observation should not be influenced by any other observation. The research sample was constituted from employees that work within the same organization. Within an organization, there may be group of employees that work in the same department, suggesting that their working behavior, and consequently their survey response behavior may be influenced by other members of the group. Such cases should be considered subject to violating this assumption and there may be a need for further validation of the statistical outcomes.

The use of Hofstede's cultural framework as a basis for the research

Hofstede's cultural framework has been used very often in several disciplines (Baskerville 2003) in order to explore people's behavior, but it has also received extensive criticism with regard to its, implicit and explicit, assumptions. Apparently, this criticism has several implications regarding the current study as well, since it is entirely based on Hofstede's cultural dimensions.

McSweeney (2002) challenges the assumptions of Hofstede's research methodology and argues that all of them should be rejected. First of all, he questions the adequacy of Hofstede's research sample size, arguing that not only the average number of respondents per country was small, but also that for some countries it was extremely small. As a result, it cannot be considered representative of an entire nation and conclusions regarding the national culture are impossible to make.

Next, McSweeney (2002) critiques and rejects Hofstede's assumption that organizational, occupational and national culture are three distinct and non-interacting notions. This was the main assumption on which Hofstede relied in order to assert that comparing IBM subsidiaries worldwide would bring national culture with unusual clarity to the fore, since he assumed that his respondents were similar in all characteristics other than national culture. However, for multinational organizations it is hard to assume that they have a singular and uniform culture worldwide, which is something that according to McSweeney (2002) Hofstede has also admitted. Indeed, as was argued in Chapter One, the example of the cement industry shows that its inherent multinational character makes it difficult to assume that national cultures do not influence the organizational culture of a multinational cement producer. As for the occupational culture, the assumed influence of national culture on the workplace, on which the hypotheses of this research study were formulated, supports the above criticism on Hofstede's framework.

Besides, McSweeney (2002) rejects the assumption that national culture is uniform and carried by all individuals. He characterizes the gap between the micro local (IBM research population) and the national as huge and argues that there are no valid reasons for assuming that the IBM responses somehow reflected the national average. This is especially because Hofstede's research sample respondents are not typical for a nation and are sampled from a very limited segment of the overall national population.

Most importantly, McSweeney (2002) challenges the use of questionnaire for such an analysis. He argues that questionnaires can be developed in many different ways, and every different questionnaire would provide a different set of responses, therefore a different set of cultural dimensions in Hofstede's research. What is more, response bias is another limiting factor when using this tool to collect response, since within a working environment, it is very probable that the respondents reply in a manner that is influenced by the possible consequences of their answers. Similar limitations may be assumed for this research project as well.

Hofstede's framework has received extensive criticism from Baskerville (2003) as well. Her citation analysis shows that it is widely used in behavioral science, management science, organizational studies and psychology, but not in sociology and anthropology. She argues that

this may happen because it fulfills a particular need in those areas, but he stands opposite to this trend by rejecting Hofstede's indices as a robust theoretical basis for research. This research project, which falls within the range of behavioral and management science, has been entirely based on Hofstede's theory and Baskerville's (2003) criticism has also several implications regarding the usage of cultural dimensions in order to explore the influence of culture on safety incident reporting.

Baskerville (2003) explains why Hofstede's indices have been rejected by scholars within anthropology and sociology. Similarly with McSweeney (2002), she claims that nations should not be equated with cultures. This is because the notion of nation is hard to define. This is the main reason behind the rejection of Hofstede's theory by anthropologists, who argue that each nation may consist of individuals from different ethnicities, which is the factor that may affect their perceptions, attitudes and behavior. Next, Baskerville (2003) challenges the quantification of culture based on numeric dimensions. According to her, culture cannot be measured at all, because it is a construct that is hard to define in a quantitative manner. What is more, the way in which Hofstede relates each of the cultural dimensions indices with other national measurements, including GNP, economic growth, latitude, population size and more, shows that Hofstede's dimensions describe characteristics most of which could be identified as of socio-economic origin, not of cultural origin. Thus, taking culture as the independent variable when attempting to explain people's behavior with Hofstede's dimensions may be totally flawed. Even if culture is equated to nation and Hofstede's framework is used to explain behavior differences, there may only be an indirect influence of culture.

Regarding this research, the above criticism directly challenges the chosen research methodology. The assumption that national culture influences incident reporting was the basis on which the hypotheses were formulated. However, incident reporting behavior may be influenced by national culture only indirectly. Other factors, such as employees' education and the organization's size and prosperity, may be the critical factors affecting the way employees perceive hazards and risks within an organization. Since, the data analysis did not reveal any significant statistical differences between various groups of respondents, based on the demographic questions, a larger and more diverse sample, probably from different organizations, is firstly recommended towards the exploration of the above assumption.

7.3 Recommendations

Despite the large number of existing studies on culture and safety management, a lack of research on direct or indirect influences of national culture on incident reporting was identified. This study attempted to somewhat fill this gap. Existing theories and models were not really confirmed by the study. However, the successful safety attitude components extraction and the identification of a few statistical relationships with some cultural dimensions items suggest that further research is worthwhile.

Since the sample cannot be deemed adequate to generalize to the entire set of The employees, and for sure not to the entire Greek cement industry, similar research using a more diverse research population should be carried out. The research population should originate from more than one cement organization in the same country to be able to control for various organizational influences. Besides, in order to extract more robust and reliable results, a far larger sample should be strived for.

Assuming that Hofstede's framework would still be the basis for the research, identifying the differences in the way employees from different cultures report incidents in hazardous industries, requires the application of the same research methodology using another research population from another culture. Time and budget constraints did not allow for applying the methodology on a multicultural sample. According to Hofstede's explicit statement that his cultural dimensions were meant for use at country level and that VSM '94 was chosen for comparing countries, a comparative study with another country is really a must for further research.

7.4 Personal evaluation

As an MSc EPA graduate wannabe, the author's objective was to gain deeper understanding on the notion of national culture and to practice with the already acquired knowledge on data collection tools and analysis. This was achieved by applying the theory on an engineering domain, such as safety science and management. The research did not make it possible to

conclude to concrete scientific outcomes, mainly due to several limitations, that is, the limited resources offered by an MSc thesis project. Nevertheless, the experience of co-operating with a diverse set of academic and business professionals was invaluable.

