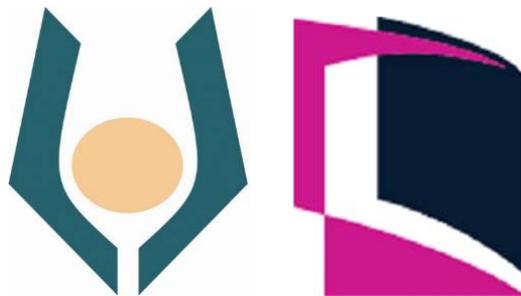


Open University of Cyprus Hellenic Open University

***Master's join degree/post graduate Programme
Enterprise Risk Management (ERM)***

MASTER THESIS



**Compatibility and Application of
ISO 31000:2018 and ISO 45001:2018**

Mr Nicos Soutzis

Supervising Professor
Dr Antonios Targoutzidis

June 2020

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This master's thesis has been submitted in partial fulfilment of the requirements for obtaining master's join degree/postgraduate programme in Enterprise Risk Management (ERM) from the faculty of economics and management of Open University of Cyprus and Hellenic Open University.

June 2020

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Summary

The increasing complexity of internal and external environment exposes organisations to a multitude of risks. ISO 31000:2018 aims to outline an effective and efficient risk management framework, to comply with the environmental changes in which organisations operate, with the aim to increase the possibility of achieving the objectives established by the business. ISO 31000 promotes the integration of risk management and corporate governance, the consistency with the organisation's principles and values, strategies, policies and management operations and controls.

In occupational health and safety, it is necessary to establish an effective management system, as of ISO 45001:2018, which aims to systematically limit the occupational risks that may endanger the safety and health of all persons affected by activities, products or services of the organisation. Systematic approach to management in the field of health and safety at work, ensures the implementation of all measures necessary for the safe operation hence protecting both the stakeholders and the organisation.

ISO 45001:2018 places greater emphasis on the risk management and the ongoing assessment of risks and opportunities to prevent or reduce side effects based on the participation of workers and interested parties. The management standard provides for active participation of management in all processes of health and safety at work and tends to promote decentralised management practices.

Both management standards, stress the importance of establishing the context in which occupational health and safety and risk management frameworks intend to apply. Enhancing the safety and health in organisations and at the same time control the likelihood of adverse event or the consequences of the particular event in case of occurrence, have significant economic importance and fosters prosperity for the organisation and the society in general.

The prevailing health and safety culture within a business has a positive impact on occupational health and safety in reducing the potential for injuries, incidents or fatalities, ensuring business continuity and reputational integrity.

The main objective of this thesis is, through the integration of ISO 45001:2018 and ISO 31000:2018, to determine the maturity of the current safety culture in Synergas Ltd with the aim to obtain related progress towards the desired 'interdependent' state and also create a risk management culture with the participation of workers and interested parties, ideal to enhance stakeholders' trust and faith to corporate values.

The thesis is examining the similarities and controversies of both management systems giving emphasis on the key mutually inclusive attributes deemed to obtain a uniformity of ISO 31000: 2018 and ISO 45001: 2018 to the best interest not only of Synergas but of any organisation with sensitivity in occupational health and safety and risk management competences.

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Foremost, I would like to express my gratitude towards my family, my wife Athina and my lovable children Michael Angelos and Christina for their continuous altruistic and sincere support and encouragement during the three years of my studies, especially for the last year where my presence was inadequate to them.

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Abbreviations

DoLI	Department of Labour Inspection
ERM	Enterprise Risk Management
EU	European Union
HAZOP	Hazard and Operability Study
HLS	High Level Structure
HM	Hazard Matrix
ILO	International Labour Organisation
IRM	Institute of Risk Management
ISO	International Organisation for Standardisation
LOPA	Layers of Protection Analysis
LPG	Liquefied Petroleum Gas
MSDs	Material Safety Data Sheets
OH&S	Occupational Health and Safety
OHSAS	Occupational Health and Safety Assessment Series
PDCA	Plan, Do, Check, Act
QRA	Quantitative Risk Assessment
RAC	Risk Assessment Code
SEM	Structural Equation Modelling
SRA	Society of Risk Analysis
WRAC	Workplace Risk Assessment and Control

Chapter 1

Introduction

Protecting ourselves against risks and latent hazards was always a common practice of human survival that takes us well back at the stone age. As long as animal attacks prevailed, construction of safeguards and defences was emerged. As long as buildings have faced floods and fires, risk management has included structural design and materials used.

Although companies have been managing risks for years, modern businesses are facing much more diverse obstacles and dangers. All businesses face threats on an ongoing basis whilst their reputation is at stake more frequently than before. Warren Buffett said that *“a reputation takes twenty years to build and five minutes to ruin”*. Chapman J.R. (2013) strengthen the statement of Buffett, by stating that *“taking and managing risks is the essence of business survival and growth”*.

According to Borge D. (2001), *“The Holy Grail of risk management is to find the best possible decision to make when faced with uncertainty”*.

Stewart I. (2019) states clearly that *“Uncertainty isn’t just a sign of human ignorance; it’s what the world is made of”*. As Drucker Peter explained, *“economic activity by definition commits present resources to an uncertain future... to take risks is the essence of economic activity”*. Chapman J.R. (2013) considers that *“history has shown that businesses yield greater economic performance only through greater uncertainty – or in other words, through greater risk taking”*.

Financial risk entered the scene at a later stage and gain the interest of many analysts, practitioners and business leaders as long as money has been lent and credit sales became a common practice for many businesses. Modern ERM practice now

encompasses speculative risk, which involves either loss or gain, for instance stock market investment and volatile exchange rates.

The lack of attention to financial risks in early risk management practices, creates a domino effect that is rapidly spreading across the globe. Taking into consideration the gas and oil industry, a decrease in global supply bring soaring oil prices which in turn drive the inflation rate up, the interest rates were also moving upwards, unemployment rate was climbing ravidly, and so forth. These economic changes created the need for financial risk management that companies had not experienced before.

Contemporary business world is becoming perceptive to potential instabilities, uncertainties and implicit threats. Still vivid in our memory the recent financial recession in 2007-2008 initiated in the United States and how ravidly the recession expanded to the rest of the world, especially in Europe.

Timothy Geithner, former president of the New York Fed and Secretary of the Treasury, dismayingly acknowledged how quickly financial problems spread from one region to another. *"The threat of cascading default, bank runs, and catastrophic risk must be taken off the table, as otherwise it will undermine all other efforts, both within Europe and globally. Decisions as to how to conclusively address the region's problems cannot wait until the crisis gets more severe"*, Geithner stated.

Globalization together with the rapid technological change, advance technologies and increasing complexity of organisations, collectively are formalizing a systemic environment sensitive to any macroeconomic trends. The potential risks to which our societies are exposed to, have changed radically and can no longer be understood under a restrictive probabilistic approach. The necessity to rethink risk management on a global rather than a local scale is imperative.

Brocal et al. (2017), have associated three emerging risk typologies (NR, NIR and IR) with risk evolutionary phases likely to be integrated into the technology lifecycle (TLC). The risk is new (NR) when its components are associated with certain

conditions such as ‘new technological or organizational variable’, ‘new social perception’, ‘new scientific knowledge’. The risk is increasing (IR) when its components are associated with the certain conditions such as ‘increase in the number of sources of risk’, ‘increase in the likelihood of exposure’, ‘increase health consequences’. They consider the third type of emerging risk, which arises when a risk is both new and increasing (NIR), that is when the risk components are associated with both new and increasing conditions.

Figure 1 illustrates the four typologies of risk as a set of evolutionary phases of the same risk. At the initial time of the embryonic phase of the new technology, the NR arises and as the use of such technology progress, the NR is becoming an occupational risk that is both new and increasing. Between the growth phase and maturity, the risk is solely granted as increasing. Finally, the IR is transformed into a traditional risk (TR) once the technology is between the maturity and aging phase.

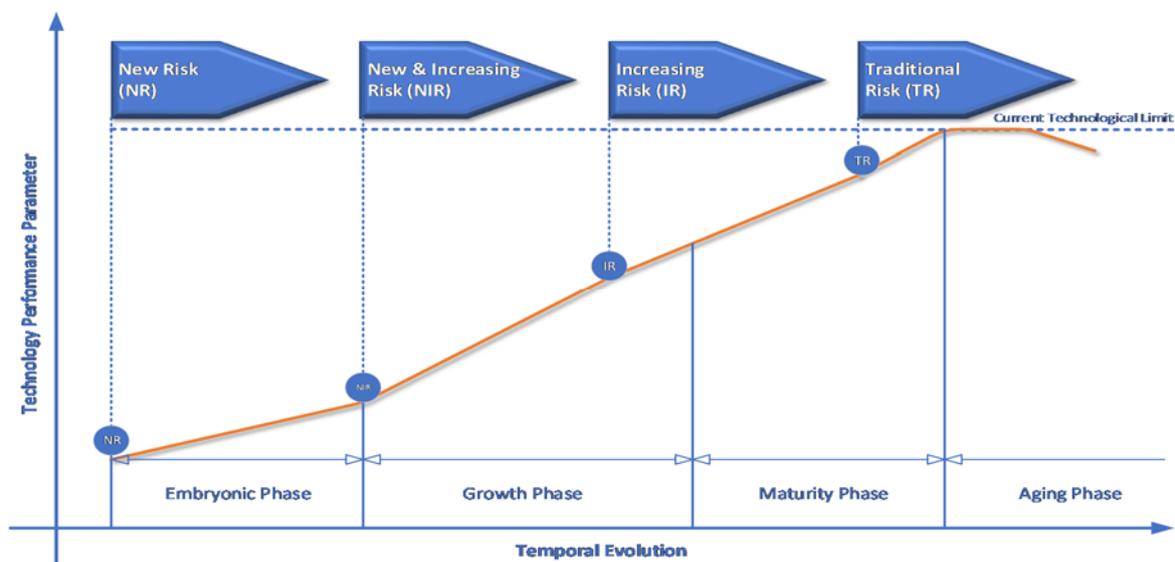


Figure 1: Integration of the evolutionary phases of risk in the TLC (Brocal F. et al., 2017)

The too-big-to fail problem obviously hasn’t faded away. It may even be more acute than before because a wave of mergers during the last crisis left the banking industry more centralized and concentrated than ever before. It is not negligible, however, the research of Rafaella Sadum (Harvard Business Review, May-June 2019), who claimed that “*the need to make tough decisions may favor centralized firms but decentralization*

was associated with relatively better performance for firms or establishments facing the toughest environment during a crisis”.

Poor risk management is summarized within the declaration issued by G20 at their summit held in Washington back on November 2008: *During a period of strong global growth, growing capital flows, and prolonged stability earlier this decade, market participants sought higher yields without an adequate appreciation of the risks and failed to exercise proper due diligence. At the same time, weak underwriting standards, unsound risk management practices, increasingly complex and opaque financial products, and consequent excessive leverage combined to create vulnerabilities in the system. Policymakers, regulators and supervisors, in some advanced countries, did not adequately appreciate and address the risks building up in financial markets, keep pace with financial innovation, or take into account the systemic ramifications of domestic regulatory actions.*

The task of risk management is quite specific. Hillson D. (2016) argues that *“the task of risk management is to enable individuals, groups and organisations to make appropriate decisions in the light of the uncertainties that surround them”.*

The field of OH&S has become a topic of increasing importance over the last 50 years. The establishment of Occupational Safety and Health Administration (OHSA) in 1970 reflected the recognition that safety in the workplace is a fundamental expectation for all employees. The field of OH&S has expanded to almost every workplace environment, from the office to the airplane.

The main goal of OH&S system is to identify hazards in the workplace and determine the risks associated with them, to design the management programme to reduce risks associated with the hazards and to communicate hazard identification, risk assessment and appropriate safety measures to all interested parties especially to workers. The challenge is to provide a safe work environment through the development of an OH&S that provides a foundation for a culture of safety that makes the worker safety a central mission for all employees and stakeholders.

The purpose is to take those decisions that mostly considered appropriate to handle or prepared to tackle specific uncertainties or the consequences of them. There are infinite number of uncertainties, but the hard work of the professionals and practisers is to promptly identify all those uncertainties that matter to them and take actions to avoid, mitigate or compensate potential impact. By focusing on objectives either individual, group or organisational, will help us concentrate on what matters and link strategy and decision making to achieve explicit objectives. Where risks are effectively managed, the possibility of achieving objectives will be optimised.

Chapter 2

Literature Review

Managing risks is a strategic challenge for organisations, which must face threats increasingly complex and diverse. Organisations are encouraged to adopt management models that consider the increasing diversity and complexity of risks in order to preserve a safe business environment. *“The one thing that is certain about the future is its uncertainty, its risks”* (Drucker P., 1979).

It is clear that risk and uncertainty are commonly interrelated since all risks are uncertain but definitely not all uncertainties are risky. Unlike any other authors that approached risk in a mathematical perspective – risk arises from randomness with unknowable probabilities. Hillson D. (2016) argued that *“if we are to find a clear role for risk management in relation to meeting the challenge of uncertainty, mathematical theory is unlikely to yield usable solutions. A more pragmatic approach is required, which is useful in practice, and which supports effective risk management and good decision making when conditions are not certain”*.

Uncertainty is a critical element in each step of the ISO 31000 risk management framework. ISO 31000 defines risk as *‘the effect of uncertainty in being able to meet objectives’* (Hutchins G., 2016).

Woods M. (2011) explains the importance of management standard applications stating that standards provide tools that are helpful for organisations seeking to establish their own risk management systems. The declared intention is not to be prescriptive and encourage a box-ticking approach but simply to provide a mechanism through which organisations can check that they are compliant. She supports that *“if risk management exists solely in order to ensure regulatory compliance, it may not be*

...serving its full purpose and providing maximum benefit to an organisation. A compliance focused approach can cause both financial and reputational damage”.

ISO 31000 and ISO 45001 can be perceived as a part of a wider ERM paradigm. The effective management of occupational health and safety (OHS), according to Pillay M. (2018) *“is an integral part of risk management in organisations”*. The concept of risk management emerged. Since the mid-1990s, enterprise risk management has been developed as a concept and as a management function within corporations. *“Enterprise risk management is a systematic and integrated approach to the management of the total risks that a company faces”* (Dickinson G., 2001).

ISO31000:2018 has developed a toolbox of risk management standards to assist on preparation, responsiveness and recovery of a business in an efficient and effective manner. According to analysts, ISO31000:2018 delivers a clearer, shorter and more concise guide that will help organisations use risk management principles to improve planning and make better decisions. Jason Brown explains that *“ISO 31000:2018 provides a risk management framework that supports all activities, including decision making across all levels of the organisation”*.

ISO 31000 standard is intended to help organisations to manage in a systematic and comprehensive manner, diverse types of risks by offering a consistent framework *“to assist the organisation to integrate risk management into its overall management system”* (ISO, 2018).

“One of the key aims behind ISO 31000 was to ensure consistency through one vocabulary, asset of performance criteria, a common process, and guidance on how such processes could be integrated in decision making” (Purdy G., 2010).

While it is difficult to measure the claimed benefits of the ISO 31000 standard before its implementation, the systematic and comprehensive view presented in the documentation relating to the standard, should help to avoid major pitfalls, particularly in terms of planning for crisis prevention and management measures. (Lalonde C. and Boiral O., 2012).

According to Purdy G. (2010), the specifications set out in the ISO 31000 manual, avoid this pitfall:

- a. By adopting a consensual definition of risk – the effect of uncertainty on objectives;
- b. By incorporating a stage of both internal and external consultation in the process of identifying risks and their management;
- c. By proposing various risk assessment techniques, including inductive reasoning techniques such as HAZOP, brainstorming and the Delphi method, to name a few.

Lalonde C. & Boiral O. (2012) argued that ISO 31000 offered several advantages over previously established standards. These included a comprehensive and multi-risk approach to reinforce commitment of corporate leaders in the advance of decisions, ability to integrate the risk management framework into an organisation's existing practices, principles and guidelines to manage poorly understood complex risks, and the ability to adapt the risk management system to specific contexts.

The information era has gifted us with an abundance of information and access to detailed and extensive data and metrics. The more information, however, is considered, the longer typically it takes to make a decision. While the decision-making process should be thorough, the best way to make good decisions is usually not to take more time or to look at more information. Instead, *'review the pertinent information you need, set a deadline to make a decision, and then stick to it'* (Erwin Mike, Harvard Business Review, August 1st, 2019).

Risk management framework can be integrated into existing organisation's practices such as ISO9001, ISO 14001 and ISO 45001 and incorporate into their management system such as the definition of goals and plans, mechanisms of communication and reporting, monitoring performance indicators and a continual improvement approach. ISO 31000 suggests principles and guidelines prompted to add value to the company.