What is more, the application of an already established theoretical framework on a real life hazardous industry case revealed interesting outcomes regarding the issues that arise when attempting to combine theory with practice. Scientific research is a task that is mainly undertaken in academic environments. Doing research in a production environment was not a trivial task. For instance, collecting a decent number of employees' responses was not easy and it took considerable amount of time and effort in order to arrange the project. Even then, according to theory, the research sample was deemed as inadequate to conclude into to concrete scientific results. The above experience is expected to bring interesting opportunities in the author's future career steps.

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Appendix A

Survey questionnaire (English version)



Occupational safety incidents reporting Questionnaire

Dear Madam or Sir,

Before you start filling in the questionnaire, please read the instructions carefully. **Thank you for your cooperation!**

Instructions

The following pages consist of a number of questions and statements about the attitudes of employees towards occupational safety and safety incident reporting, such as potential hazards, near misses and accidents.

- Please fill in **ALL** questions.
- Do give your opinion about each one of the questions/statements by CIRCLING the answer that suits your opinion best.
- Do not try to think about your answers too long; just give the answer that you immediately think of.
- Please do not consult your colleagues when answering the questions.

Please think of an ideal job, not necessarily your present job. In choosing an ideal job, ...

1	how important would it be to you, to have sufficient personal time next to your job?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

2	how important would it be to you, to have good physical working conditions (good ventilation and lighting, adequate work space, etc)?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

3	how important would it be to you, to have a good working relationship with your direct superior?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

4	how important would it be to you, to have security of employment?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

5	how important would it be to you, to work together with people who cooperate well with one another?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

6	how important would it be to you, to be consulted by your direct superior in his/her decisions?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

7	how important would it be to you, to have an opportunity for advancement to higher level jobs?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

8	how important would it be to you, to have an element of variety and challenges in your job?				
	Of utmost importance	Very important	Of moderate importance	Of little importance	Of very little or no importance

At your work,...

9	how often do you feel nervous or tense at work?				
	Never	Seldom	Sometimes	Usually	Always

10	how frequently, in your experience, are subordinates afraid to express disagreement with their superiors?				
	Never	Seldom	Sometimes	Usually	Always

To what extent do you agree or disagree with each of the following statements?

11	Most people can be trusted.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

12	One can be a good manager without having precise answers to most questions that subordinates may raise about their work.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

13	An organizational structure with two bosses in which employees have to report to both of them, should be avoided at all cost.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

14	Competition between employees usually does more harm than good.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

15	A company's rules should not be broken; not even when the employee thinks it is in the company's best interest.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

16	When people have failed in life, it is often their own fault.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

To what extent do you agree or disagree with each of the following statements?

17	The safety rules at my work are clear to all employees.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

18	I know what to do, in order to report a potential hazard at my workplace.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

19	At my work, it is easy for somebody to report a potential hazard.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

20	I believe that reporting every single potential hazard, near miss or accident is worthwhile, because it really helps improving safety conditions at my workplace.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

21	I know that I have certain safety responsibilities, which I should not break at any case.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

22	I am completely aware of the fact that breaking safety rules may find their way to my personal employment records.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

23	Near miss and accident investigations are carried out in order to improve the safety conditions.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

24	Near miss and accident investigations are carried out in order to attribute blame to the employees involved.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

25	Near miss and accident investigations at my workplace are always objective and fair.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

26	If I notice a potential hazard, I will report it immediately, not wait for my colleagues or manager to do it instead.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree
27	Reporting a potential hazard at my work wastes too much valuable time from my job.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree
28	In case that reporting a potential hazard or investigating a near miss or an accident is against the interest of my colleagues, I will definitely NOT report it.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree
29	If I get an occupational accident, it will probably be my own fault, not somebody else's fault.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree
30	As long as one of my colleagues does not get an occupational accident, it is acceptable for me to break a safety rule.				
	Strongly agree	Agree	Neither agree, nor disagree	Disagree	Strongly disagree

Some information about you (for statistical purposes)

31	You are ...				
	Male			Female	

32	What is your age?				
	 years				

33	What is the highest level of education you have a diploma of?				
	High school	Lower HBO	HBO	University	Postgraduate

34	Your job is...				
	Higher department manager	Department manager	Department foreman	Office worker	Frontline worker/ technician

35	Which department do you work at?				
	Production department			Administration department	

36	How many years have you been working at this company?				
	 years				

37	Did you report a potential hazard in the past year?				
	Yes			No	

Thank you very much for your cooperation!

Survey questionnaire (Greek version)



Αναφορά συμβάντων ασφαλείας στους εργασιακούς χώρους Ερωτηματολόγιο

Αγαπητή(ε) Κυρία(ε),

Προτού ξεκινήσετε, παρακαλούμε διαβάστε προσεκτικά τις οδηγίες. **Ευχαριστούμε για την συνεργασία!**

Οδηγίες συμπλήρωσης

Οι επόμενες σελίδες περιέχουν ερωτήσεις και προτάσεις σχετικά με την γνώμη των εργαζομένων ως προς την ασφάλεια εργασίας και την αναφορά συμβάντων ασφαλείας, όπως πιθανοί κίνδυνοι, παρ' ολίγον ατυχήματα και ατυχήματα.

- Παρακαλούμε συμπληρώστε **ΟΛΕΣ** τις ερωτήσεις.
- Εκφράστε την γνώμη σας για κάθε μία από τις ερωτήσεις/προτάσεις, σημειώνοντας με **κύκλο** την απάντηση που σας ταιριάζει καλύτερα.
- Μην σκεφτείτε την απάντηση σας για πολύ ώρα. Απλά απαντήστε αυτό που σας έρχεται κατευθείαν στο μυαλό.
- Παρακαλούμε μην συμβουλευέστε τους συναδέλφους σας κατά την συμπλήρωση των ερωτήσεων.

Παρακαλώ σκεφτείτε την ιδανική δουλειά, όχι απαραίτητα την τωρινή σας δουλειά. Διαλέγοντας την ιδανική δουλειά, ...

1	πόση σημασία θα είχε για σας, να έχετε επαρκή προσωπικό χρόνο εκτός εργασίας;				
	Μέγιστη σημασία	Πολύ σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

2	πόση σημασία θα είχε για σας, να έχετε καλές φυσικές συνθήκες εργασίας (καλό εξαερισμό και φωτισμό, επαρκή χώρο εργασίας κτλ);				
	Μέγιστη σημασία	Πολύ Σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

3	πόση σημασία θα είχε για σας, να έχετε καλή εργασιακή σχέση με τον άμεσο προϊστάμενό σας;				
	Μέγιστη σημασία	Πολύ σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

4	πόση σημασία θα είχε για σας, να έχετε εξασφαλισμένη εργασιακή απασχόληση;				
	Μέγιστη σημασία	Πολύ σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

5	πόση σημασία θα είχε για σας να δουλεύετε μαζί με ανθρώπους που συνεργάζονται καλά μεταξύ τους;				
	Μέγιστη Σημασία	Πολύ σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

6	πόση σημασία θα είχε για σας, να σας συμβουλευέται ο άμεσος προϊστάμενός σας όταν παίρνει αποφάσεις;				
	Μέγιστη σημασία	Πολύ Σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

7	πόση σημασία θα είχε για σας, να έχετε την ευκαιρία για προαγωγή σε υψηλότερη θέση;				
	Μέγιστη σημασία	Πολύ Σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

8	πόση σημασία θα είχε για σας, να έχετε ποικιλία και προκλήσεις σε αυτά που κάνετε στην εργασία σας;				
	Μέγιστη σημασία	Πολύ σημασία	Μέτρια σημασία	Λίγη σημασία	Ελάχιστη/καθόλου σημασία

Κατά την εργασία σας,

9	πόσο συχνά νοιώθετε ένταση ή άγχος στην δουλειά σας;				
	Ποτέ	Σπάνια	Μερικές φορές	Συνήθως	Πάντα

10	πόσο συχνά, σύμφωνα με την εμπειρία σας, οι εργαζόμενοι φοβούνται να εκφράσουν την διαφωνία τους με τους προϊστάμενούς τους;				
	Ποτέ	Σπάνια	Μερικές φορές	Συνήθως	Πάντα

Σε ποιο βαθμό συμφωνείτε ή διαφωνείτε με κάθε μία από τις παρακάτω προτάσεις;

11	Υπάρχει εμπιστοσύνη μεταξύ των περισσότερων ανθρώπων.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

12	Κάποιος μπορεί να είναι καλός διευθυντής/προϊστάμενος, χωρίς απαραίτητα να έχει ακριβείς απαντήσεις στις περισσότερες από τις ερωτήσεις των υφισταμένων σχετικά με την δουλειά τους.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

13	Η δομή μιας εταιρείας όπου οι εργαζόμενοι έχουν δύο προϊστάμενους και πρέπει να δίνουν αναφορά και στους δύο, θα πρέπει να αποφεύγεται με κάθε τρόπο.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

14	Ο ανταγωνισμός μεταξύ των εργαζομένων συνήθως κάνει περισσότερο κακό παρά καλό.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

15	Οι κανόνες μιας εταιρείας δεν πρέπει να παραβιάζονται, ακόμα και όταν ο εργαζόμενος πιστεύει ότι είναι για το καλό της εταιρείας.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

16	Όταν αποτυγχάνει κανείς στην ζωή του, συνήθως οφείλεται σε προσωπικά λάθη.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

Σε ποιο βαθμό συμφωνείτε ή διαφωνείτε με κάθε μία από τις παρακάτω προτάσεις;

17	Οι κανόνες ασφαλείας στην δουλειά μου είναι σαφείς σε όλους τους εργαζομένους.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
18	Γνωρίζω τι πρέπει να κάνω, για να αναφέρω έναν πιθανό κίνδυνο στο χώρο εργασίας.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
19	Στη δουλειά μου, είναι εύκολο για κάποιον να αναφέρει έναν πιθανό κίνδυνο.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
20	Πιστεύω ότι η αναφορά κάθε ενός πιθανού κινδύνου, παρ' ολίγο ατυχήματος ή ατυχήματος, αξίζει τον κόπο, επειδή βοηθάει πραγματικά στην βελτίωση των συνθηκών ασφαλείας στο χώρο εργασίας μου.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
21	Γνωρίζω καλά πως έχω συγκεκριμένες υποχρεώσεις ασφαλούς εργασίας, τις οποίες δεν πρέπει να παραβιάσω για κανένα λόγο.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
22	Έχω πλήρη επίγνωση του γεγονότος ότι η παραβίαση των κανόνων ασφαλείας, μπορεί να προστεθεί στο επαγγελματικό μου ιστορικό.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
23	Η διερεύνηση των παρ'ολίγο ατυχημάτων και των ατυχημάτων γίνεται με σκοπό την βελτίωση των συνθηκών ασφαλείας.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
24	Η διερεύνηση των παρ'ολίγο ατυχημάτων και των ατυχημάτων γίνεται με σκοπό την απόδοση ευθυνών στους εμπλεκόμενους εργαζόμενους.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
25	Η διερεύνηση των παρ'ολίγο ατυχημάτων και των ατυχημάτων στη δουλειά μου είναι πάντα αντικειμενική και δίκαιη.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

26	Εάν εντοπίσω έναν πιθανό κίνδυνο, θα τον αναφέρω αμέσως, χωρίς να περιμένω τους συναδέλφους μου ή τον προϊστάμενό μου να το κάνουν.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
27	Η αναφορά πιθανών κινδύνων στη δουλειά μου σπαταλά πολύτιμο χρόνο από την εργασία μου.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
28	Σε περίπτωση που η αναφορά ενός πιθανού κινδύνου ή διερεύνηση ενός παρ'ολίγο ατυχήματος ή ενός ατυχήματος είναι ενάντια στο συμφέρον των συναδέλφων μου, ΔΕΝ ΠΡΟΚΕΙΤΑΙ να το αναφέρω.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
29	Σε περίπτωση που μου συμβεί ένα εργασιακό ατύχημα, πιθανότατα η υπαιτιότητα θα είναι δική μου, όχι άλλου.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα
30	Με την προϋπόθεση ότι σε κανέναν από τους συναδέλφους μου δεν θα συμβεί εργασιακό ατύχημα, είναι αποδεκτό να παραβιάζω κάποιον από τους κανόνες ασφαλούς εργασίας.				
	Συμφωνώ απόλυτα	Συμφωνώ	Ούτε συμφωνώ, ούτε διαφωνώ	Διαφωνώ	Διαφωνώ απόλυτα