There was, however, a contradicted perception to the value of ISO 31000 among analysts. For instance, Leitch M. (2010) have argued that *'the terminology used in ISO 31000 is too vague or ambiguous and offers minor guidance to managers to the point that it leads to illogical decisions and is impossible to comply with'*. Purdy G. (2010) proposed that *'some compromise and change was required to address the differences in terminology and its application across different regions and sectors'*.

Hutchins G. (2016), argued that *"the descriptive nature of the ISO 31000 standard may well be its strength, but may be its weakness. The standard without the proper guidance of a risk professional may become discretionary and even arbitrary"*.

Researchers, such as Weick and Suncliffe (2007), stated that *"it would be wise for managers to not let the process's apparent rationality make them forget that there is inevitably an element of subjectivity in any process, stemming from the perceptions and expectations of the diverse actors concerned with risks in any given set of social circumstances"*.

Although the ISO 31000 standard incorporates guiding principles from the literature to promote practices found to be most appropriate for dealing with risk, the effectiveness of the standard in improving risk prevention and management remains uncertain if applied mechanically as an objective tool instead of being seen as a strategic praxis (Whittington, 2006).

ISO45001:2018 aims to raise awareness of the importance of occupational health and safety and build a culture of prevention in the workplace. The standard provides a framework to increase safety, reduce workplace risks and enhance health and well-being at work. The framework is not intended to prescribe a management system but to assist organisations integrate risk management into its overall management system. Many organisations have already established management systems, such as ISO 9001, ISO 14001 or OHSAS 18001 (replaced by ISO 45001), so there is an expectation that the key processes used for these can be integrated into a company's risk management framework (Pillay M. and Jefferies M.C., 2015).

In OH&S field, the ISO 45001 standard defines management system *“as a set or interrelated or interacting elements of an organisation to establish policies and objectives and processes to achieve those objectives”*.

Haddad et al. (2012), proposed a risk assessment method, Hazard Matrix (HM), and demonstrated how this could be applied to health, safety and environment management by integrating it with the risk management process suggested in ISO 31000. The hazard matrix provides a very flexible approach to the risk and hazard analyses. The tool decomposes the risk in its independent variables (likelihood and severity) and analyses each variable separately.

The authors highlighted the importance of the preliminary analysis which identifies, describes and classifies the risk treatment. Since, in certain times companies are working with limited resources, they raised the importance of prioritisation tool, able to identify critical risks on which the plan of risks' mitigation can be based and oriented.

In the OH&S, the probabilistic factor is represented by the probability of occurrence and severity of the hazard to affect the health and safety of a number of workers exposed to the hazard. The analysis starts by dividing the company in sectors, identifying the hazards and its respective sectors of exposure. Due to this method, it is flexible to use the HM combined with other risk identification and assessment tools. HM is a valuable tool to allow determination of prioritisation among several risks, hazards and sectors within a given system or environment.

Chapter 3

Theoretical Framework

3.1 Theory of Enterprise Risk Management

In a volatile economic momentum, the most successful companies establish comprehensive, fully integrated risk management processes at each level of decision-making process.

Lam J. (2017) supports that ERM provides integrated analyses, strategies and reporting with respect to an organisation's key risks, which address their interdependencies and aggregate exposures. In addition, an integrated ERM framework supports the alignment of oversight functions such as risk, audit and compliance which rationalises risk assessment, risk mitigation and reporting activities.

Organisation's risk profile can also be affected by macroeconomic influences, environment that politics and collective measures need to be altruistically embedded, otherwise considerable risky external business environment vulnerable to interest rates, energy prices, inflation, unemployment and stagnation will thrive. Therefore, integration of ERM into business strategy leads to more informed and effective decisions which allows understanding the risks associated with business strategy. The recent economic crisis was the ultimate risk management 'stress test' by which many organisations have failed setting the need for establishing an effective ERM and becoming embedded in corporate culture as a decisive priority.

Chapman R.J. (2015) supports that *"the impact of companies lacking robust risk management and good governance will impact negatively on company's long-term investment performance"*. It is obvious that at the micro or business level there is

recognition that businesses need to improve their corporate and risk management practices.

Lam J. (2017) defined Enterprise Risk Management (ERM) as *'an integrated and continuous process for managing enterprise-wide risks including strategic, financial, operational, compliance, and reputational risks, in order to minimise unexpected performance variance and maximise intrinsic firm value'*. This process empowers the board and management to make more informed risk decisions by addressing fundamental requirements with respect to governance and policy, including risk appetite, risk analysis, risk management and monitoring and reporting.

Razali and Tahir (2011) discussed that ERM differs from the traditional risk management (TRM). They defined ERM as *"a goal to achieve increasing of the organisation's short- and long-term value to its stakeholders by assessing, controlling, exploiting, financing and monitoring the risks of all departments within the firm"*. As per Alvinunessen and Jankensgard (2009), ERM is *"an approach for the whole company to manage the risk and centralise the information according to the risk exposures"*. Risk affecting future cash-flows and the entity of the company is a universal risk that if acknowledged, the management team could take a step further to assess the likelihood and the impact of the risk based on the firm's objective (Alvinunessen and Jankensgard, 2009).

ERM provides an integrated or portfolio approach to risk management through the application of an enterprise level assessment, quantification, financing, and management of risk. The interaction of one risk with the company's portfolio or other priority risks is assessed through the methodology provided with ERM (Grace et al., 2010).

The objectives of risk management, according to Gibson D. (2014) are epigrammatically *'to protect the company, helps create a framework, encourages management to be proactive, as a warning to be careful and to improve company performance'*.

Douglas and Widalvsky (1982) similarly argue that the concept of risk is strongly influenced by culture and distinguished four cultural types, each with a different attitude towards risk: the hierarchical type (risk averse), the individualist type (risk taking), the sectarian type (risks as object of social causes) and the marginal type (distrustful attitude).

Lam J. (2017) define risk as *“a variable that can cause deviation from an expected outcome, and as such may affect the achievement of business objectives and the performance of the overall organisation”*.

Borge D. (2001) define risk as *“being exposed to the possibility of a bad outcome”* whereas he defines Risk Management as *“taking deliberate action to shift the odds in your favour-increasing the odds of good outcomes and reducing the odds of bad outcomes”*.

Hillson D. (2016) defined risk as *“the uncertainty that, if it occurs, will affect the achievement of objectives”*.

The three attributes that characterise risk management, according to Hutchins G. (2016) are Systematic, Structured and Timely. Plan methodologically, follow a process Plan-Do-Check-Act cycle (PDCA) on a logical pattern and decision-making sequence at the appropriate time. The PDCA concept is an interactive process used by organisations to achieve continual improvement (ISO 45001:2018).

Risks can emerge, change or disappear as an organisation’s external and internal context changes. Risk management anticipates, detects, acknowledges and responds to those changes and events in an appropriate and timely manner (ISO 31000:2018, p.3).

Risk management facilitates identification of major risks and implementation of appropriate measures for their prevention or effective management. On the other, it promotes increased awareness of risks and encourages the organisation to take risks into account. The ISO 31000 standard defines the main responsibilities of organisations in this regard, including establishing a policy on risk management,

communicating its beneficial effects to the various stakeholders, and ensuring that sufficient resources are in place and available for utilisation.

According to Herbane B. (2010), *“there is a funding paradox in many small and medium-size businesses that lead to crisis management being a low priority for leadership and investment”*. The author reports that *“the financial costs of introducing techniques for greater business resilience represents a ‘grudge purchase’”*. Spillan J. and Hough M. (2003) show that *“concern regarding risk management among small business owners appears to be the actual occurrence of a crisis”*.

The ISO 31000 standard defines risk management *“as coordinated activities to direct and control an organisation with regard to risk”*, whereas the Society of Risk Analysis (SRA) considers risk management *“as activities to handle risks such as prevention, mitigation, adaptation or sharing”*.

Both systems, ISO 31000 and ISO 45001 prerequisite the understanding of the organisation’s context. An understanding of the context is used to establish, implement, maintain and continually improve its management system.

3.2 ISO 31000:2018

A management system is the framework of policies, processes and procedures employed by an organisation to ensure that it can fulfil the tasks required to achieve its purpose and objectives (Institute of Risk Management-IRM, 2018). These objectives will cover all aspects of the organisation, including strategy, tactics, operations and compliance. Managing risk is based on the principles, framework and process as outlined in figure 2 below. Even though these principles and components might already exist in full or in part within an organisation, they might need to be adapted or amended so that managing risk is efficient, effective and consistent.

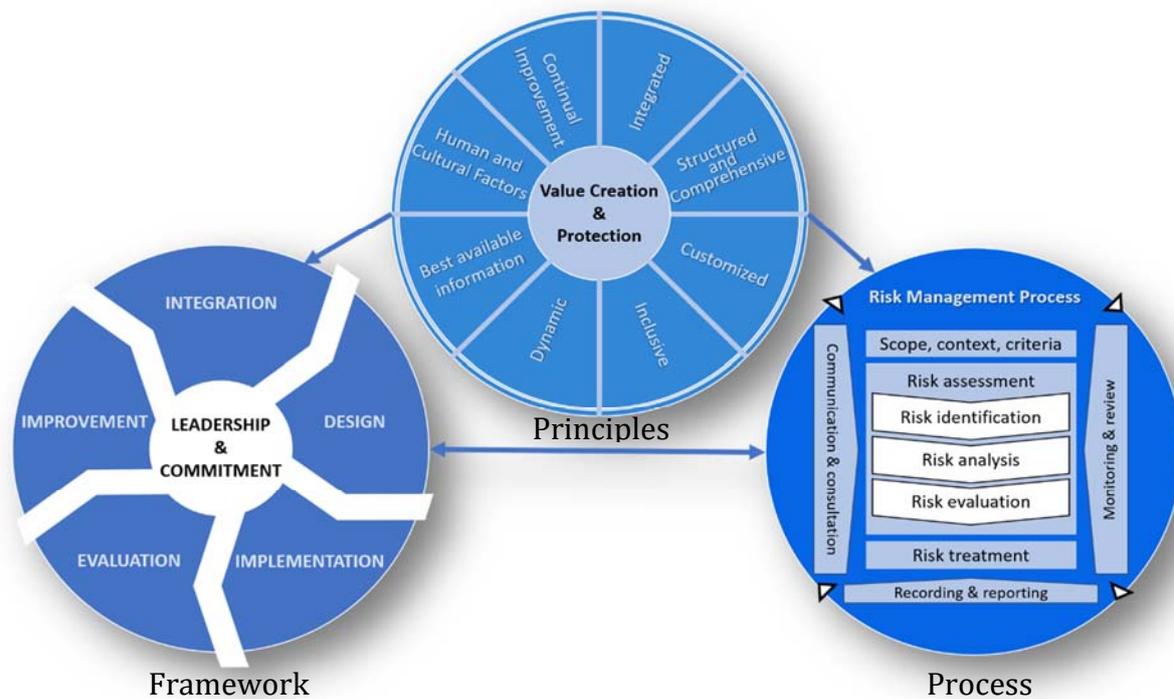


Figure 2: Principles, Framework and process of ISO31000:2018

Traditionally, risk management has played a strong supporting role at board level. ISO 31000 provides important information for managers and board members, so that they can define and fulfil their risk oversight responsibilities. It is important to align and integrate consideration of risk into existing management activities to ensure that risk circulated information, is part of the business model. This will help overcome the perception that risk management is only concerned with the management of a list of risks undertaken separately and isolated from the management of the business and formation of strategy.

ISO 31000 was originally published in 2009 and an updated version was published in February 2018. The latter is very similar to the former standard, but the main differences, according to ISO, succinctly stated below:

- a. Review of the principles of risk management, as these are considered the key criteria for successful risk management;

- b. Focus on leadership by top management who should ensure that risk management is integrated into all organizational activities, starting with the governance of the organisation;
- c. Greater emphasis is placed on the iterative nature of risk management, drawing on new experiences, knowledge and analysis for the revision of process elements, actions and controls at each stage of the process; and
- d. Streamlining of the content with a greater focus on sustaining an open system model that regularly exchanges feedback with its external environment to fit multiple needs and contexts.

Jason Brown, Chair of technical committee ISO/TC 262 on risk management that developed the standard, says: *“The revised version of ISO 31000 focuses on the integration with the organisation and the role of leaders and their responsibility. Risk practitioners are often at the margins of organisational management and this emphasis will help them demonstrate that risk management is an integral part of business.”*

3.2.1 Principles

According to ISO 31000:2018, the principles outlined in Figure 2, provide guidance on the characteristics of effective and efficient risk management, communicating its value and explaining its intention and purpose. The principles are the foundation for managing risk and should be considered when establishing the organisation’s risk management framework and processes. These principles should enable the organisation to manage the effects of uncertainty on its objectives.

In essence, the eight principles are briefly explained below:

- a. **Integrated:** risk management is an integral part of all organisational activities;
- b. **Structured and comprehensive:** a structured and comprehensive approach to risk management contributes to consistent and comparable results;
- c. **Customised:** the risk management framework and process are customised and proportionate to the organisation’s external and internal context related to its objectives;

- d. **Inclusive:** appropriate and timely involvement of stakeholders enables their knowledge, views and perceptions to be considered. This results in improved awareness and informed risk management;
- e. **Dynamic:** risks can emerge, change or disappear as an organisation's external and internal context changes. Risk management anticipates, detects, acknowledges and responds to those changes and events in an appropriate and timely manner;
- f. **Best available information:** the inputs to risk management are based on historical and current information, as well as on future expectations. Risk management explicitly considers any limitations and uncertainties associated with such information and expectations. Information should be timely, clear and available to relevant stakeholders;
- g. **Human and cultural factors:** human behaviour and culture significantly influence all aspects of risk management at each level and stage;
- h. **Continual improvement:** risk management is continually improved through learning and experience.

3.2.2 Framework

According to ISO 31000:2018, the purpose of the risk management framework is to assist the organisation in integrating risk management into significant activities and functions. The effectiveness of risk management will depend on its integration into the governance of the organisation, including decision-making process. This requires support from stakeholders, particularly top management. Framework development encompasses, as illustrated in Figure 2, integrating, designing, implementing, evaluating and improving risk management across the organisation.

According to IRM, the principles of risk management and the framework are closely related. For example, one of the principles is that risk management should be integrated and one of the components of the framework is integration. The principle outlines what must be achieved, and the framework provides information on how to achieve the required integration. The effectiveness of risk management will depend on its integration into all aspects of the organisation, including the decision-making process.

The five components of framework according to ISO 31000:2018, are described below:

- a) Integration:** Integrating risk management relies on an understanding of the organisational structures and context. Structures differ depending on the organisation's purpose, goals and complexity. Risk is managed in every part of the organisation's structure and everyone has the responsibility for managing risk. Governance, on the other hand, guides the course of the organisation, its external and internal relationships, and the rules, processes and practices needed to achieve its purpose. Management structures translate governance direction into the strategy and associated objectives required to achieve desired levels of sustainable performance and long-term viability. Determining risk management accountability and oversight roles within an organisation are integral parts of the organisation's governance. Integrating risk management into an organisation, is a dynamic and interactive process and should be customised to the organisation's culture.

- b) Design:** when designing the framework for managing risk, the organisation should examine and fully understand its external and internal context. Top management should demonstrate and articulate continual commitment to risk management through a policy, a statement or other forms that clearly convey organisation's objectives and commitment to risk management. Also, top management should ensure that the authorities, responsibilities and accountabilities for relevant roles with respect to risk management are assigned and communicated at all levels of the organisation and appropriately allocate resources for effective risk management. Furthermore, the organisation should establish an approved approach to communication and consultation in order to support the framework and facilitate the effective application of risk management. Communication and consultation should be timely and ensure that relevant information is collected, collated, synthesised and shared and that feedback is provided and improvements are effected.

- c) Implementation:** Successful implementation of the framework requires the engagement and awareness of stakeholders. This enables organisations to

explicitly address uncertainty in decision making, while ensuring that any new subsequent uncertainty can be considered. Properly designed and implemented, the risk management framework will ensure that the risk management process is a part of all activities throughout the organisation, including decision-making, and that changes in external and internal contexts will be adequately captured.

d) Evaluation: in order to evaluate the effectiveness of the risk management framework, the organisation should periodically measure performance against its purpose, implementation plans, indicators and expected behaviour and also determine whether it remains suitable to support achieving the objectives of the organisation.

e) Improvement: the organisation should continually monitor and adapt the risk management framework to address external and internal changes. The organisation should continually improve the suitability, adequacy and effectiveness of the risk management framework and the way the risk management process is integrated, develop plans and tasks and assign them to those accountable for implementation for the enhancement of risk management.

3.2.3 Process

The risk management process, as illustrated in Figure 2, involves the systematic application of policies, procedures and practices to the activities of communicating and consulting, establishing the context and assessing, treating, monitoring, reviewing, recording and reporting risk. The risk management process should be an integral part of management and decision-making and integrated to the structure, operations and processes of the organisation.