Μερικές πληροφορίες σχετικά με εσάς (για στατιστικούς λόγους)

31	Είσατε...				
	Άνδρας		Γυναίκα		

32	Πόσο χρονών είστε;				
	 χρονών				

33	Είστε απόφοιτος...				
	Λυκείου ή πρωτοβάθμιας εκπαίδευσης	IEK	ΤΕΙ	Πανεπιστημίου	Μεταπτυχιακού

34	Η εργασία σας είναι...				
	Προϊστάμενος υπηρεσίας	Προϊστάμενος τμήματος	Εργοδηγός τμήματος	Υπάλληλος γραφείου	Εργάτης/τεχνίτης

35	Σε τι τμήμα εργάζεστε;				
	Παραγωγή		Γραφείο		

36	Πόσα χρόνια εργάζεστε σε αυτή την εταιρεία;				
	 χρόνια				

37	Κάνατε μια αναφορά πιθανού κινδύνου τον προηγούμενο χρόνο;				
	Ναι		Όχι		

Ευχαριστούμε πολύ για την συνεργασία!

Appendix B

Codebook

Variable	SPSS name	Coding instructions
ID number	id	Number assigned to each questionnaire
1-IDV	q1_idv1	1,2,3,4,5
2-IDV	q2_idv2	1,2,3,4,5
3-PDI	q3_pdi1	1,2,3,4,5
4-IDV	q4_idv3	1,2,3,4,5
5-MAS	q5_mas1	1,2,3,4,5
6-PDI	q6_pdi2	1,2,3,4,5
7-MAS	q7_mas2	1,2,3,4,5
8-IDV	q8_idv4	1,2,3,4,5
9-UAI	q9_uai1	1,2,3,4,5
10-PDI	q10_pdi3	1,2,3,4,5
11-MAS	q11_mas3	1,2,3,4,5
12-UAI	q12_uai2	1,2,3,4,5
13-PDI	q13_pdi4	1,2,3,4,5
14-UAI	q14_uai3	1,2,3,4,5
15-UAI	q15_uai4	1,2,3,4,5
16-MAS	q16_mas4	1,2,3,4,5
17-Safety	q17	1,2,3,4,5
18-Safety	q18	1,2,3,4,5
19-Safety	q19	1,2,3,4,5
20-Safety	q20	1,2,3,4,5
21-Safety	q21	1,2,3,4,5
22-Safety	q22	1,2,3,4,5
23-Safety	q23	1,2,3,4,5
24-Safety	q24	1,2,3,4,5
25-Safety	q25	1,2,3,4,5
26-Safety	q26	1,2,3,4,5
27-Safety	q27	1,2,3,4,5
28-Safety	q28	1,2,3,4,5
29-Safety	q29	1,2,3,4,5
30-Safety	q30	1,2,3,4,5
31-Demo Sex	q31_sex	1,2
32-Demo Age	q32_age	Age in years
33-Demo Education	q33_edu	1,2,3,4,5
34-Job level	q34_lev	1,2,3,4,5
35-Job department	q35_dep	1,2,3,4,5

1=of utmost importance
2=Very important
3=Of moderate importance
4= Of little importance
5=Of very little or no importance

1=Never
2=Seldom
3=Sometimes
4=Usually
5=Always

1=Strongly agree
2=Agree
3=Neither agree/Nor disagree
4=Disagree
5=Strongly disagree

1=Male
2=Female

1=High school
2=Lower HBO
3=HBO
4=University
5=Postgraduate

1=Higher department manager
2=Department manager
3=Department foreman
4=Office worker
5=Front line worker/ technician

1=Production
2=Sales/Marketing
3=Accounting
4=Administration

		5=Management	
36-Job duration	q36_dur	Duration in years	
37-Self reporting	q37_rep	1,2	1=Yes 2=No
33: Education level (2 categories)	q33_edu_collapsed	1,2	1= Basic Education 2= Higher Education
34: Job level (2 categories)	q34_lev_collapsed	1,2	1= Manager 2= Non-manager
32: Age (into categories)	q32_age_collapsed	1,2,3	1= up to 39 2= 40-49 3= 50+
36: Employment duration (into categories)	q36_dur_collapsed	1,2,3	1= 9 2= 10-26 3= 26+

Goodness of fit test for categorical variables

Gender				
	Frequencies		Statistics	
	Observed N	Expected N	Chi-Square	0,332
Male	48	46,9	df	1
Female	3	4,1	Asymp. Sig.	0,565
Total	51			
Education level				
	Frequencies		Statistics	
	Observed N	Expected N	Chi-Square	0,262
Basic	37	35,4	df	1
Higher	13	14,6	Asymp. Sig.	0,609
Total	50			
Job level				
	Frequencies		Statistics	
	Observed N	Expected N	Chi-Square	1,2
Manager	12	9	df	1
Non-manager	39	42	Asymp. Sig.	0,273
Total	51			
Job department				
	Frequencies		Statistics	
	Observed N	Expected N	Chi-Square	4,08
Production	44	37,9	df	1
Administration	6	12,1	Asymp. Sig.	0,043
Total	50			

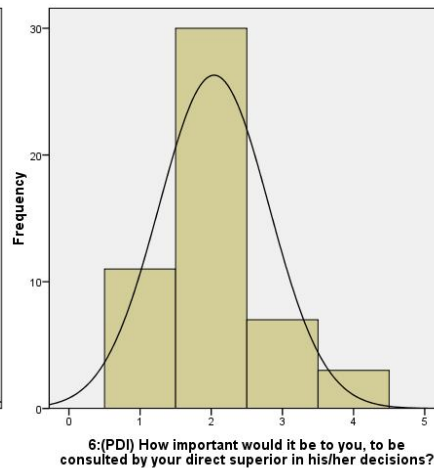
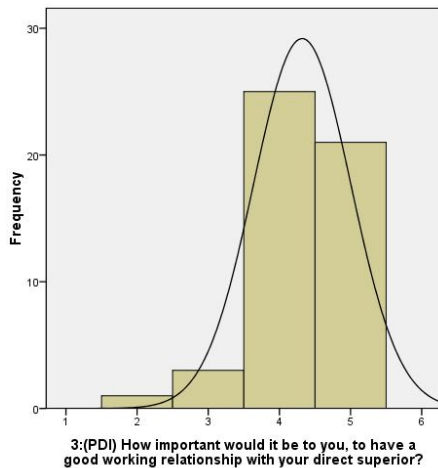
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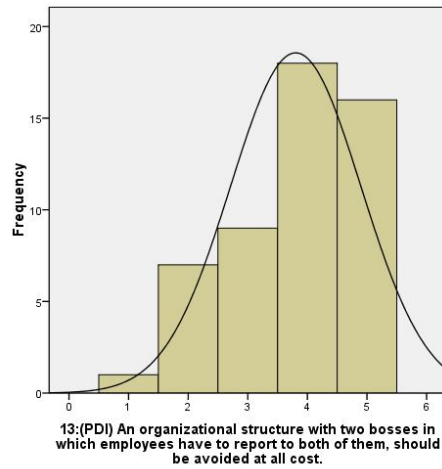
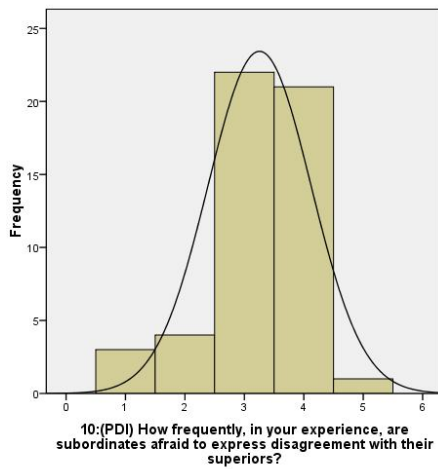
p value less than 0,05

7.5 Descriptive statistics and histograms with normal curve

PDI variables

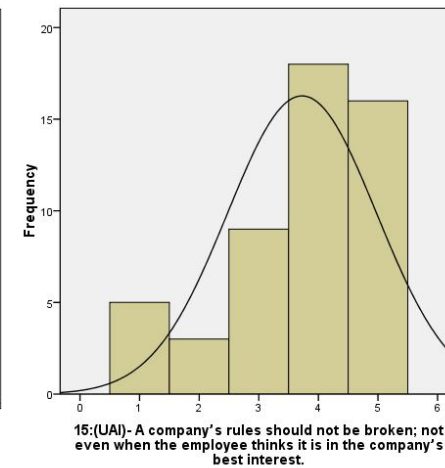
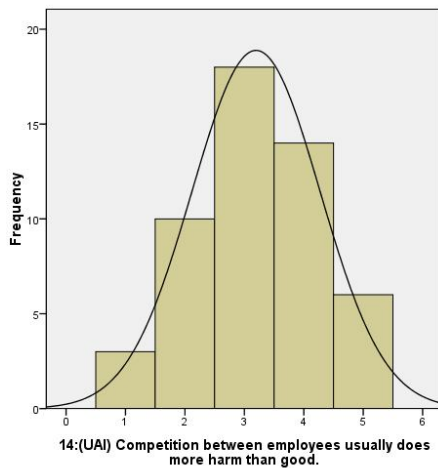
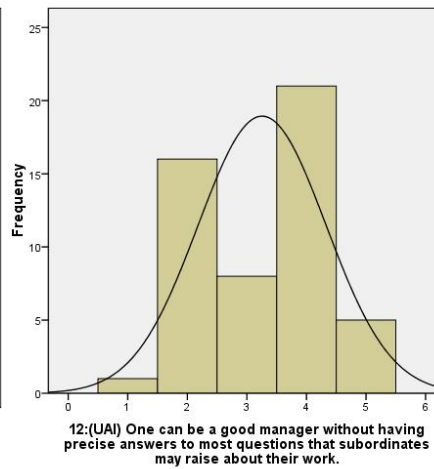
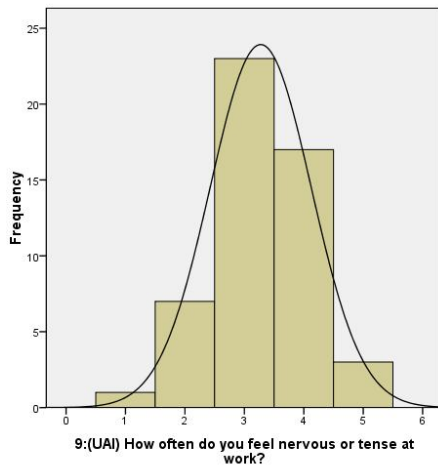
3: How important would it be to you, to have a good working relationship with your direct superior?					
Cases	Valid	50	Descriptives	Mean	4.32
	Missing	1		Std. Deviation	.683
				Skewness	-.906
				Kurtosis	1.339
6: How important would it be to you, to be consulted by your direct superior in his/her decisions?					
Cases	Valid	51	Descriptives	Mean	2.04
	Missing	0		Std. Deviation	.774
				Skewness	.741
				Kurtosis	.787
10: How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?					
Cases	Valid	51	Descriptives	Mean	3.25
	Missing	0		Std. Deviation	.754
				Skewness	-.912
				Kurtosis	.912
13: An organizational structure with two bosses in which employees have to report to both of them, should be avoided at all cost.					
Cases	Valid	51	Descriptives	Mean	3.80
	Missing	0		Std. Deviation	1.096
				Skewness	-.638
				Kurtosis	-.491