Process involves the following attributes:

a. **Communication and consultation:** The purpose of communication and consultation is to assist relevant stakeholders in understanding risk, the basis

on which decisions are made and the reasons why particular actions are required. Communication seeks to promote awareness and understanding of risk, whereas consultation involves obtaining feedback and information to support decision-making. Communication and consultation with appropriate external and internal stakeholders should take place within and throughout all steps of the risk management process.

The organisation's culture allows communication with internal and external stakeholders throughout the process of risk management. Communication and consultation aim to bring different areas of expertise together, promotes the exchange of different views and provide sufficient information to facilitate decision making.

- b. **Scope, context and criteria:** The purpose of establishing the scope, the context and criteria, is to customise the risk management process, enabling effective risk assessment and appropriate risk treatment. Scope, context and criteria involve defining the scope of the process and understanding the external and internal context. As the risk management process may be applied at different levels, it is important to clear about the scope under consideration, the relevant objectives to be considered and their alignment with organisational objectives.

The external and internal context is the environment in which the organisation seeks to define and achieve its objectives. The external and internal context analysed when establishing the risk management framework. Mainly the external context is considering the Political, Economic, Sociocultural, Technological, Environmental and Legal (PESTEL) analysis, external stakeholders' analysis and mapping, contractual relationships and commitments, the complexity of networks and dependencies and generally all factors affecting the internal and external business environment.

The internal context is mainly considering the organisation's structure, governance, policies and objectives, available resources (capital and people), culture, information system and flow, various standards, guidelines and models

adopted, vision, mission and values, strategy, objectives and policies, internal stakeholders' analysis, contractual relationship and commitments. Both internal and external context is in line with stakeholders' perceptions and values.

Risk criteria should be set at the beginning of the risk assessment process and aligned with the risk management framework. Risk criteria should reflect the organisation's values, objectives and resources and should be dynamic and always consistent with policies and statements about risk management. The criteria should be defined taking into consideration the organisation's obligations and views of stakeholders.

c. **Risk assessment:** Risk assessment is the overall process of risk identification, risk analysis and risk evaluation. Risk assessment should be conducted systematically and collaboratively, drawing on the knowledge and views of stakeholders as aligned with risk appetite. The process involves the steps provided below:

i. **Risk identification:** The aim of this step is to generate a comprehensive list of risks based on those events that might create, enhance, prevent, degrade, accelerate or delay the achievement of objectives. This stage is critical since if a risk is not identified then no further analysis will be underpinned.

Opportunities and Threats (Part of SWOT analysis), changes in the external and internal context, indicators of emerging risks, vulnerabilities and capabilities are factors that an organisation should be considered when identifying risks.

ii. **Risk analysis:** Risk analysis involves developing an understanding of the risks identified. Risks are analysed by determining their consequences in relation to their likelihood to occurred. Analysis can be either quantitative or qualitative depending on the present circumstances. Risk analysis provides an input to risk evaluation, to decisions on whether risk needs to

be treated and how, and on the most appropriate risk treatment strategy and methods.

Risk analysis involves a detailed consideration of uncertainties, risk sources, consequences, likelihood, events, scenarios, controls and their effectiveness. An event for instance, might have multiple causes and consequences and can affect multiple objectives. Risk analysis can be undertaken with varying degrees of detail and complexity, depending on the purpose of the analysis, the availability and reliability of information, and the resources available at a given time.

- iii. **Risk evaluation:** The purpose of risk evaluation is to support decisions. Risk evaluation involves comparing the level of risk found during the analysis process with risk criteria established when the context was considered. Based on this comparison, the need for treatment can be considered. Decisions should take account of the wider context and the actual and perceived consequences to external and internal stakeholders. The outcome of risk evaluation should be recorded, communicated and then validated at appropriate level.

- d. **Risk treatment:** Risk treatment options are not necessarily mutually exclusive or appropriate in all circumstances. Options for treating risk may involve one or more of the following:
 - i. Risk avoidance;
 - ii. Risk reduction;
 - iii. Increase risk in order to pursue an opportunity;
 - iv. Risk transfer;
 - v. Changing risk likelihood or consequences;
 - vi. Risk acceptance;
 - vii. Risk sharing.

Selecting the most appropriate risk treatment option, involves balancing the potential benefits derived in relation to the achievement of the objectives against costs, effort or disadvantages of implementation. When selecting risk treatment options, the organisation should consider the values, perceptions and potential involvement of stakeholders and the most appropriate ways to communicate and consult with them. Monitoring and review need to be an integral part of the risk treatment implementation process, to give assurance that the different forms of treatment become and remain effective.

Risk treatment plans are specifying how the chosen treatment options will be implemented, so that arrangements are understood by those involved and progress against the plan can be monitored. The treatment plan should clearly identify the order in which risk treatment should be implemented. Treatment plans should be integrated into the management plans and processes of the organisation, in consultation with appropriate stakeholders.

When selecting risk treatment options, the organisation should consider the values, perceptions and potential involvement of stakeholders. Monitoring and review need to be an integral part of the risk treatment implementation to give assurance that the different forms of treatment become and remain effective.

e. Monitoring and review

The purpose of monitoring and review is to assure and improve the quality and effectiveness of process design, implementation and results. Ongoing monitoring and periodic review of the risk management process and its outcomes should be a planned part of the risk management process, with responsibilities clearly defined. It should be part of the risk management the frequent review of the process to alter, revised, amend when needed. Monitoring and review include planning, gathering and analysing information, recording results and providing feedback. The main purpose of this process is to continuously improve the risk assessment in order to identify and properly analyse risks, emerging and residual risks.

f. Recording and reporting

The risk management process and its outcomes should be documented and reported through appropriate mechanisms. Reporting is an integral part of the organisation's governance and should enhance the quality of dialogue with stakeholders and support top management and oversight bodies in meeting their responsibilities.

3.3 ISO 45001:2018

Back in the early 1990s, organisations worldwide recognised the need to control and improve occupational health and safety (OH&S) performance. The timing of this recognition was, in a certain degree, aligned with the formation of European Union (November 1st, 1993). Organisations of all kinds are increasingly concerned with achieving and demonstrating sound OH&S performance by controlling their occupational risks, consistent with their OH&S policy and objectives.

According to International Labour Organisation (ILO), 2.34 million workers died due to their occupation. 2 million of those deaths were related to health and the rest of them were related to work accidents (Yokoyama K. et al., 2013). By analysing these devastating statistics, it is apparent that there is an urgent need for organisations around the globe to improve their management systems of protection and safety of employees. Globalisation urged organisations to give emphasis on ethics in every aspect of its operations, including the way they treat and protect their employees.

Enhancing the safety and health at work has foremost a significant economic importance to the business as addressing issues related to safety and health to create favourable work conditions and optimised work relations and processes. OH&S brings reduction of losses, promotes and enhance productivity, efficiency and quality of work, conditions that lead to greater prosperity for the company and the society. To sustain prosperity, it is important to establish and implement a mechanism to ensure control and proper functioning of the business.

ISO 45001 and previously OHSAS 18001 aims to systematically limit the occupational risks that may endanger the safety and health of persons affected by business activities, products or services. The target is to help organisations to manage OH&S risks and improve product quality or services and organisational performance by preventing injuries and occupational diseases.

OHSAS 18001 standard has been developed since 1999. The basic aim of OHSAS 18001 was to support and promote good practices in occupational health and safety through systematical and structured management system, preventing work related injuries and ill health to personnel performed in a safe and healthy workplace. It is of vital importance for the organisation to eliminate hazards and minimise the occupational exposure to risk by taking effective preventing and protective measures.

Kristian Glasel, Convenor of the ISO working group that developed ISO 45001, and Charles Corrie, Secretary of ISO occupational health and safety management systems, characterised ISO 45001 as the world's first international standard dealing with health and safety at work which provides a single and clear framework for all organisations wishing to improve their OH&S performance.

Directed at the top management of an organisation, it aims to provide a safe and healthy workplace for employees and visitors. To achieve this, it is crucial to control all factors that might result in illness, injury, and in extreme cases death, by mitigating adverse effects on the physical, mental and cognitive condition of a person. According to them, ISO 45001 covers all of those aspects.

ISO 45001 is the successive standard of OHSAS 18001 and the first occupational health and safety standard issued by ISO. The intention of the standard is to provide a safe and healthy work environment for workers and persons under the organisation's control. ISO 45001 is based on plan-do-check-act (PDCA), a model that provides a framework to plan what it is needed for regular operations in order to minimise the risk of harm. The PDCA model, in relation to ISO 45001:2018 is illustrated in Figure 3.

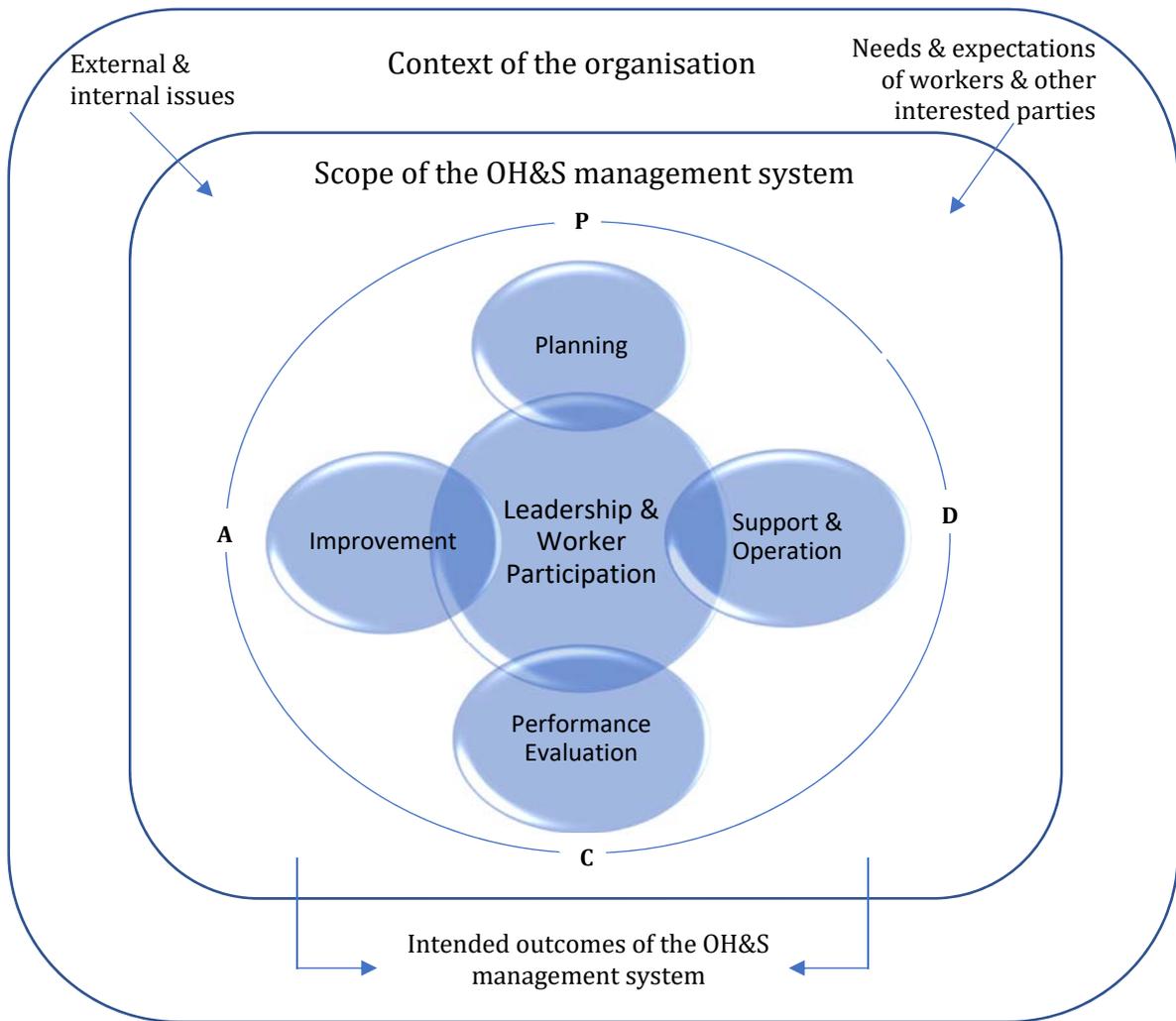


Figure 3: Relationship between PDCA and OH&S framework (Source: ISO 45001)

The PDCA concept, according to ISO 45001:2018, is an interactive process used by organisations to achieve continual improvement and can be applied to a management system and to each respective element of it. Good practice in risk management requires a systematic approach, including appropriate capacity for the key management functions and processes needed to deliver effective action to sustain desired risk controls.

Successful implementation of risk management model depends upon commitment from all persons working within the organisation or on its behalf. The commitment begins at the highest levels of management and moves down the hierarchy. PDCA methodology, which is a cyclical approach, requiring strong leadership and

commitment from top management. The pace, rate, extend and timescale of this continual process are determined by the organisation in the light of economic status, business environment and other conditions.

Plan: determine and assess OH&S risks, OH&S opportunities and other risks and other opportunities, establish OH&S objectives and processes necessary to deliver results in accordance with the overall OH&S policy.

Do: implement the processes as planned and ensure that sufficient capacity is provided for the delivery of the key system functions to allow the identified actions to be carried out and to ensure that objectives and targets are met.

Check: monitor and measure activities and processes with regard to the OH&S policy and objectives, contact internal audits and periodic reviews of the management model to identify opportunities for continual improvement, achieving results and necessary changes in the risk management model and report the results.

Act: take actions to continually improve the OH&S performance to achieve the expected outcome, following a review of performance against objectives and targets, deficiencies and non-conformities and identification of corrective action and opportunities for preventive action aimed at reducing risk exposure.

ISO 45001 is based on the new ISO high level structure (HLS), which can be integrated with other management system standards, has a content compatible with the management of the organisation and assists to improve the organisation's core competences. It is expected that all management system standards of the future will have the same high-level structure, identical core text, as well as common terms and definitions. The revised ISO 9001 and ISO 14001 as well as the new ISO 45001 are commonly based on this high-level structure, the so call Annex L (some authors referred to as Annex LS).

3.4 High Level Structure (Annex L)

Annex L, also referred as High-Level Structure (HLS), is aiming to solve the problem of potential redundancy in basic structure for companies, wishing to deploy and integrate multiple standards. An integrated management system (IMS) can streamline a business operation by merging different areas of compliance. For instance, combining quality (ISO 9001), environmental (ISO 14001) and safety (ISO 45001) into a single IMS, requires less resources and is more likely to succeed than maintaining separate management systems.

Standards can either be combined or integrated. Integration of two or more systems means that similar processes are implemented without duplication, confusion or disorder, whereas IMS elements are treated as common resources. They are defined, deployed and managed in the same manner and do not have to deal with multiple and often slightly different interpretations of their roles in executing each respective management standard.

Dentch M.P. (2018), acknowledged the importance of Annex L as *'to harmonise all ISO management system terminology and formatting, making it easier for organisations to comply with more than one management system standard'*. However, according to the same author, the requirement created by Annex L to force each ISO standard to align with common terminology and formatting *'has made the process of defining the requirements for planning and controlling processes in ISO 9001, ISO 14001 and ISO 45001 less clear'*.

ISO is planning to roll out this HLS across all new and revised management system standards, to ensure consistency and compatibility in one hand and avoid conflict, duplication, confusion, misunderstandings and unnecessary time-consuming in the other hand. To deal with this, Annex L consists of ten clauses in total as indicated and analysed below:

Clause 1: Scope

The scope covers the intended outcomes and the boundaries within which the management system applies. The outcomes are industry specific and should be aligned with the context of the organisation (clause 4). Scope defines the subject and the purpose of the management system and indicates the limits of the applicability of the standard.

Clause 2: Normative references

This clause provides details of the reference standards or publications relevant and useful to the particular standard. The normative references clause is an informative element which lists those documents that are cited in the management standard text, in such a way as to make it indispensable for the application of the related standard.

Clause 3: Terms and definitions

Underpins detail terms and definitions applicable to the specific standard in addition to any formal related terms and definitions standard. This clause can be used to override the definition used in the 'normative references' clause, by changing it to suit the needs of the standard under examination. In Annex L, for instance, there are 21 definitions whereas in ISO 45001:2018 standard 37 definitions applied. In this way there is no need to customise every definition into each consequent standard application.

Clause 4: Context of the organisation

It is important for any business to become familiar with and magnify awareness of the business environment that it is operating in. This highlights the importance to identify internal and external issues that can impact business expected outcomes, as well as all interested parties and their requirements. Organisations need to promptly respond to any risks associated with the business environment or to any opportunities that also revealed within the same environment.

The context briefly includes consideration of:

- a. The organisation's goals and intended outcomes;
- b. Internal and external issues;

- c. Relevant interested parties and their requirements;
- d. The management system scope.

Collectively these will provide a key insight into the organisation. Each is very different in governance, complexity, customer oriented, speed of response, speed of decision making, degree of formality required. Each of these factors influences the way we view management system requirements and hence how the audit responds and accomplished.

A moderate business environment lead organisations to look out their business landscape to encounter changes and elaborate with those changes. Some comprehensive tools helpful to tackle external and internal environmental changes can be preserved using PESTEL analysis (acronym for Political, Economic, Social, Technological, Environmental, Legal), M. Porter's five forces model, SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), and Stakeholder analysis, according to their expectations and needs.

Clause 5: Leadership

HLS places particular emphasis on leadership rather than management as previously encountered. Top management has a greater accountability and involvement in the organisation's management system. Top management needs to explicitly integrate the requirements of the management system into the organisation's core business processes, ensures the management system achieves its intended outcomes and allocate the necessary resources.

Leadership integrates the management system in the organisational business processes and ensures that policy and objectives are in line with the organisation's goals, ensuring resources are available and appropriate roles and authorities have been allocated. It is really important to embed management system into the organisation's overall structure otherwise the implementation of such system will probably fail. Responsibility should be sheered down the hierarchy and involve all people within the organisation. Top management is also responsible to communicate

the importance of the management system and enhance employee awareness and involvement.

Clause 6: Planning

This clause is bringing risk-based thinking to the front. Once top management highlighted risks and opportunities (clause 4), it is then needed to specify the pattern to address risks and opportunities through thorough planning. Emphasis should be given on the need to address risks and opportunities when establishing action plan to meet the organisation's objectives. The objectives have to be consistent with the policy and be measurable, monitored, communicated, aligned to the policy of the management system and updated when proved necessary.

The planning phase considers what, who, how and when the risks outlined must be addressed. In this phase the organisation is planning ahead in order to get familiar with potential risks and opportunities, the consequences of an event and the associated likelihood of occurrence and the means to promptly identify and optimise opportunities. Planning also assess risks and examines possible ways to treat the risks identified (accept, avoid, eliminate, reduce, mitigate, compensate).

Clause 7: Support

Organisations, after addressing the context, should ensure sufficient resources are available together with the appropriate employee training, skills, awareness, communication and documentation. Organisations will have to look at the support needed to meet their goals and objectives. This includes resources, targeted internal and external communication, as well as documented information that replaces previously used terms such as documents, documentation and records.

Research shows that high performing organisations are engaging employees, subcontractors, suppliers in an attempt to understand the contribution of the management system to the organisation and what is trying to achieve. It is therefore the responsibility of the organisation to identify what documentation is needed to support the operation of the processes and also to have the confidence that these processes have been carried out as planned.

Clause 8: Operation

The bulk of the management system requirements lies within this clause. At its core, the organisation needs to address both in-house and any outsourced processes. Detailed operation description of the standard and requirements to plan, control and implement processes to meet the organisational objectives. From standard to standard this is where the pre-requirements for change most and subclauses deployed as moving towards each standard's requirements. There is greatest scope for expansion into sector specific content.

The organisation shall plan, implement and control the processes needed to meet requirements and to implement the actions determined in clause 6, by:

- a. Establishing criteria for the processes;
- b. Implementing control of the processes in accordance with the criteria;
- c. Keeping documented information to the extent necessary to have confidence that the processes have been carried out as planned.

The organisation shall control planned changes and review the consequences of unintended changes and at the same time, taking action to mitigate any adverse effects as necessary.

Clause 9: Performance evaluation

Organisations need to determine what, how and when things are to be monitored, measured, analysed and evaluated. An internal audit is also part of this process to ensure the management system conforms to the requirements of the organisation as well as the standard and is successfully implemented and maintained. Management review perceives whether the management system is suitable, adequate and effective.

Performance evaluation considers the checks needed to be made to ensure that the organisation and the management system are meeting their objectives. Focus is on the output of how you deal with adequate information and evaluate the information gathered, regular monitoring, measuring and analysing to meet organisational objectives.

Clause 10: Improvement

This clause brings down the requirements for correction and corrective action. Continual improvement is a resulting activity to enhance performance. Errors and deviations from the norms or from the expected results need to be addressed. Failure to meet the requirements of the management system standard normally is described as non-conformities. Clause 10 looks at ways to address non-conformities and corrective actions, as well as strategies for improvement on a continual basis.

Corrective action is the action taken to identify the cause to correct the problem and stop it from happening again. Continual improvement ensures the suitability, adequacy and effectiveness of the management system to improve performance.

HLS is based on 'Deming Cycle', an interactive four stage approach for continually improving processes, products or services. The model gives powerful insights to test solutions and assess results in a waste-reducing cycle. PDCA cycle is a continuous loop of planning, doing, checking and acting as illustrated in figure 4.

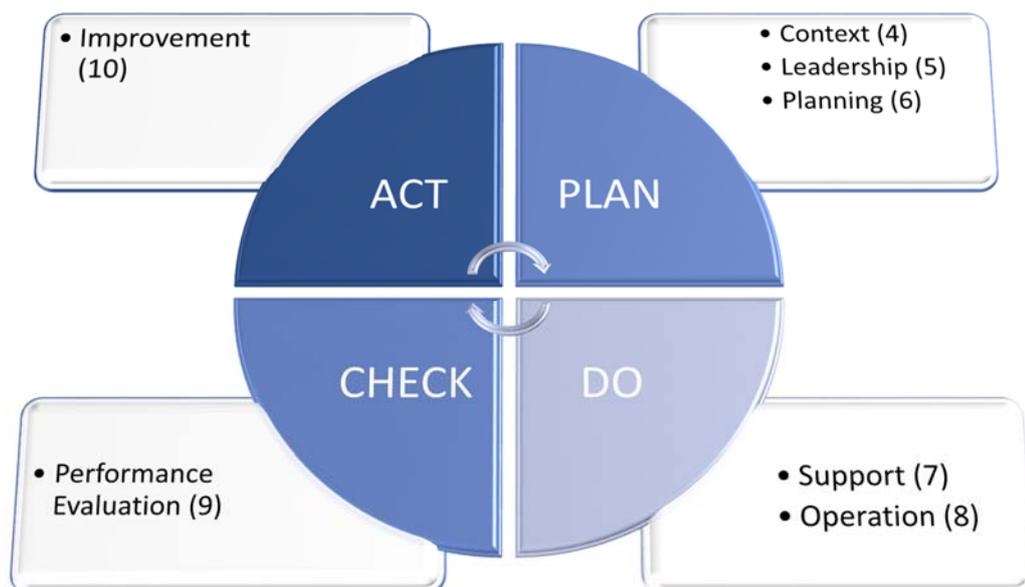


Figure 4: Deming Cycle as apply to HLS

The first step, 'Plan', is both practical and theoretical, its goal of which is to plan ahead to understand what it is actually needed to be achieved. The planning stage guide the management team to improve expected outcomes and also provides the means to

understand the context of the business. The participation of leadership from the very first step of the process it is fundamentally important in order to lead the way and explicitly integrate the requirements and resources available to support implementation of business objectives.

The second step, 'Do', is the step where change takes 'flesh and bones' gradually and not suddenly and overhauling all operations. This will allow management to assess whether the proposed changes can achieve the desired outcome with the minimum interruption of the rest of the business activities. It is of vital importance to gather all the support needed to achieve business goals and objectives. Employees' full potential utilisation is strategically important to try or test the implementation of the management standard.

The third stage, 'Check', is a piloting stage which examines the tests or trials developed in previous step and compare the results or findings against the expectations as defined in the first step. If the results abstain from the business goals and objectives then the first step should be repeated otherwise if the management system is evaluated as suitable, adequate and effective then the fourth step should be tackled. The 'Do' and 'Check' stages could be repeated as many times as necessary before the distillation of the purified application.

The 'Act' stage is the final stage of our process and the first stage of the next cycle. It is the stage where the management system is fully applied. Continual improvement is a key element to sustain durable and enduring application of the management system.

3.5 The compatibility of ISO 31000:2018 and ISO 45001:2018

Several studies concentrated on some aspects of the risk management process but none of them considered safety management practices, so the utility of ISO 31000 for managing safety risks and hazards remains ambiguous.

Pillay M. (2018) states that “The effective management of occupational health and safety is an integral part of risk management in organisations”. In occupational safety, one of the most complicated and harder to achieve goals, is to prioritise actions towards risk prevention and mitigation.

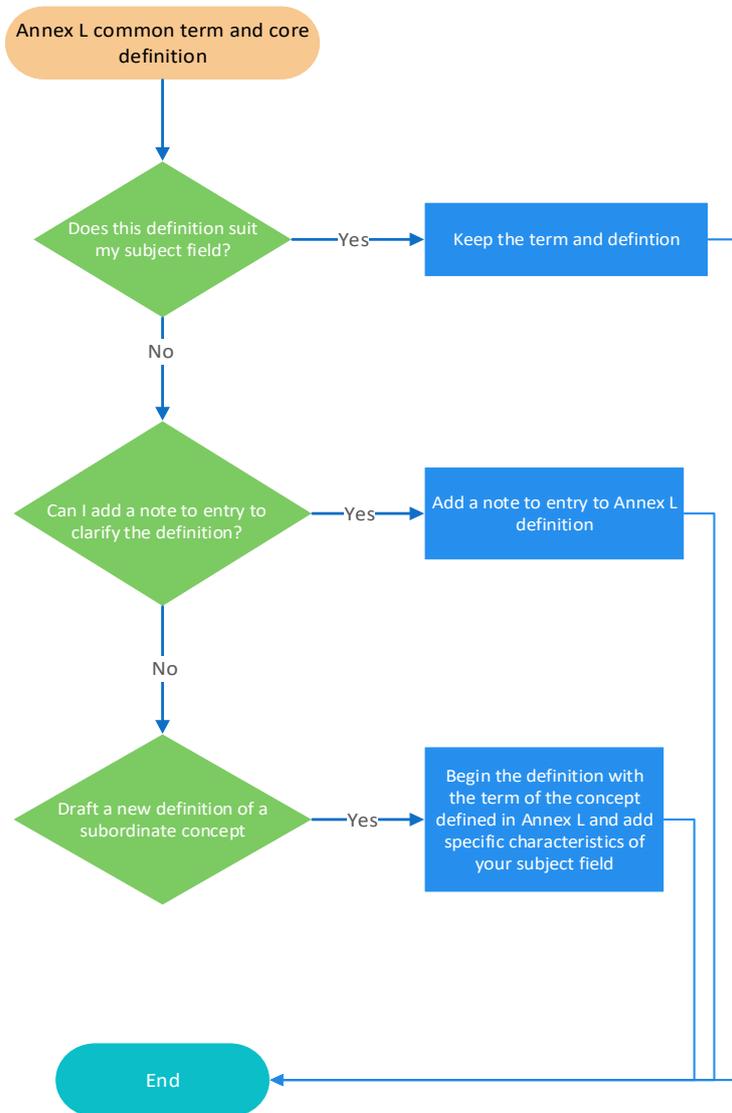


Figure 5: Annex L integration flowchart

Adhering to the purpose of a High-Level Structure which mainly interacts as a bridge to merge various management standards, the process to address the purpose of HLS can be implemented through a methodological approach that contains certain steps and procedures. This methodology is illustrated in a flowchart in Figure 5 (Source: ISO/TMB/JTCG).

The attempt is to use the HLS to integrate ISO 31000:2018 with ISO 45001:2018. Appendix 1(a) shows the common definitions between the two standards. Although the process of mapping ISO 31000:2018 with the Annex L, and consequently with ISO 45001:2018, remains challenging, Table 1 provides a mapping of the framework and process components of ISO 31000:2018 against Annex L. The mapping, according to the Institute of Risk Management, demonstrates that ISO 31000:2018 provides full coverage of the requirements for a management system standard.

Annex L (HLS)		ISO 31000:2018
1	Scope	Scope
2	Normative references	Normative references
3	Terms and definitions	Terms and definitions
4	Context of the organisation	Context of the organisation
4.1	Understanding the organisation & its context	Framework: Integration Includes determining oversight roles and responsibilities and ensuring risk management is part of all aspects of the organisation. Process: Scope, context and criteria Includes purpose and scope of risk management, defining risk criteria and risk decision-making.
4.2	Understanding the needs & expectations of interested parties	
4.3	Determining the scope of XXX management system	
4.4	XXX management system	
5	Leadership	Leadership
5.1	Leadership & commitment	Framework: Leadership and commitment Includes aligning risk management, policy statement, resources and risk appetite. Framework: Design Includes internal and external context, roles and responsibilities, and communications and consultation.
5.2	Policy	
5.3	Roles, responsibilities and authorities	
6	Planning	Planning
6.1	Actions to address risks and opportunities	Framework: Leadership and commitment Includes aligning risk management, policy statement, resources and risk appetite. Framework: Design Includes internal and external context, roles and responsibilities, and communications and consultation.
6.2	XXX objectives & planning to achieve them	
7	Support	Support
7.1	Resources	Process: Communication and consultation Includes involvement, risk information and ownership of risk Process: Recording and reporting Includes information for decision-making and risk information for stakeholders
7.2	Competence	
7.3	Awareness	
7.4	Communication	
7.5	Documented information	
8	Operation	Operation

Annex L (HLS)		ISO 31000:2018
8.1	Operational planning and control	<p><u>Framework</u>: Implementation Includes implementation deadlines, decision-making and implementation responsibilities</p> <p><u>Process</u>: Risk assessment Includes description of the identification, analysis and evaluation stages of risk assessment</p> <p><u>Process</u>: Risk treatment Includes the selection, design and implementation of risk treatment options</p>
9	Performance evaluation	Performance evaluation
9.1	Monitoring, measurement, analysis & evaluation	<p><u>Framework</u>: Evaluation Includes measuring framework performance and continued suitability of the framework</p> <p><u>Process</u>: Monitoring and review Includes monitoring risk management outcomes and inclusion of risk within performance reports</p>
9.2	Internal audit	
9.3	Management review	
10	Improvement	Improvement
10.1	Nonconformity & corrective action	<p><u>Framework</u>: Improvement Includes value of risk management, adapting the framework and integration of risk management activities</p>
10.2	Continual improvement	

Table 1: Mapping of ISO 31000:2018 against Annex L (Source: Institute of Risk Management, 2018)

Taking into consideration the attributes of table 1, the common definitions identified and described in Appendix 1(a) and the flowchart illustrated in Figure 5, Appendix 1(b) demonstrates a full integration of ISO 31000:2018 with Annex L hence with ISO 45001:2018.

3.6 The controversies of ISO 31000:2018 and ISO 45001:2018

According to Pillay M. (2018), there are four main differences between ISO 31000 and OH&S management practice. These differences are succinctly enumerated below:

Although Pillay initially considered that the inclusion of ‘establishing the context’ is a concept that is not featured in health and safety management practice, this difference was seized to prevail since the inauguration of ISO 45001:2018. The standard involves the evaluation and understanding of the internal and external context, the challenges

faced by the organisation, factors that, according to Sousa et al. (2012), undeniably can impact the achievement of goals and the broader risk management strategy.

The notion of 'risk identification' is the second difference acknowledged by the author. According to Pillay risk identification represents a significant point of departure from existing OH&S literature and practice, which associated risk with a 'degree of harm, injury or disease'. Being able to determine the 'degree' involves making some level of determination based on two aspects, 'consequence' and 'severity'. OH&S regulations, practitioners, professionals and academics relate more to the notion of 'identifying hazards', not risks.

The terms hazard and risk often used interchangeably but they have different meanings. Hazard is normally involving situations or factors that can cause harm whereas risk is the likelihood that a hazard will cause adverse effect. Risk depends on both the likelihood of the consequences and a measure of the consequences or harm.

The third difference acknowledged by the author, is the notion of 'risk treatment'. The use of the term treatment seeks to suggest that an adverse outcome is normally expected by risk management whilst the main objective of OH&S is to preventing harm, illness or diseases. OH&S refers to 'risk control' rather than 'risk treatment'.

The fourth difference is in the range of approaches suggested for dealing with risks. ISO 31000 recommends that dealing with risks can be done by avoiding the risks altogether, taking or increasing the risk to pursue an opportunity, removing the source, changing the likelihood, changing the consequences, sharing (outsourcing) the associated risks and retain the risks through informed decision-making. However, in certain countries, for instance Australia, the suggested approaches of transferring and retaining OH&S hazards are prohibited by law. The primary responsibility yields on the business conducting or undertaking OH&S practice.

3.7 The uniformity of ISO 31000:2018 and ISO 45001:2018

Haddad et al. (2012), proposed a practical approach to link risk management with OH&S, the so call 'hazard matrix'. Hazard matrix is a risk assessment method which can apply to OH&S and environmental management by integrating it with the risk management process suggested in ISO 31000 framework.

The Hazard Matrix (HM) aims to resolve a complicated and hard to overcome obstacle of OH&S which is to prioritise actions towards risk prevention and mitigation. The HM, according to the authors, is a prioritisation tool and methodology suitable to be applied in the analysis phase of a risk management system. The application of HM in OH&S is a powerful tool to highlight the critical hazards and sectors or units in a business given the population associated with each sector or unit.