UAI variables

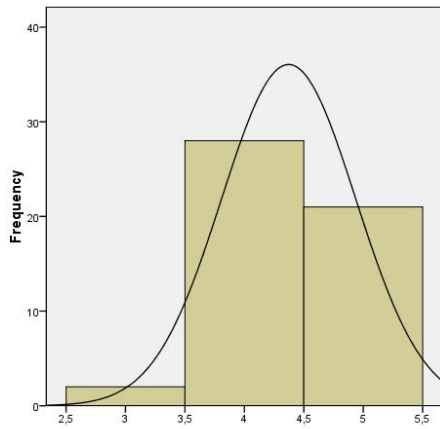
9: How often do you feel nervous or tense at work?					
Cases	Valid	51	Descriptives	Mean	3.27
	Missing	0		Std. Deviation	.850
				Skewness	-.164
				Kurtosis	.117
12: One can be a good manager without having precise answers to most questions that subordinates may raise about their work.					
Cases	Valid	51	Descriptives	Mean	3.25
	Missing	0		Std. Deviation	1.074
				Skewness	-.134
				Kurtosis	.1183
14: Competition between employees usually does more harm than good.					
Cases	Valid	51	Descriptives	Mean	3.20
	Missing	0		Std. Deviation	1.077
				Skewness	-.109
				Kurtosis	-.517
15: A company's rules should not be broken; not even when the employee thinks it is in the company's best interest.					
Cases	Valid	51	Descriptives	Mean	3.73
	Missing	0		Std. Deviation	1.250
				Skewness	-.922
				Kurtosis	.017



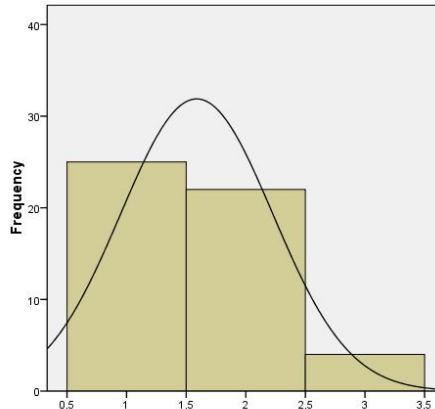
IDV variables

1: How important would it be to you, to have sufficient personal time next to your job?					
Cases	Valid	51	Descriptives	Mean	4.37
	Missing	0		Std. Deviation	.564
				Skewness	-.166
				Kurtosis	-.766
2: How important would it be to you, to have good physical working conditions (good ventilation and lighting, adequate work space, etc)?					
Cases	Valid	51	Descriptives	Mean	1.59
	Missing	0		Std. Deviation	.638
				Skewness	.617
				Kurtosis	-.533
4: How important would it be to you, to have security of employment?					
Cases	Valid	51	Descriptives	Mean	1.51
	Missing	0		Std. Deviation	.644
				Skewness	1.364
				Kurtosis	2.901
8: How important would it be to you, to have an element of variety and challenges in your job?					
Cases	Valid	51	Descriptives	Mean	3.88
	Missing	0		Std. Deviation	.931

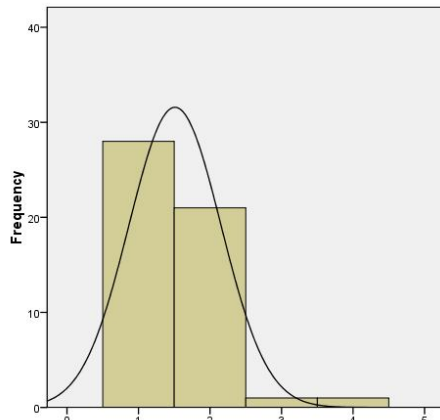
Skewness -.998
Kurtosis 1.089



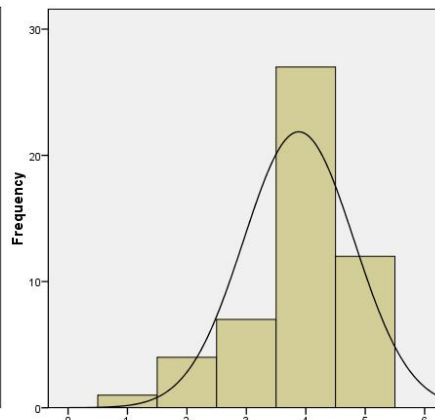
1:(IDV) How important would it be to you, to have sufficient personal time next to your job?



2:(IDV) How important would it be to you, to have good physical working conditions (good ventilation and lighting, adequate work space, etc)?



4:(IDV) How important would it be to you, to have security of employment?

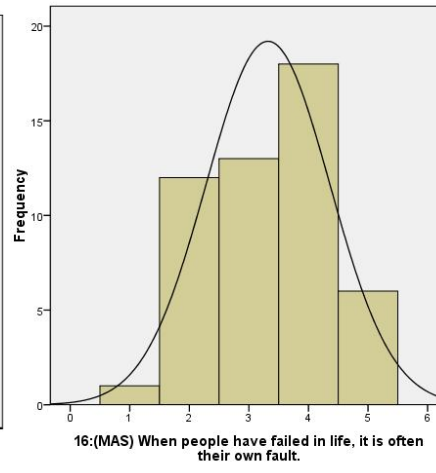
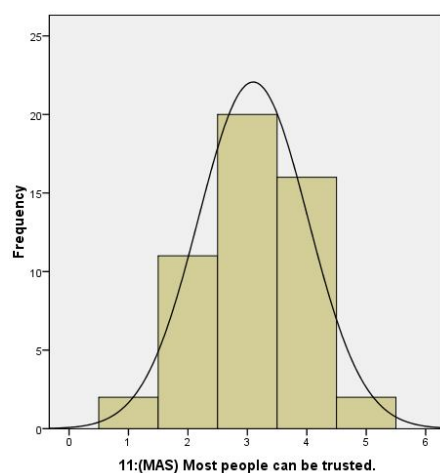
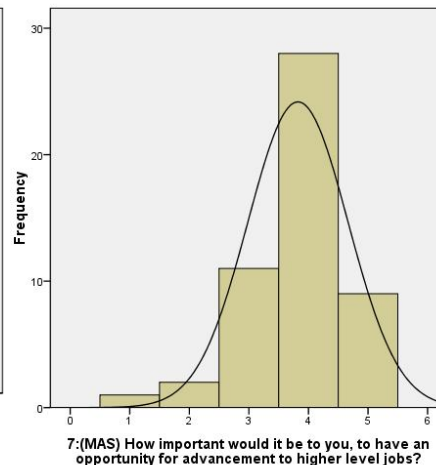
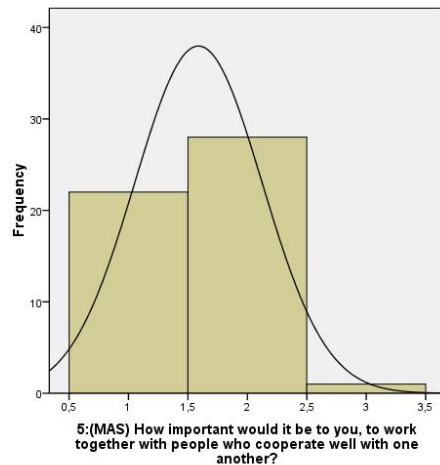


8:(IDV) How important would it be to you, to have an element of variety and challenges in your job?