In order to plan and organise an OH&S programme, it is needed to develop and structure a set of activities in a close relation with a risk management programme. The first step to the establishment of such a risk management programme, is the determination of the scope and the objectives of the programme. The mapping of all business's processes that interfere in risk management and also their interactions must be performed thoroughly. All activities, operations and the relations between them must be clearly identified as they represent potential sources of hazard. In order however to gather the appropriate knowledge to underline adequate action of OH&S process, data must be collected from the activities and operations, about its processes and its people.

After data is collected and the process of mapping being performed, the management process is able to realise the hazard mapping and identification. The process consists of the identification, localisation and classification of the hazards involved in each activity within the business context. The aforementioned classification is utilised by taking into consideration the type of hazard existent and the severity of its impact. The severity according to HM is expressed mathematically by weights.

The concept of risk is always relating to certain activities or tasks performed that are intimately related to a human behaviour or environment. For example, liquid petroleum gas (LPG) isolated and stored properly does not present any level of risk. The risk is triggered when LPG is considered to be handled at an environment where sources of ignition exist. The associated risk will vary according to the behaviour of the person(s) involved and the environmental factors affecting the handling operations. It is important to acknowledge that *“even apparently insignificant risks have the potential, as they interact with other events and conditions, to cause great damage”* (Ciocoiu and Dobrea, 2010).

It is commonly accepted that the accelerating pace of business influenced by globalisation, the financial crisis and recently the pandemic caused by COVID-19, all contribute to the growing number and complexity of risks. The need to manage OH&S risks is emerged in order to assure minimum casualties and sustain optimum performance. Furthermore, due to this complexity and the limitation of resources which most of the time is unavoidable, addressing all the risks identified becomes an unrealistic approach. Decomposing the risk in its independent variables, likelihood and severity, and analysing each variable separately is a good assisting strategy to assess and manage risks.

It is becoming intense the need to give emphasis to the most critical hazards and business sectors so as to utilise all available resources to their full potential. The important role of prioritisation is efficiently accomplished by HM since its main objective is to establish a priority ranking among risks and sectors. The HM methodology is a valuable tool to allow determination of prioritisation among several risks, hazards and sectors within a given system or environment.

In the HM, the probabilistic factor is represented by the number of people (population) exposed to the recognised hazard. The analysis initiated by dividing the organisation into sectors or segments. Each sector constitutes a line (from 1 to y) in the HM, followed by a column that stands for the number of people involved in the specified sector (population). The rest of the columns (1 to x) describes all the hazards associated with each respective sector. The hazards are then assessed through the use

of Risk Assessment Code (RAC). The RAC is built upon criteria which varies according to the scenario under consideration, availability of data or even precision required. The criteria to be consistent with the objectives must be identical for the entire matrix. An example of the matrix setup is illustrated in table 2.

RAC	Description
0	Not present hazard in the sector
1	The exposure to the hazard is occasional
3	The exposure to the hazard is continuous
6	The exposure level of the hazard can damage property or harm people
9	The exposure level of the hazard can cause severe damage or death

Table 2: Risk assessment codes (RAC)

The HM is completed by evaluating the hazards using the pre-empted RAC table for a given scenario. Each given position within the matrix corresponds to the hazard in each given sector. For better understanding on how the HM works, table 3 presents a general model of a HM.

Sector	Hazards					
	Description	Population	H ₁	H ₂	H ₃	...
S ₁	W ₁	R _{1,1}	R _{1,2}	R _{1,3}	...	R _{1,x}
S ₂	W ₂	R _{2,1}	R _{2,2}	R _{2,3}	...	R _{2,x}
S ₃	W ₃	R _{3,1}	R _{3,2}	R _{3,3}	...	R _{3,x}
...
S _Y	W _Y	R _{Y,1}	R _{Y,2}	R _{Y,3}	...	R _{Y,x}

Table 3: Hazard Matrix general model

The following steps of the HM model is to calculate the '*hazard frequency of recurrence*', the '*exposure frequency*' and the '*relevancy percentage*'. The hazard frequency of recurrence measures how intense is the overall exposure to a given risk, while the exposure frequency evaluates which business sector represents a more hazardous occupation or environment to work in. Both frequencies, take into consideration the number of workers exposed in each segment and the intensity of the hazard.

The relevancy is a calculation of the percentage relevant to hazard frequency of recurrence and to the exposure frequency. The percentage calculated gives the insights for better and clear understanding of the hazards' prioritisation.

Poplin et al. (2015), demonstrated how the ISO31000 risk management process could be used to prioritise and manage injury risks using a systematic approach. Risk management according to the authors, *'has been increasingly adopted within industry as a formal proactive approach to improving occupational safety and health. Risk management creates a structure for individual operations to develop solutions to the risks faced, based on the surrounding environment, conditions, equipment and personnel involved'*.

The authors believe that the *'primary responsibility to ensure occupational health and safety should lie with those who create risks and those work with them'*. This approach requires direct input from those employees as they are the individuals that are subject to risks. By engaging the employees involved in hazardous areas to contemplate risks, it is more likely to create the ideal structure and culture within the business and calibrate employee behaviour and perception to proactively identify emerging risks and give the proper insights to decision makers to take appropriate courses of action.

The risk management model as applied by Poplin et al. (2015), consists of three phases: *Scoping, risk assessment, control implementation*. The model is illustrated in Figure 6.

The risk management approach can be used at all levels of the management structure. It is a process that organises information about unwanted event in an efficient and orderly manner so that decision-makers can make informed choices. Successful risk management implementation includes a systematic approach that raises collaboration of various working groups (teams) that aiming towards developing strategies to mitigate risks. The risk management approach can be applied either broadly or in niche areas, depending on the overall objectives and the nature of the industry and potential hazards.

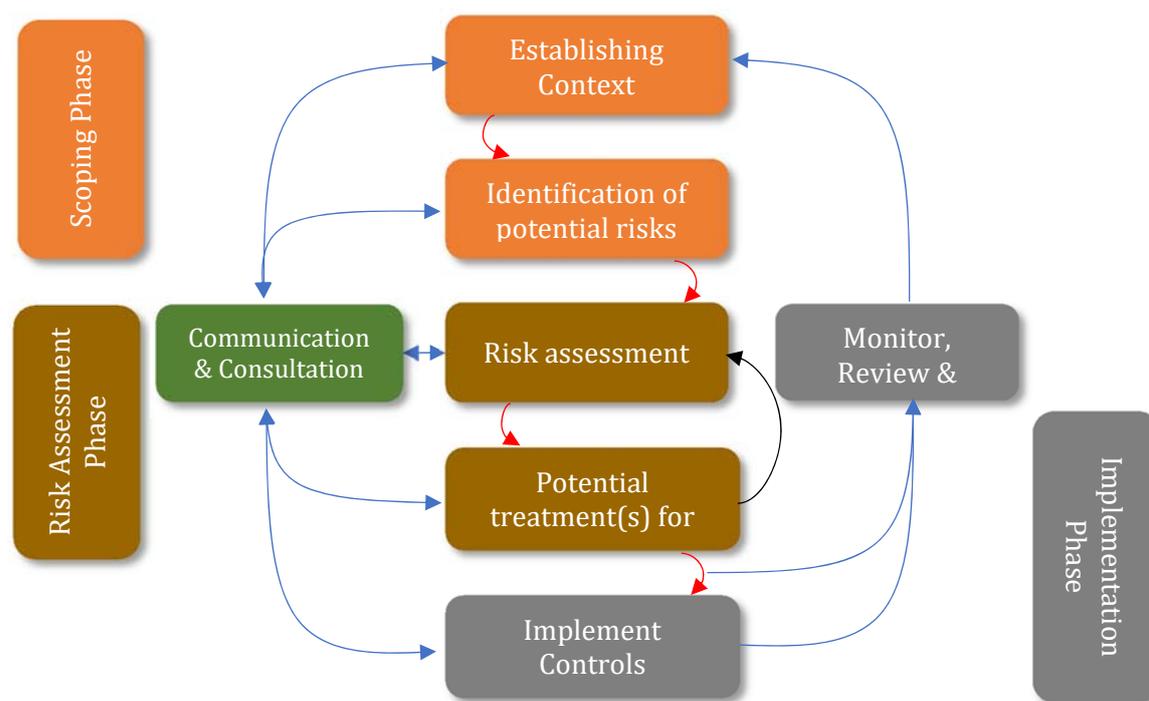


Figure 6: Risk management approach for OS&H

The scoping phase initiated by establishing the context of the operation or task, understanding the potential hazards and identifying unsolicited events. Outputs from the scoping phase generates insights for specific risk assessment techniques. For instance, a risk assessment focus on preventing specific incident to occur would likely utilise different techniques than an assessment of a personnel injury during a job-task. During the risk assessment phase, hazards are more properly specified and understood so that a risk analysis be finalised. The risk analysis can generate measures attempting to provide information regarding the likelihood and consequence of a particular incident or injury.

In the risk assessment phase, many instruments can be used to analyse risks based on the type of unwanted events, data available and goals set. Poplin et al. (2015) tackled the Workplace Risk Assessment and Control (WRAC) method to estimate risk that complements a process approach generated in the scope phase. Using a consensus approach (Bertrand K.H., 2016), potential hazards or exposures described in each step are quantified or semi-quantified by agreeing to the likelihood and consequence of each particular hazard which corresponds to a pre-determined range of values within

a risk matrix (exposure to hazard Vs consequences). Risks are then characterised describing the extent and severity of risk to individuals and the overall workforce.

Control strategies are then considered in implementation phase, for mitigating the identified risks. The implementation phase develops and applies the new or modified controls after ensuring that appropriate levels of control measures are in place to tackle the most important and critical risks. The phase is completed by applying a regular review and process evaluation to assess overall effectiveness and to ensure that no unintended risks are emerged.

Chapter 4

Methodology

4.1 The Research Approach

For the purpose of the present thesis, a primary as well as secondary research was conducted. The primary data was collected using questionnaires distributed among the workforce of the company. Interview as well as unformal discussion was conducted to the mechanical engineer of the facility, responsible for the overall OH&S application. Qualitative as well as quantitative data was collected to document the compatibility and application of the ISO 31000:2018 and ISO 45001:2018 standards within Synergas Ltd, a company which operates in the petrochemical industry of Cyprus. Synergas Ltd is briefly presented in Appendix-2 to help readers to gain a general idea of the company. The secondary research was established through the literature and the use of company's annual reports and audits.

The qualitative data supports the quantitative data analysis and results. According to Patton M.Q. (2002), *'qualitative method is used to explain and explore the data collected and relate it to the assessment process, rather than setting a value for something'*.

The aim of the study is to analyse enterprise risk management framework throughout the company, always within the scope of ISO 31000:2018 and also assess OH&S as applied by the business and compare the results with feedback received by the front-line employees through anonymous questionnaires. An important aspect of the research is to evaluate the OH&S culture within Synergas and how the overall structure of the company contributes towards the creation of a safe environment for its members, visitors and public.

A survey is conducted using descriptive statistics by measuring dependent and independent variables and the correlation between variables under examination. This method is reflected on the focus of identifying, assessing and treating risks in various levels of the organisation. Saunders et al. say that '*descriptive research portrays an accurate profile of persons, events, or situations*'.

The research contemplates the identification of potential risks that may impact the achievement of objectives, the identification of zero tolerance risk exposure, and the understanding of the current risk-taking capacity and risk appetite. For instance, the amount and type of risk the organisation is able to acquire in pursuit of its business objectives taking into account its capital structure. Then, define the risk appetite statements for key risks that impact the achievement of objectives in order to develop risk response strategies. These strategies include the organisation level metrics with tolerance ranges to formalise the risk appetite. Lastly, the company must monitor the tolerance range and associated metrics on an ongoing basis as part of the process established in risk governance structure.

To address the main research objectives, both qualitative and quantitative methods and combination of primary and secondary sources of information were utilised. The qualitative data supports the quantitative data analysis and results. The primary data sources obtained through personal interaction and by the use of formal questionnaires and discussions took place with the employees of the company.

Interview is a useful technique to collect specific information from people who are acutely knowledgeable about the subject of interest. The interview allows the researcher to seek new insights, ask questions and assess information in different perspectives. The opportunity emerging from the interview is the in-depth examination of the working environment and the prominent factors affecting behaviours and consequences. It provides the means to refine the data collected and examine specialised systems or processes. Furthermore, interview is a useful technique to triangulate the data obtained from other primary and secondary sources.

Another advantage of using interviews as a method is that it allows respondents to raise issues that the interviewer may not have expected. Interview for the sake of this dissertation was conducted to the senior management.

Desk review has been also conducted to gather data from various secondary sources of information. The secondary data includes reports and projects conducted by the company. Literature regarding risk management and OH&S obtained in order to reinforce the research and assist to the research design and formation. Data also collected from the existing working documents, manuals, appraisals, procedures, reports, policies, regulations, standards and audit reports.

4.2 Data Collection

Primary data sources are both qualitative and quantitative. The qualitative sources are on site observation, interview, discussions while the quantitative data sources are survey questionnaires and interview questions.

Observation is an important aspect of the research. The observation is tightly connected to data collection whilst the observational research findings are considered strong in validity because the researcher is competent to collect a depth of information about a certain type of behaviour, performance or working condition.

Data was collected within the prominent value of the observation from experts, about specific measurements taken in the workplace environment for dust, vibration, ventilation, light, noise and exposure to hazardous materials as inherently the administration of LPG generates.

Questionnaire gives unbiased insights since unanimously distributed among front-line employees, workers and ADR¹ drivers, hence data collected is considered valuable for the objectives of the present dissertation.

¹ ADR: Accord Dangereux Routier - European regulations concerning the international transport of dangerous goods by road

The questions raised were collected from an established organisation in Canada, the Institute for Work and Health, aiming to measure the extent to which a worker may be vulnerable to OH&S risks at work. The questionnaire was based on a scale helpful to raise awareness of the frequency, the depth and extend of each attributable factor that is engaging employees into a hazardous situation. The questionnaire was distributed to the workers, technicians and ADR drivers in Greek language in order to be fully understood by the candidates and then translated into English language, as presented in Appendix 3(a).

The questionnaire assesses OH&S vulnerability in four areas:

- a. Hazard exposure;
- b. Workplace policies and procedures;
- c. Worker awareness of hazards and OH&S rights and responsibilities;
- d. Worker empowerment to participate in injury and illness prevention.

A second questionnaire was also distributed among the workers, this time to raise awareness regarding the perceived safety culture in Synergas. The variables considered in this study included safety culture, personnel error behaviour, personnel attitudes towards violation behaviour and the significance of the perceived safety culture on improving personnel safety motivation and performance. The conceptual and practical background of the research was obtained by a research conducted by a group of researchers and statisticians in a cross-sectional study, regarding the perceived safety culture in the petrochemical industry in Japan. The survey questionnaire and the experimental protocol for the particular study were approved by the Institutional Review Board at the University of Central Florida, Orlando, Florida, USA.

The perceived safety culture was captured through five main factors, including:

- a. Management commitment towards safety (MC);
- b. Employees' personal attitude towards safety (EPA);
- c. Co-workers' support of safety (CSS);

- d. Workplace pressure (WP);
- e. Safety management system (SMS).

The research was focusing on answering the following five questions to assess error behaviours with regard to skills, decision-making and error perceptions through the questions as defined in Appendix 3(b):

- a. What is the impact of the perceived safety culture on the safety motivation of personnel in Synergas?
- b. What is the effect of perceived safety culture on personnel error behaviours in Synergas?
- c. What is the effect of the existing perceived safety culture on personnel attitudes toward violations in Synergas?
- d. Does personnel safety motivation in Synergas mediate the relationship between perceived safety culture and personnel error behaviour?
- e. Does personnel safety motivation in Synergas mediate the relationship between perceived safety culture and personnel attitudes toward behaviour related to safety violations?

The main objective of the research is to understand of how perceived safety culture affects personnel safety performance and behaviours required to reduce hazards and ensure safe operations. Also, consideration is given to assess the perceived safety culture in Synergas and the effects of the current safety culture on personnel safety motivation and performance.

Structural equation modelling (SEM) was used to investigate the relationships between organisational factors and the safety performance of workers. SEM as a statistical method, determines the relationships and directional influence, either direct or indirect between the model's latent variables, each of which has a set of observed variables in the conceptualised study mode. Smart PLS was used to analyse the data collected, the reliability, the validity and the path coefficients. The adopted model is illustrated in Figure 7.

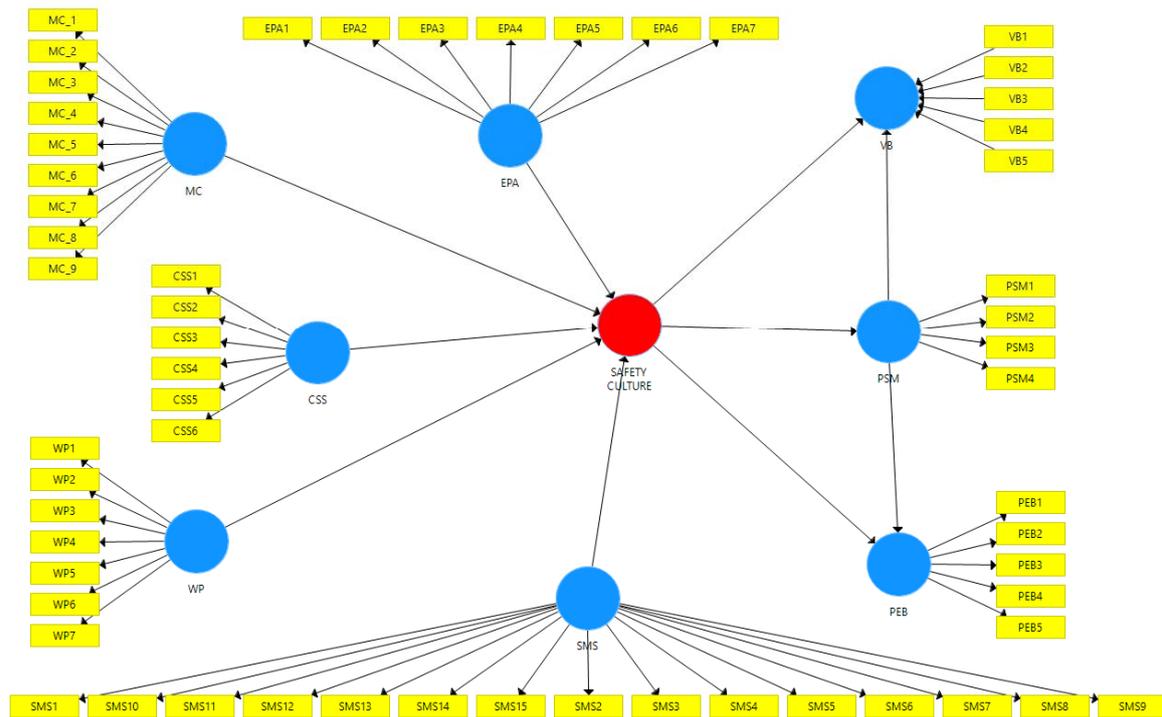


Figure 7: Structural model with standardised path coefficients

The secondary data collection method gives insights of the research and covers a wide range of areas and aspects. To cover the objectives of the dissertation an excessive document review and reports of the company was conducted. Literature review is assisting to content analysis where qualitative as well as quantitative aspects are assorted to assess descriptive statistics. The research was mainly focused on articles, reports and books that measure the dimensions within the research of OH&S and Risk management framework.

4.3 Data Analysis

Safety culture is reflecting the organisation’s practices towards safety and the management of these practices can influence negatively or positively worker’s behaviour, attitude and performance. The effects of the prevailing safety culture on Synergas’ personnel safety motivation and performance, is justified through the findings of the research contacted for this purpose.

The questionnaires given to front-line employees was coded with responses that were measured on a five- step Likert scale ranged from 1 = 'strongly disagree' to 5 = 'strongly agree'. The results of the survey are proportionately displayed in table 4 and proportionately illustrated in figure 8.

	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %	Total
MC	2%	11%	3%	64%	21%	100%
EPA	0%	2%	3%	45%	49%	100%
CSS	4%	14%	10%	50%	23%	100%
WP	3%	23%	3%	47%	24%	100%
SMS	1%	4%	2%	60%	33%	100%
VB	0%	2%	0%	36%	62%	100%
PSM	3%	8%	0%	71%	18%	100%
PEB	7%	20%	3%	49%	21%	100%

Table 4: Questionnaire results

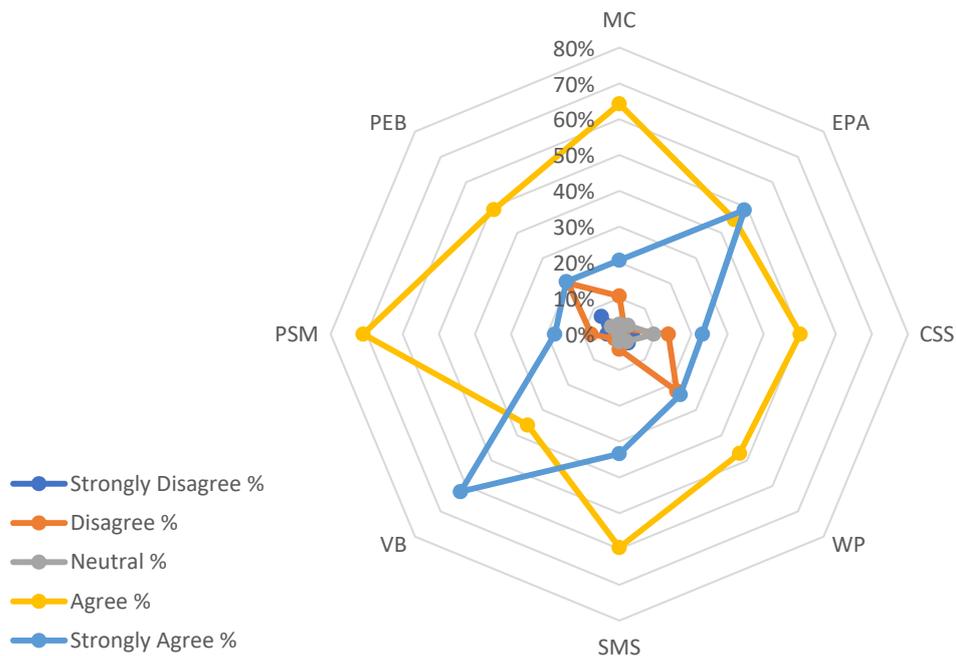


Figure 8: Radar chart showing the research results

The model attempts to evaluate the relationships between the perceived safety culture and personnel safety motivation (PSM), personnel error behaviour (PEB) and attitudes

toward violations (VB). The suggested hypotheses tested by the use of the model, are the following:

- H1: Perceived safety culture affects personnel safety motivation in Synergas;
- H2: Perceived safety culture affects personnel error behaviour in Synergas;
- H3: Perceived safety culture affects personnel attitudes toward violations in Synergas;
- H4: Personnel safety motivation mediates the relationship between perceived safety culture and employee error behaviours in Synergas;
- H5: Personnel safety motivation mediates the relationship between perceived safety culture and employee attitudes toward violations in Synergas.

The model data estimate the means, standard deviations from the means and the median for all variables examined (see table 5). Running the initial model, by the use of Smart PLS software, multicollinearity was identified between certain variables which were removed from the initial model. Figure 9 illustrates the final model after the removal of multicollinear variables.

	<i>Mean</i>	<i>St.Dev.</i>	<i>Median</i>	<i>MC</i>	<i>EPA</i>	<i>CSS</i>	<i>WP</i>	<i>SMS</i>	<i>VB</i>	<i>PSM</i>	<i>PEB</i>
<i>MC</i>	3.73	0.71	4	1							
<i>EPA</i>	4.26	0.68	4	0.76	1						
<i>CSS</i>	3.53	0.82	4	0.99	0.80	1					
<i>WP</i>	3.19	1.12	3	0.94	0.75	0.95	1				
<i>SMS</i>	4.03	0.73	4	0.96	0.91	0.97	0.91	1			
<i>VB</i>	4.48	0.61	5	0.55	0.96	0.61	0.60	0.76	1		
<i>PSM</i>	3.60	0.90	4	1.00	0.72	0.98	0.92	0.94	0.51	1	
<i>PEB</i>	3.30	0.71	4	0.97	0.72	0.96	0.99	0.92	0.54	0.96	1

Table 5: Descriptive statistics and correlation analysis of questionnaire results

SEM was used to extract the structured model and to test the relationships among the variables under examination. Path analysis was employed by using each latent indicator to test the connections between each latent variable as well as the postulated hypothesis of the survey.

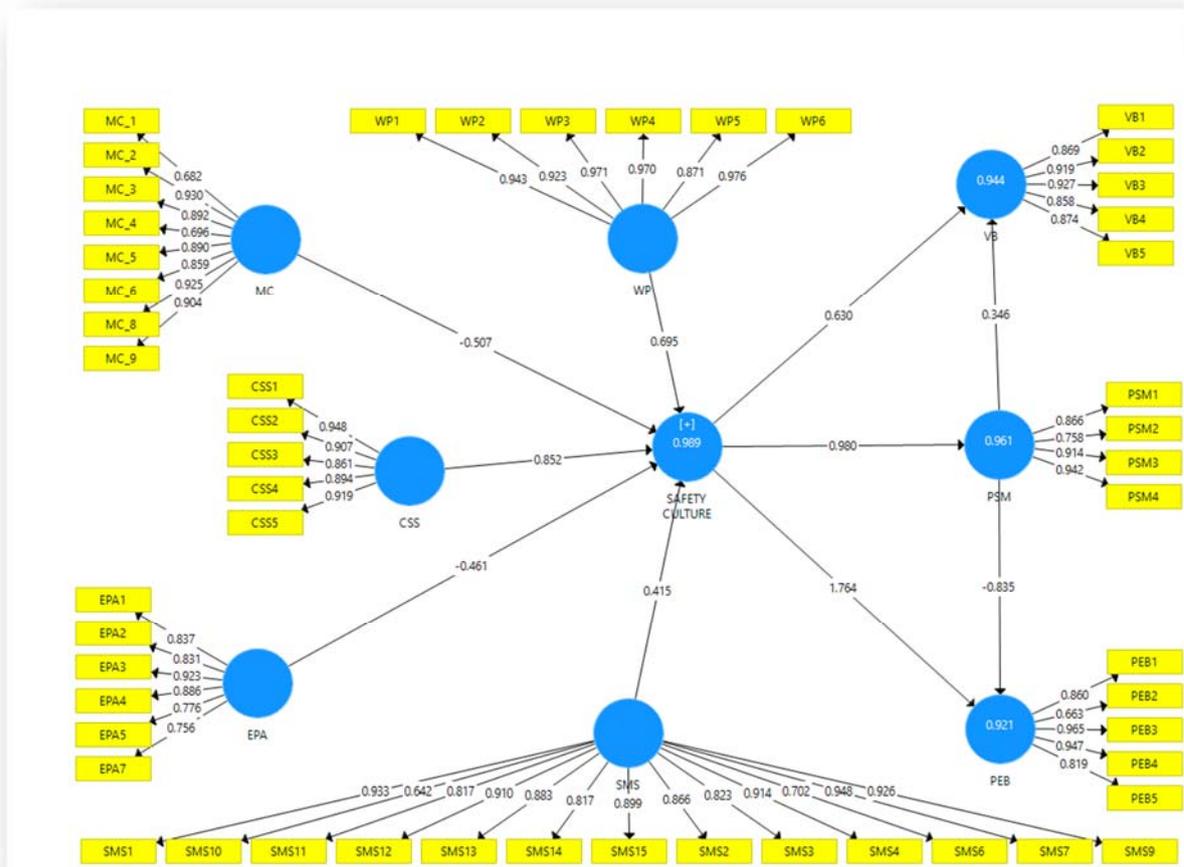


Figure 9: Standardise path coefficients analysis of the safety culture in Synergas

A bootstrapping test was performed to assess the significance of the path coefficients depending on t-statistics. All hypotheses were supported by the survey results as presented in table 6. The results of the analyses are as follows:

- H₁: The perceived safety culture had a significant positive effect on personnel safety motivation in Synergas ($\beta=0,980$; p-value <0,05).
- H₂: A positive effect of the perceived safety culture on personnel error behaviours was identified in Synergas ($\beta=1,764$; p-value <0,05).
- H₃: The perceived safety culture positively influenced personnel attitudes toward violations in Synergas ($\beta=0,630$; p-value <0,05).
- H₄: The effect of personnel safety motivation on personnel error behaviour in Synergas, although a negative effect was identified, was statistically significant ($\beta=-0,835$; p-value <0,05). Hence personnel safety motivation it was found to negatively mediate the relationship between the perceived safety culture and personnel error behaviour in Synergas.

→ H₅: Personnel safety motivation in Synergas mediated the relationship between the perceived safety culture and personnel attitudes towards behaviour in relation to violations ($\beta=0,346$; p-value <0,05).

#	Hypotheses	Original Sample (O)	Simple Mean (M)	St.Dev. (STDEV)	T Statistics (O/STDEV)	P Values
H ₁	SAFETY CULTURE → PSM	0.980	0.981	0.003	312.167	0.000
H ₂	SAFETY CULTURE → PEB	1.764	1.738	0.213	8.282	0.000
H ₃	SAFETY CULTURE → VB	0.630	0.649	0.156	4.033	0.000
H ₄	PSM → PEB	-0.835	-0.807	0.220	3.801	0.000
H ₅	PSM → VB	0.346	0.328	0.159	2.170	0.030

Table 6: Results of hypothesis testing

The results of the hypothesis testing and bootstrapping lead to the conclusion that perceived safety culture plays a crucial role on personnel safety management. The change in perceived safety culture is affecting the personnel safety motivation with a contribution of 96.1% ($R^2=0.961$). Similarly, perceived safety culture and personnel safety motivation play a critical role in personnel error behaviour with a contribution of 92.1% ($R^2=0.921$). The perceived safety culture and personnel safety motivation has an important role in violation behaviour, with a contribution of 94.4% ($R^2=0.944$).

The second research was focused on OH&S vulnerability in Synergas. The model is measuring the extent to which a worker may be vulnerable to OH&S risks at work. Vulnerability at work is basically associated with elevated rates of reported work injuries and illness. Vulnerability is becoming more acute when exposed to hazards in the workplace in combination with one or more of the following:

- Inadequate workplace policies and procedures;
- Low OH&S awareness;
- An adverse workplace safety culture.

Table 7 shows the hazards at work, workers are exposed to. It is obvious from the research that workers are exposed to almost all hazards listed on a daily frequency.

The vulnerability of workers is amplified if resources are not in place to lessen the effects of hazard exposure. The resources available are examined in the second part of the research, the results of which are described in table 8.

Workplace hazards	MEAN	ST.DEV	MEDIAN	Never	Once a Year	For 6 Months	For 3 Months	Every Month	Every Week	Every Day
Manually lift, carry or push items heavier than 25kg at least 10 times during the day	6.00	2.16	7	2%	0%	5%	0%	0%	0%	93%
Do repetitive movements with your hands or wrists for at least 3 hours during the day	6.60	1.26	7	0%	0%	5%	0%	0%	0%	95%
Perform work tasks or use work methods that you are not familiar with	1.00	-	1	100%	0%	0%	0%	0%	0%	0%
Interact with hazardous substances such as chemicals, flammable liquids and gases	7.00	-	7	0%	0%	0%	0%	0%	0%	100%
Work in a bent, twisted or awkward work posture	3.60	2.80	2.5	11%	6%	8%	0%	0%	17%	58%
Work at a height that is 2 meters or more above the ground or floor	2.00	2.00	1	35%	10%	0%	20%	0%	0%	35%
Work in noise levels that are so high that you have to raise your voice when talking to people less than a meter away	3.10	2.13	3	13%	0%	19%	13%	32%	0%	23%
Experience being bullied or harassed at work	1.00	-	1	100%	0%	0%	0%	0%	0%	0%
Stand for more than 2 hours continually	7.00	-	7	0%	0%	0%	0%	0%	0%	100%
	4.14	0.67	3	29%	2%	4%	4%	4%	2%	56%

Table 7: Workplace hazards identified

Workplace policies and procedures	MEAN	ST.DEV	MEDIAN	N/A	Disagree	Partially Agree	Agree
Everyone receives the necessary workplace health and safety training when starting a job, changing jobs or using new techniques	3.90	0.32	4	0%	0%	8%	92%
There is regular communication between employees and management about safety issues	3.90	0.32	4	0%	0%	8%	92%
Systems are in place to identify, prevent and deal with hazards at work	4.00	-	4	0%	0%	0%	100%
Workplace health and safety is considered to be at least as important as production and quality	3.70	0.67	4	0%	5%	8%	86%
There is an effective health and safety committee and/or representative	4.00	-	4	0%	0%	0%	100%
Incidents and accidents are investigated quickly in order to improve workplace health and safety	3.60	0.97	4				
Communication about workplace health and safety procedures is done in a way that I can understand	4.00	-	4	0%	0%	0%	100%
	3.87	0.25	4	0%	1%	4%	95%
Occupational health and safety awareness							
I am clear about my rights and responsibilities in relation to workplace health and safety	3.50	0.85	4	0%	11%	9%	80%
I am clear about my employer's rights and responsibilities in relation to workplace health and safety	3.10	0.74	3	0%	13%	48%	39%
I know how to perform my job in a safe manner	4.00	-	4	0%	0%	0%	100%
If I became aware of a health or safety hazard at my workplace, I know who I would report to	4.00	-	4	0%	0%	0%	100%
I have the knowledge to assist in responding to any health and safety concerns at my workplace	3.60	0.70	4	0%	6%	17%	78%
I know what the necessary precautions are that I should take while doing my job	3.90	0.32	4	0%	0%	8%	92%
	3.68	0.30	4	0%	5%	14%	81%
Participation in occupational health and safety							
I feel free to voice concerns or make suggestions about workplace health and safety at my job	4.00	-	4	0%	0%	0%	100%
If I notice a workplace hazard, I would point it out to management	4.00	-	4	0%	0%	0%	100%
I know that I can stop work if I think something is unsafe and management will not give me a hard time	3.80	0.42	4	0%	0%	16%	84%
If my work environment was unsafe, I would not say anything and hope that the situation eventually improves	2.20	0.63	2	0%	82%	0%	18%
I have enough time to complete my work tasks safely	3.80	0.42	4	0%	0%	16%	84%
	3.56	0.08	4	0%	16%	6%	77%

Table 8: Resources available to tackle work hazards

The second part of the research focus on the resources available aiming at lessening the effects of being exposed to hazardous conditions: OH&S policies and procedures, OH&S awareness and OH&S empowerment.