MAS variables

5: How important would it be to you, to work together with people who cooperate well with one another?					
Cases	Valid	51	Descriptives	Mean	1.59
	Missing	0		Std. Deviation	.536
				Skewness	.039
				Kurtosis	-1.161
7: How important would it be to you, to have an opportunity for advancement to higher level jobs?					
Cases	Valid	51	Descriptives	Mean	3.82
	Missing	0		Std. Deviation	.842
				Skewness	-.907
				Kurtosis	1.667
11: Most people can be trusted.					
Cases	Valid	51	Descriptives	Mean	3.10
	Missing	0		Std. Deviation	.922
				Skewness	-.201
				Kurtosis	-.334

16: When people have failed in life, it is often their own fault.					
Cases	Valid	50	Descriptives	Mean	3.32
	Missing	1		Std. Deviation	1.039
				Skewness	-.121
				Kurtosis	-.872



Normality assessment (Kolmogorov-Smirnov test)

	Kolmogorov-Smirnova		
	Statistic	df	Sig.
1: How important would it be to you, to have sufficient personal time next to your job?	.334	51	.000
2: How important would it be to you, to have good physical working conditions (good ventilation and lighting, adequate work space, etc)?	.312	51	.000
3: How important would it be to you, to have a good working relationship with your direct superior?	.260	50	.000
4: How important would it be to you, to have security of employment?	.335	51	.000
5: How important would it be to you, to work together with people who cooperate well with one another?	.348	51	.000
6: How important would it be to you, to be consulted by your direct superior in his/her decisions?	.324	51	.000
7: How important would it be to you, to have an opportunity for advancement to higher level jobs?	.309	51	.000

8: How important would it be to you, to have an element of variety and challenges in your job?	.315	51	.000
9: How often do you feel nervous or tense at work?	.234	51	.000
10: How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?	.247	51	.000
11: Most people can be trusted.	.203	51	.000
12: One can be a good manager without having precise answers to most questions that subordinates may raise about their work.	.266	51	.000
13: An organizational structure with two bosses in which employees have to report to both of them, should be avoided at all cost.	.238	51	.000
14: Competition between employees usually does more harm than good.	.180	51	.000
15: A company's rules should not be broken; not even when the employee thinks it is in the company's best interest.	.254	51	.000
16: When people have failed in life, it is often their own fault.	.224	50	.000
a. Lilliefors Significance Correction			

Prediction of employees safety attitude through cultural dimensions

PDI variables

3: How important would it be to you, to have a good working relationship with your direct superior?				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	0.329	0,22	10.82%
	Spearman's rho	0.215	0.143	4.62%
Safety prioritization (against other motives)	Pearson	0.225	0.120	5.06%
	Spearman's rho	0.148	0.311	2.19%
6: How important would it be to you, to be consulted by your direct superior in his/her decisions?				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	-0.325	0.023	10.56%
	Spearman's rho	-0.253	0.079	6.40%
Safety prioritization (against other motives)	Pearson	-0.219	0.127	4.80%
	Spearman's rho	-0.200	0.164	4.00%
10: How frequently, in your experience, are subordinates afraid to express disagreement with their superiors?				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	-0.113	0.439	1.28%
	Spearman's rho	-0.109	0.455	1.19%
Safety prioritization (against other motives)	Pearson	-0.125	0.387	1.56%
	Spearman's rho	-0.186	0.196	3.46%
13: An organizational structure with two bosses in which employees have to report to both of them, should be avoided at all cost.				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	0.134	0.358	1.80%
	Spearman's rho	0.140	0.338	1.96%
Safety prioritization (against other motives)	Pearson	0.121	0.404	1.46%
	Spearman's rho	0.153	0.290	2.34%

x.xxx	Correlation is significant at the 0.05 level (2-tailed)
x.xxx	Correlation is significant at the 0.01 level (2-tailed)

UAI variables

9: How often do you feel nervous or tense at work?				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	-0.055	0.706	0.30%
	Spearman's rho	-0.101	0.492	1.02%
Safety prioritization (against other motives)	Pearson	0.162	0.262	2.62%
	Spearman's rho	0.000	0.997	0.00%
12: One can be a good manager without having precise answers to most questions that subordinates may raise about their work.				

Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	-0.266 -0.219	0.065 0.130	7.08% 4.80%
Safety prioritization (against other motives)	Pearson	-0.109	0.452	1.19%
	Spearman's rho	-0.166	0.250	2.76%
14: Competition between employees usually does more harm than good.				
Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	0.044 -0.051	0.762 0.727	0.19% 0.26%
Safety prioritization (against other motives)	Pearson	-0.276	0.052	7.62%
	Spearman's rho	-0.220	0.125	4.84%
15: A company's rules should not be broken; not even when the employee thinks it is in the company's best interest.				
Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	0.159 0.128	0.277 0.381	2.53% 1.64%
Safety prioritization (against other motives)	Pearson	0.011	0.941	0.01%
	Spearman's rho	0.184	0.201	3.39%

x.xxx

Correlation is significant at the 0.05 level (2-tailed)