The results show that workplace policies and procedures are well established in Synergas with the majority of workers (95%) to reveal adequate resources are available in their business domains. Occupational health and safety awareness is also positively affecting the overall safety culture, with the majority of candidates being aware of the procedures and activities related to OH&S. Noteworthy the reporting of all candidates knowing exactly how to perform the tasks assigned to them in a safe manner.

The research has revealed, however, room for improvement in respect to the awareness workers expressed in consideration of employer's rights and responsibilities related to workplace health and safety issues. Some of the employees expressed their need to get familiar with their rights and responsibilities in relation to their workplace health and safety. Also, it is needed by the management of the company to enhance knowledge to assist responsiveness to any safety concerns at the workplace. In general, strong workers' empowerment to participate in the protection of their own health and safety, is giving the impetus to Synergas for a lesser vulnerable work environment. This research is strengthening the results of the first research conducted, related to prevailing safety culture in Synergas.

The respond rate to both questionnaires, although small in number – the company employs in total 20 people including office and managerial staff – it represents the 85% of the total workforce of the company.

Chapter 5

Establishing the Context

Understanding the organisation and its context and the needs and expectations of the interested parties, require the organisation to analyse all issues that can have an impact on the organisation's OH&S. According to Dentch M.P. (2018), this specific clause of ISO 45001, is consistent with the requirement that the company quality management and environmental management, view business in a more holistic, proactive and vantage position. The integration of management systems of protection and safety of employees in general management system, will be facilitated by the fact that ISO 45001 adopts the same structure as ISO 9001 and ISO 14001.

Context refers to the organisation's business model, the external and internal issues that can impact the company. Internal and external issues have an impact on business operations and holistic management. The economy, new technology and regulations, legal framework, politics, market trends, culture, social patterns, competition, labour availability, suppliers and contractors, are among many external issues that their contribution can impact business and decision-making. It is expected that internal factors such as culture, values and performance, materials, products and processes, knowledge and capabilities of the workforce, trade unions etc, also affect business operations and should be examined thoroughly. Interested parties can include regulatory authorities and legislative requirements, industry sectors, customers, workers and the community.

5.1 Understanding the organisation and its context

The organisation shall determine external and internal issues that are relevant to its purpose and that affect its ability to achieve outcomes of its OH&S and risk

management systems. The external and internal context is the environment in which the organisation seeks to define and achieve its objectives.

Figure 10 illustrates the environment of which an organisation operates and the relationship among general, task and internal environments. According to Daft R.L. (2008), *'as an open system the organisation draws resources from the external environment and releases goods and services back to it'*.

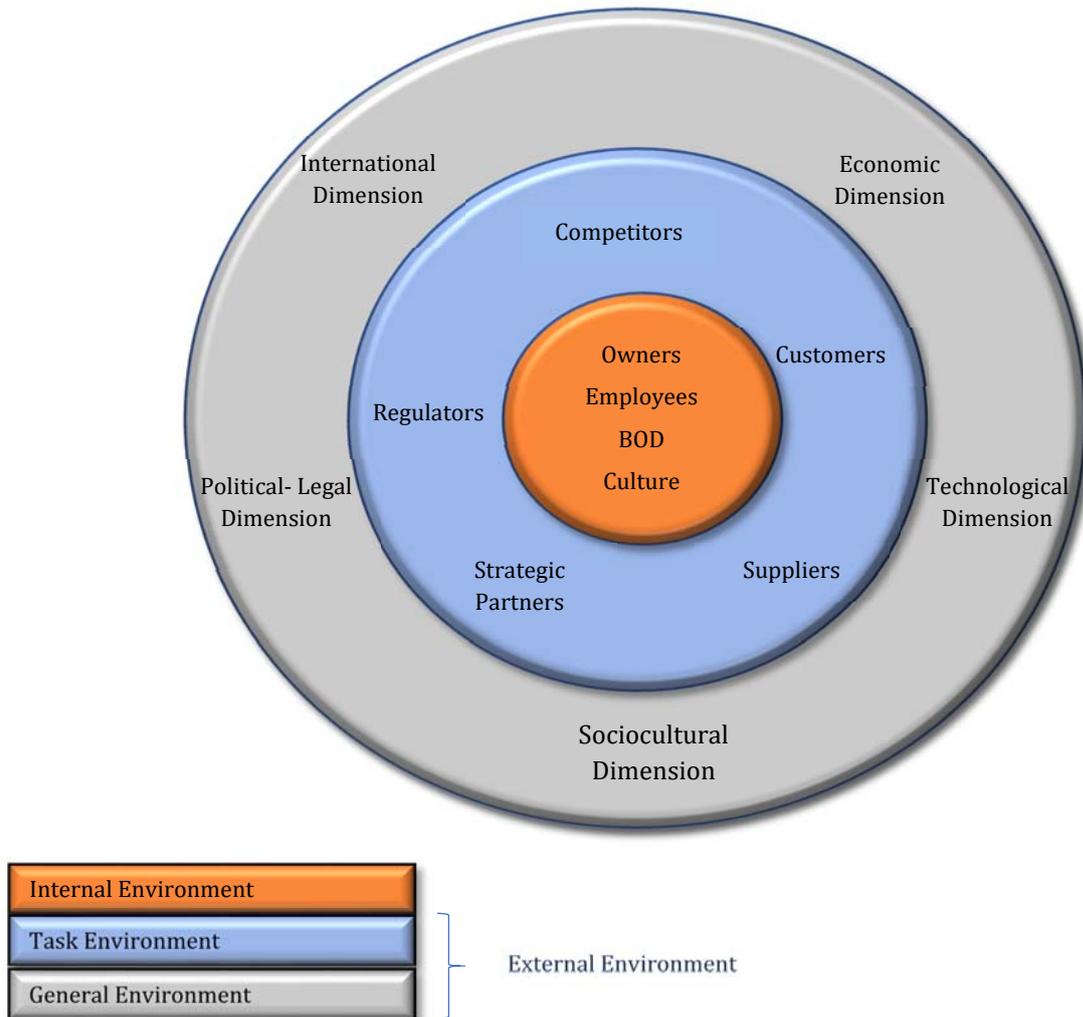


Figure 10: The organisation and its environments

Understanding the organisation and its context represents the milestone for further analysis of the management systems. Both management systems can apply in many organisations worldwide, but their application varies based on the environment each individual organisation operates within. Hence it is important to realise and gather the information necessary to understand and establish accurate and reliable knowledge of

the internal and external environment of the organisation. Each organisation is affected by dynamic environmental changes and forces that brings so many challenges to the forefront for managers and leaders that they need to be vigilant about the latent or unforeseen changes. Based on their understanding, they will be better able to establish the required objectives for their organisation and formulate appropriate strategies to achieve those objectives.

According to Griffin R.W. (1990), the external environment is everything outside an organisation that might potentially affect its operations and activities whilst general environment consists of the nonspecific dimensions and forces in business surroundings that might affect the organisation's activities. These dimensions are typically not associated with other specific organisations or groups. Instead they are general forces or processes that interact with each other and also affect the organisation as a whole. He also defined task environment as the one that consists of specific groups that are likely to influence the organisation and the internal environment as the one that consists of the general conditions and forces within the organisation.

Synergas' general environment can be analysed using useful tools such as the PESTEL analysis. PESTEL is the acronym for Political, Economic, Socio-cultural, Technological, Environmental and Legal dimensions of business external environment. PESTEL analysis is a management method whereby an organisation can evaluate major external factors that influence its operation in order to become more competitive in the market.

The external general environmental factors that impose negative or positive impact on Synergas Ltd, are succinctly described below:

Political dimension

The political factors of the general environment refer to the 'relationship' between the government and the organisation and the overall political situation of the country. It is essential to keep a healthy relationship between the two parties, government, and businesses, in order to sustain ultimate performance and comprehensive results in the

economy. Apparently, Synergas is affected directly and indirectly by the following political factors:

- a. Political stability;
- b. Government safety standards;
- c. Favorable trade regulations and duties;
- d. Favorable tax policy for LPG;
- e. Industrial training and safety regulations;
- f. Bureaucracy;
- g. Energy policy and regulations.

Economic Dimension

The economic dimension usually has an impact on the demand of products or services. General economy is never static therefore managers need to analyse the economic environment prudently. Economy can be in a situation of boom or recession or depression or recovery or in fluctuation state. The following attributes have an impact on Synergas' corporate strategy:

- a. Level of unemployment;
- b. Low borrowing rates;
- c. Fixed currency: - Hedging (EUR=USD);
- d. Low Inflation rate;
- e. High government debt relative to GDP;
- f. Budgetary balance;
- g. Stabilisation of the banking system;
- h. Stabilisation of the European Economy;
- i. Extensive liquidity in the market.

Sociocultural dimension

The sociocultural dimension of the general environment is made up of the customs, values, demographic characteristics, traditions, habits of the society in which the organisation is functioning. Social and cultural stimuli influence consumer behaviour opinion, beliefs, values, purchasing activities, trends, habits and determine the products, services and standards of conduct that the society is likely to value. This

dimension also influences how employees feel about an organisation. Synergas is volatile and opt to offer products and services that correspond to the above attributes and extended to the following sociocultural characteristics:

- a. Social security and benefits;
- b. Social culture and lifestyle;
- c. Demographics and skill levels of the population;
- d. Level of education and training skills;
- e. Trend and habits;
- f. Growing consumer demand for quality;
- g. Increased cooperation between management and labour;
- h. Stable social structure.

Technological dimension

Technology is the set of processes, hardware and software systems that the utility derived from these systems determine the organisation's capacity and capability to convert resources into products and services. For this instance, management must be concerned with technology and technological innovations to keep pace with its competitors or use the technological transformation to gain competitive advantage by adopting promptly new and radical technology. The management of Synergas is continuously monitor developments in technology for the specific industry that is operating in and responds respectively in order to avoid obsolescence by giving emphasis to the following technological general environmental aspects:

- a. Effect of technology on product supply and quality;
- b. High rate of technological diffusion;
- c. Impact on cost structure in LPG industry;
- d. Telecommunications and the Internet;
- e. Digital Transformation;
- f. More efficient operating systems.

Environmental dimension

The most pertinent issues in the environment that managers must consider when forming corporate strategy include the availability of raw materials and other inputs, changes in the cost of energy, levels of environmental pollution and the changing role of government in environmental protection legislation. Within the LPG industry, Synergas need to take the opportunity that the LPG offers - environmentally friendly fuel – and penetrate to the industry by aligning strategy to the following environmental factors:

- a. Renewable energy sources;
- b. Environmental awareness;
- c. Climate change and global warming;
- d. Growing shortage of raw materials.

Legal dimension

Legal and regulatory frameworks in a country determines the path, limits and boundaries within organisations must operate and develop. Many laws regulate the business operations of enterprises and the primary objective of them is to protect companies from unfair competition and also protect consumers from unfair business practices. The legal dimension of Cyprus that directly influence Synergas' policy, highlights the following legal factors:

- a. Cooperative Society legislative framework;
- b. European norms, directives and regulations;
- c. Country's legislative framework;
- d. Occupational Health and Safety rules and regulations;
- e. Equal opportunities at work;
- f. Consumer rights and protection;
- g. Insurance coverage;
- h. General posture toward business regulation.

International dimension

Last but not least, omitting assessing various international indications and gradients while at the same time be enclosed and focus only on the domestic economic shell, then

the exposure to intolerable threats for the business is vibrant. Virtually every organisation is affected by international factors so does Synergas. The following international factors undoubtedly affecting the strategic choice of Synergas:

- a. Globalisation and global economies;
- b. Oil prices and trends;
- c. International shipping regulations and restrictions;
- d. Wars, conflicts and rivalries;
- e. Pandemic.

All the above dimensions, depending on their intensity and severity, deem to have an immediate and direct or indirect impact on operations and activities of the organisation.

The task environment provides all the insights for the business to get familiar with its stakeholders. Understanding the needs and expectations of interested parties and workers is within the scope of the task environment. Based on Michael Porter's five forces model, industry/task structure consists of suppliers, customers/buyers, direct competitors, new entrants and substitutes. Porter's model is illustrated in Figure 11.

Porter's five forces have been originated by Michael Porter, professor in Harvard Business School (1979) in order to analyse industry attractiveness and the level of competition within a specific industry. According to Porter, competition is not only evaluated by analysing the existing competition (existing industry rivalry), but it is also affected by other forces within a particular industry resulting from the threat of new entrants, the bargaining power of suppliers, the bargaining power of buyers and the threat of substitute products or services. The collective strength of these forces determines the attractiveness of the industry.

Threat of new entrants

The threat and the capacity of the threat to enter a new market, depends on the barriers inherently imposed by the industry as a system. The higher the barriers to entry, the smaller the threat for existing players to compensate market share.



Figure 11: Michael Porter's five forces model

LPG industry is characterised by high barriers to enter, for the following systemic reasons:

- a. Large capital requirements and upfront investment cost;
- b. Need for licenses and insurances, that are costly and not easy to obtain;
- c. Extensive and cumulative experience from existing players;
- d. High operating costs and overheads;
- e. Tight regulations and directives including OH&S;
- f. Limited access and options to distribution channels;
- g. Bank funding of the investment is difficult to obtain.

Bargaining power of suppliers

This force examines the possibility of raising prices by suppliers in the industry or to reduce the quality of the goods or services provided without any serious or low implications. The power of suppliers is determined by the concentration level of suppliers and the availability of substitute suppliers in the market. The fewer suppliers in the market the more power they have. From the business perspective, it is more favourable to have a multitude of suppliers. Sources of supplier power also include the

switching costs of companies in the industry, the presence of available substitutes, the strength of their distribution channels and the uniqueness or differentiation level of the products or services a supplier provides.

The LPG industry in Cyprus is very distinct and divergent from other similar industries. The reason for the distinctiveness yields on the fact that:

- a. Niche market with limited access to foreign suppliers;
- b. High switching costs to alternative sources of imports;
- c. Absenteeism of available substitutes;
- d. The price of LPG is subject to the fluctuations in the global market for oil;
- e. Limited access to marine facilities;
- f. Limited storage capacity to allow accommodation of larger quantities – larger scale of available options and suppliers;
- g. Company's ability to substitutes or diversification.

The bargaining power of suppliers in the LPG market, taking into consideration the aforementioned industry characteristics, is designated considerable high.

Bargaining power of buyers

This force is analysing the extent to which the customers (buyers) within a specific industry are able to exercise pressure upon the company to lower the prices which consequently will result in lower profit margins. The customers gain power when they are only few to the industry or they have alternatives to shift to other company that provides the same or similar products. Buying power is relatively low when customers are buying small quantities of products and the seller's product is difficult to be found in other company. Internet gives all the insights needed by a customer to search and compare prices online and get the desired information about products of their interest.

The bargaining power of customers in LPG industry is substantially high and this is explained by the following characteristics of the industry:

- a. Very low switching cost – except household customers;

- b. Very low product loyalty;
- c. Considerable large number of customers;
- d. Same product provided by other competitors in the industry;
- e. Easy access to buyer's information and price comparison;
- f. The selling price is sensitive to fluctuations.

Threat of substitution

This force is examining the likelihood of the customers to switch to alternative products. The focus should be spread to other commodities as well that mainly covers the same need, for instance, to generate heat. The existence of products that covers the need and joy to consume, increase the tendency to switch to alternatives. For the LPG industry such alternatives are:

- a. Number of substitute products available – electricity, renewable energy, diesel, light mazut, etc.;
- b. The switching costs, depending on what alternatives, is not compelling;
- c. Governmental and European policy on renewable sources of energy;
- d. Benefits of using LPG rather than another fossil fuel available.

Taken the above characteristics into consideration, the threat of substitutes in the LPG industry can be considered at least medium to high.