x.xxx

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

IDV variables

1: How important would it be to you, to have sufficient personal time next to your job?				
Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	0.015 0.062	0.921 0.675	0.02% 0.38%
Safety prioritization (against other motives)	Pearson	0.043	0.768	0.18%
	Spearman's rho	0.010	0.945	0.01%
2: How important would it be to you, to have good physical working conditions (good ventilation and lighting, adequate work space, etc)?				
Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	-0.257 -0.231	0.074 0.110	6.60% 5.34%
Safety prioritization (against other motives)	Pearson	-0.355	0.011	12.60%
	Spearman's rho	-0.409	0.003	16.73%
4: How important would it be to you, to have security of employment?				
Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	-0.260 -0.123	0.071 0.401	6.76% 1.51%
Safety prioritizing (against other motives)	Pearson	0.012	0.932	0.01%
	Spearman's rho	-0.054	0.709	0.29%
8: How important would it be to you, to have an element of variety and challenges in your job?				
Safety participation, awareness and trust	Pearson	Correlation	Sig. (2 tailed)	Shared variance
	Spearman's rho	0.436 0.461	0.002 0.001	19.01% 21.25%
Safety prioritization (against other motives)	Pearson	0.197	0.169	3.88%
	Spearman's rho	0.262	0.066	6.86%

x.xxx	Correlation is significant at the 0.05 level (2-tailed)
x.xxx	Correlation is significant at the 0.01 level (2-tailed)

MAS variables

5: How important would it be to you, to work together with people who cooperate well with one another?				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	-0.068	0.640	0.46%
	Spearman's rho	-0.046	0.752	0.21%
Safety prioritation (against other motives)	Pearson	-0.037	0.796	0.14%
	Spearman's rho	0.004	0.979	0.00%
7: How important would it be to you, to have an opportunity for advancement to higher level jobs?				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	0.205	0.157	4.20%
	Spearman's rho	0.298	0.038	8.88%
Safety prioritation (against other motives)	Pearson	0.144	0.318	2.07%
	Spearman's rho	0.180	0.211	3.24%
11: Most people can be trusted.				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	-0.301	0.035	9.06%
	Spearman's rho	-0.171	0.241	2.92%
Safety prioritation (against other motives)	Pearson	0.114	0.429	0.14%
	Spearman's rho	-0.002	0.991	0.00%
16: When people have failed in life, it is often their own fault.				
		Correlation	Sig. (2 tailed)	Shared variance
Safety participation, awareness and trust	Pearson	0.404	0.004	16.32%
	Spearman's rho	0.376	0.008	14.14%
Safety prioritation (against other motives)	Pearson	0.000	0.997	0.00%
	Spearman's rho	0.133	0.364	1.77%

x.xxx	Correlation is significant at the 0.05 level (2-tailed)
x.xxx	Correlation is significant at the 0.01 level (2-tailed)

Differences in extracted safety componetns between groups with two categories

Age								
		N	Mean	Levene's Test Sig.	t-test Sig. (2-tailed)	t	eta squared	Effect size %
Component 1	Male	46	32.19	0.802	0.61	-0.52	0.0057	0.57%
	Female	3	33.66					
Component 2	Male	47	15.61	0.355	0.94	-1.71	0.0573	5.73%
	Female	3	18.66					
Education level								
		N	Mean	Levene's Test Sig.	t-test Sig. (2-tailed)	t	eta squared	Effect size %
Component 1	Basic education	37	32.05	0.37	0.68	-0.41	0.0037	0.37%
	Higher education	11	32.73					
Component 2	Basic education	37	16.14	0.94	0.60	0.53	0.0059	0.59%
	Higher education	12	15.67					
Job level								
		N	Mean	Levene's Test Sig.	t-test Sig. (2-tailed)	t	eta squared	Effect size %
Component 1	Manager	12	33.00	0.37	0.55	0.60	0.0077	0.77%
	Non-manager	37	32.05					
Component 2	Manager	12	15.67	0.94	0.86	-0.17	0.0006	0.06%
	Non-manager	38	15.84					
Job department								
		N	Mean	Levene's Test Sig.	t-test Sig. (2-tailed)	t	eta squared	Effect size %
Component 1	Production	44	32.20	0.44	0.54	-0.62	0.0083	0.83%
	Administration	4	33.75					
Component 2	Production	44	15.52	0.28	0.66	-1.89	0.0703	7.03%
	Administration	5	18.20					
Self reporting								
		N	Mean	Levene's Test Sig.	t-test Sig. (2-tailed)	t	eta squared	Effect size %
Component 1	Yes	23	32.74	0.32	0.53	0.63	0.0084	0.84%
	No	26	31.88					
Component 2	Yes	23	16.22	0.15	0.38	0.89	0.0162	1.62%
	No	27	15.44					

Differences in extracted safety components between groups with more than two categories

Age

	N	Mean
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safety_comp1	39-	17	32,6471
	40 - 49	17	31,4706
	50+	15	32,8000
	Total	49	32,2857
safety_comp2	39-	18	16,6111
	40 - 49	17	15,5882
	50+	15	15,0667
	Total	50	15,8000

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
safety_comp1	,794	2	46	,458
safety_comp2	2,731	2	47	,075

ANOVA table

		Sum of Squares	df	Mean Square	F	Sig.
safety_comp1	Between Groups	17,482	2	8,741	,386	,682
	Within Groups	1042,518	46	22,663		
	Total	1060,000	48			
safety_comp2	Between Groups	20,671	2	10,336	1,111	,338
	Within Groups	437,329	47	9,305		
	Total	458,000	49			

Employment duration

Employment duration

		N	Mean
safety_comp1	up to 9	15	31,9333
	10 - 26	17	32,3529
	More than 26	16	32,6875
	Total	48	32,3333
safety_comp2	up to 9	16	16,5000
	10 - 26	17	15,3529
	3	16	15,6250
	Total	49	15,8163

	Levene Statistic	df1	df2	Sig.
safety_comp1	,238	2	45	,789
safety_comp2	,328	2	46	,722

ANOVA table

		Sum of Squares	df	Mean Square	F	Sig.
safety_comp1	Between Groups	4,413	2	2,207	,095	,910
	Within Groups	1050,253	45	23,339		
	Total	1054,667	47			

safety_comp2	Between Groups	11,715	2	5,857	,605	,551
	Within Groups	445,632	46	9,688		
	Total	457,347	48			