Rivalry among existing competitors

The last and seemingly important force to examine, is how intense the current competition is in the marketplace. This indicator is determined by the number of existing competitors and the capabilities of each competitor in the industry. Rivalry is high when the number of competitors is considerable high in relation to the market, when the industry is slowly growing and when consumers can easily switch to another competitor. When rivalry is high, competition is merely acute leading to price battles and spending frequently and intensively to advertising campaigns. Such situation can harm all the businesses in the industry by pushing the selling prices down and at the same time unable to reduce the cost of production nor the overheads. Rivalry

empowered by the barriers to exit are high, forcing the companies to remain in the industry.

When looking at the LPG industry in Cyprus, the industry is extremely competitive due to the following reasons:

- a. The number of competitors in the industry are four including Synergas, leading to high consecration ratio;
- b. The pace of industry growth is slow due to emphasis given on renewable sources of energy;
- c. The product provided (LPG) is exactly the same with all the competitors in the market;
- d. Differentiation can be sustained by enhanced attribution given to services and support provided to the customers;
- e. The barriers to exit the market are high due to high capital expenditure in relation to the limited market capabilities and investors' willingness to invest;
- f. The switching costs are relatively low hence customers can easily pursue cooperation with a competitor;
- g. Competitors are providing a variety of products including diesel for heating, renewable sources of energy and a vast number of petrol stations.

Regulators

Regulators are *'units in the task environment that have the potential to control, regulate or influence an organisation's policies and practices'* (Griffin R.W., 1990). Government agencies and interest groups are the main regulators of an organisation's task environment. Various government agencies in Cyprus impose control on the LPG industry with the aim to protect, in one hand, the public from illicit business practices and in the other hand, to protect organisations either from unsafe internal practices or from one another in the field. Such government agencies in Cyprus are the following:

- a. Ministry of Energy, Commerce and Industry:
 - i. Co-operative Societies Supervision and Development Authority
 - ii. Cyprus organisation for the promotion of quality
 - iii. Department of Registrar of Companies and Official Receiver

- iv. Consumer Protection Service
 - v. Trade Service
 - vi. Industry and Technology Service
 - vii. Energy Service
 - viii. Weights and Measures Service
- b. Ministry of labour, welfare and social insurance:
- i. Department of labour inspection
 - ii. Department of labour relations
 - iii. Department of OH&S
 - iv. Cyprus productivity centre
- c. Ministry of finance:
- i. Customs and excise department
 - ii. Tax department
- d. Ministry of Interior:
- i. Civil defence department
- e. Ministry of agriculture:
- i. Department of Environment
- f. Ministry of Justice and Public Order:
- i. Cyprus Fire Service
 - ii. Cyprus Police
- g. Ministry of transport, communications and works:
- i. Department of electrical and mechanical services
 - ii. Department of road transport
- h. Larnaca municipality and district administration offices.

Interest groups are mainly formed by its members to attempt to influence businesses. Such interest groups in Cyprus that prominently exert influence on organisations within the industry under consideration, include the following bodies:

- a. Cyprus chamber of commerce and industry;
- b. Trade unions;
- c. Cyprus consumers association.

Strategic Partners

Strategic cooperation between two or more companies can be established to realise mutual benefits. Joint venture or other similar arrangements focusing mainly on achieving economies of scale or exchange of specialised products or swap expertise or reduce exposure and risk, and so on.

Synergis has been involved in such business cooperation to preserve economies of scale, profit maximisation and risk diffusion. One joint venture was established in Paphos district in the attempt to minimise logistic costs and the other in the new energy centre in Vasilikos area in the attempt to obtain economies of scale and minimise the risk of investment given the stagnant LPG market.

The internal environment of an organisation is mainly comprised of the board of directors, employees and the culture the organisation elicits. The internal environment of an organisation provides the means and resources necessary to tackle both general and task environment issues. The proper management of all the resources, either internal or external, determines the uniqueness of each corporate entity.

Board of Directors

The board of directors (BOD) is elected by the stockholders and is charged with the controlling and overseeing the general management of the firm and for the best interest of its stockholders. The BOD is electing the chairman of the board whereby a casting vote might be nominated to him/her. Unless otherwise required by applicable law, all board resolutions shall be passed either unanimously or by a simple majority of valid votes cast during the board meeting. The BOD usually consists of independent, executive or non-executive directors. The BOD plays a major role in setting corporate

strategy and leading all the business activities to ensure implementation of the corporate strategy.

Synergas' BOD consists of five members whose service duration is valid for three years unless otherwise decided by the Co-op commissioner. The BOD members elect the chairman of the board on the first board meeting who retains a casting vote in the event of a tie in a resolution. Each member of the board retains only one casting vote. The secretary/general manager of the company, although his role is important in decision-making, retains no voting rights during the board meetings.

Owners and Stockholders

Currently the total stockholders of Synergas are twelve in number but the shares they possessed are allocated to two major shareholders with proportion of 64,6% and 35,4% respectively. All the rest of the shareholders possess one share each. The share capital of the company is €855.000 divided into 500.000 shares of a nominal value of €1,71 per share. The value of the share is paid in cash by the member except where otherwise expressly decided by the Committee or the general assembly according to the provisions of the Co-operative societies' legislation and rules. Shares are held by the members of Synergas are transferable only between members, in accordance to the provisions of the legislation and the rules apply for Co-operative institutions.

It is important, however, to mention that every member of the stockholders has only one casting vote during the annual general meetings, irrespective of the number of shares held in the organisation. Each member of the company has the right to appoint one and only representative who has one and only vote to exercise in person at the general assembly. Another important uniqueness of the system is that the liability of members, against the obligations of the organisation, shall not exceed twice the nominal value of the shares held in the corporation by each member.

Employees

Employees is the most important asset of an organisation's internal environment. Without recruiting the right people for the right position, it is difficult for any organisation to succeed and prosper. Managers and employees must embrace the same

values and beliefs, set the same goals and objectives in order to foster the core competencies of the organisation and at the same time concrete its position and status within the industry. Many forces are affecting the employees' behaviour, work satisfaction, motivation and willingness to work for the best interest of the organisation as active members of it. In the event where employees are demotivated or express avert behaviour due to failure of the management to embed the core values, then everyone suffers.

The workforce of Synergas consists of 19 full time and two part time/seasonal employees, allocated in various ranks, positions, age, expertise and gender as shown in table 9. It is obvious that the workforce is dominated by men (84%) with long experience in the field. For instance, workers have on average 14 years of experience, but the standard deviation from the mean is high, and this is happening because the range is between 30 years of work experience and 3 years. Employees seldomly retire from the company and not before been pensioned whilst new employees are recruited in new established positions (Chief Accounting Officer and Assistant Mechanical Engineer). Knowledge, experience and skills are of great importance to the company whereby collectively allow the delegation of authority to prevail which in turn enhance teamworking and solidarity in the organisational internal environment. The company, moreover, is using a simple and flat organisational chart as portrayed in Appendix 4.

Position Held	Men	Women	Proportion on Total Employed	Age mean	Std Dev Age	Years of Experience	Std Dev Years of Experience
General Manager	1	-	5%	45	-	11	-
Chief Accounting Officer	1	-	5%	37	-	2	-
Mechanical Engineer	1	-	5%	37	-	10	-
Assistant Mechanical Engineer	1	-	5%	34	-	5	-
Accounts & Administration	-	3	16%	38	4.78	8	8.26
ADR Drivers	3	-	16%	46	2.94	10	5.10
Technical Staff	2	-	11%	51	1.00	26	3.00
Workers	7	-	37%	45	10.04	14	9.11
	16	3	100%	43	8.06	12	8.89

Table 9: Synergas' employees in groups by positions held

Culture

According to Thomas D.C. (2008), *'organisational culture has been variously defined as stable attitudes, beliefs, and values held in common by organisation members, shared normative beliefs and behavioural expectations or a set of goal-directed values, beliefs and behaviours'*. Griffin R.W. (1990) defined culture as *'the set of values of an organisation that helps its members understand what the organisation stands for, how it does things, and what it considers important'*. Although there is little consensus as to the definition of corporate culture, many authors describe it as *'an internal attribute of the organisation that is socially constructed, historically determined, holistic and difficult to change'*.

Each culture within a corporation is unique and is formed and influenced by many factors. A strong culture defines the long-term success of a business and constitutes the denominator among the most successful companies. Coleman J. in his article posted in Harvard Business Review (May 6, 2013), analysed after a vigorous research, the six components of a great corporate culture. These components, even though are not the only ones that influence culture, the following can provide a firm foundation for shaping organisational culture:

- a. **Vision:** a great culture starts with a vision or mission statement. The vision and mission statement of Synergas are both described in Appendix 2. These simple statements or phrases guide a company's values and provide it with purpose which in turn gives the insights to employees to align these values to drive and appraise decisions taken.
- b. **Values:** a company's values are the core of its culture. Based on Synerga's vision and mission statements, a clearly articulated set of values that are prominently communicated to all employees, involve the way the business commit to serve its business partners (clients), people (employees), maintain professional standards, and generate environmental and social consciousness.
- c. **Practices:** values are of minor importance if are not supported in practice by decision-makers. For instance, a customer-oriented company must show in practice and invest in means that best serve customers, for instance in quality

of good and services, after sales support, contribution to the society, and so forth.

- d. **People:** no company can build a coherent culture without people who either share its core values or retain the eagerness and ability to embrace those values. It is important to pay attention while recruiting employees not just fit corporate perspective and expectations but also fit to the corporate culture. Aristotle said, *'we are what we repeatedly do'*. This view promotes repeated behaviour or habits as the core of culture. Synergis is striving to change the culture and peoples' behaviour and perceptions over the last decade. The company, since its establishment in 1965, was suffering from all the residues given the structure and core values of Co-operative societies framework, which was far away outside the core values and vision of its creators. The detachment from the initial values, drove the company near to bankruptcy between the years 2007-2008.

- e. **Narrative:** each organisation has a unique history and story behind its existence. It is therefore important to attach that history into a narrative since it provides strong element of culture creation. In this view, culture is about the story in which people in the organisation are embedded and the values and rituals that reinforce that narrative. It is perceived that Co-operative societies infrastructure has a strong reputation and idealistic perception for most people's notion. This perception was reinforced by the widespread slogan Co-operative societies promoted, *'All for one and one for all'*. This motto however collapsed during the economic crisis stroke the island in 2013.

- f. **Place:** whether geography, architecture, or aesthetic design, impact the values and behaviours of people in a workplace. It is always important to work in an environment that best interprets the core values of the business in order to be able to affect positively the employees' behaviour and attitude towards goal achievement. Feeling comfortable and safe with adequate resources and means necessary to perform the daily responsibilities, duties, and tasks in a workplace, provides a favourable utility to shape culture. Synergis, even though does not

provide the ideal workplace for the employees to work comfortably and productively, investment to create a more functional working environment is facilitated each year.

Internal and external environments are both dynamic and exposed to changes so managers need to include in corporate strategy the frequent examination of those forces that have the tendency to affect either positively (opportunities) or negatively (threats) the external environment of the organisation and the strengths and weaknesses internally influencing business operations. This is particularly important for the reason that any developments or changes in the remote environments, influence the organisation's success. Knowing the environment helps managers to identify the direction and course of action to follow and creates the flexibility to manoeuvre when strategy initially set lead to deadlock.

Ansoff referred to SWOT analysis which is a wide accepted technique for assessing and exploring both the internal and external factors that influence the business operations and activities following the formulation of objectives. The internal factors are determined by Strengths and Weaknesses whereas the external factors by Opportunities and Threats. All four forces develop a fuller awareness of the organisation's environment which in turn guide management to shape both strategic planning and decision making.

Furthermore, SWOT analysis is a useful tool that contributes to the identification of potential prominent hazards and risks. Creates the awareness to turn threats to opportunities and weaknesses to strengths if properly and promptly tackled.

Strengths describe what the organisation does particularly well or in a way that distinguishes it from competitors. According to Mullins L.J. (1996), *'strengths are those positive aspects or distinctive attributes or competencies which provide a significant market advantage or upon which the organisation can build'*.

Weaknesses are inherent elements of the organisation that in a certain degree drag the organisation down from prospective development or expansion. Mullins described weaknesses as *'those negative aspects or deficiencies in the present competencies or*

resources of the organisation, or its image or reputation, which limit its effectiveness, and which need to be corrected or need action taken to minimise their effect’.

In contrast, opportunities and threats are those factors that are outside of the control of the organisation, but each leader needs to identify and consider in order to be able to tackle opportunities and avoid threats. Mullins acknowledge opportunities as *‘favourable conditions that usually arise from the nature of changes in the external environment whereas threats as converse of opportunities that refer to unfavourable situations which arise from external developments likely to endanger the operations and effectiveness of the organisation’.*

Synergas’ SWOT analysis is illustrated in table 10. The SWOT analysis was initially drawn from the annual internal review of the company, as part of the ISO 9001 requirements, and informal discussions with the company’s officials.



Table 10: Synergas’ SWOT analysis – Source: company’s annual internal review

5.2 Understanding the needs & expectations of interested parties & workers

Interested parties are those who have stakes in the organisation and are directly affected by the organisation’s operations. Stakeholders in general are those individuals or organisations or bodies who can affect or be affected by the business.

Freeman F.E. (1984), suggests that *‘the stakeholder ecosystem involves anyone invested and involved in or affected by the company’*. Freemans theory, dissimilarly with the theory of Milton Friedman which states that *‘the only stakeholders a company should care about are its shareholders’*, suggests that *‘a company’s real success lies in satisfying all its stakeholders, not just those who might profit from its stock’*.

The following Table (Table 11), is been used to document the external and internal issues relevant to Synergas’ operational purpose and strategic direction that may affect its ability to achieve the intended result of the OH&S and risk management systems. This Table is useful to map out and understand the expectations of relevant interested parties and how the company is planning to deal with their requirements. The generated information should be retained as a strategy or tactical planning document to underpin organisation’s policies and to provide a road map to achieve future goals and objectives. The effect on priority and relevance is rated by taking into consideration the tables provided in Appendix 5.

Interested Party	Priority (1 to 4)	Relevance (1-4)	Power (PxR)	Interested Party Requirements	Criteria & Methods
Customers / Clients	4	4	16	<ul style="list-style-type: none"> # Reasonable & competitive prices # Quality of products/ services provided # Foster safety # Reliability # Keep informed 	<ul style="list-style-type: none"> # Questionnaires # Surveys # ERM # Feedback # Sales frequency # Manage closely # Interviews

Interested Party	Priority (1 to 4)	Relevance (1-4)	Power (PxR)	Interested Party Requirements	Criteria & Methods
Shareholders / Owners	4	4	16	<ul style="list-style-type: none"> # Profit maximisation # Expansion & growth strategies # Keep involved to decision making # Reputation/goodwill 	<ul style="list-style-type: none"> # Consultation # Meetings # Brainstorming
Competitors	4	3	12	<ul style="list-style-type: none"> # Fair competition # Benchmarking # Economies of scale 	<ul style="list-style-type: none"> # Reviews # Appraisal # Media # Research # Internet
Employees	4	3	12	<ul style="list-style-type: none"> # Fair pay # Good benefit package # Safe & healthy environment # Working time arrangements # Incentives/recognition # Job security # Working conditions & hygiene # Delegation of authority # Work-Life balance # Shared culture # Team working # Keep informed 	<ul style="list-style-type: none"> # Appraisal # Meetings # Unofficial conversation # Complaints & grievances # Suggestions box # Feedback # Performance metrics
Suppliers / Vendors	3	4	12	<ul style="list-style-type: none"> # On time payment # Order frequency & quantity # Keep informed 	<ul style="list-style-type: none"> # Reviews # Appraisal # Reports # Visits # Meetings # Internet
Local Authorities	3	3	9	<ul style="list-style-type: none"> # Social contribution # Compliance with directives # Consultation & information # Environmental concern 	<ul style="list-style-type: none"> # Engagement with planning # Consultation # Compliance # Reporting
Community / Society	3	3	9	<ul style="list-style-type: none"> # Corporate social responsibility # Promote public utility works # Engagement # Green spaces & parks 	<ul style="list-style-type: none"> # Consultation # Engagement # Compliance # Reporting # Complaints # CSR activities
Governmental Bodies	2	3	6	<ul style="list-style-type: none"> # Compliance with rules & regulations # On time reporting 	<ul style="list-style-type: none"> # Licences # Compliance # Reporting # Circulars

Interested Party	Priority (1 to 4)	Relevance (1-4)	Power (P×R)	Interested Party Requirements	Criteria & Methods
Workers	3	2	6	<ul style="list-style-type: none"> # Proper training # Contribution # Health and safety # Less authoritarianism # Working conditions & hygiene # Adequate & steady income # Working time arrangements # Co-worker support 	<ul style="list-style-type: none"> # Appraisal # Complaints & suggestions box # Training & competence
Unions	2	3	6	<ul style="list-style-type: none"> # Representation & cooperation # Increase contributions # Organisational prosperity 	<ul style="list-style-type: none"> # Consultation # Feedback # Meetings # Appraisals
Environmentalists	2	2	4	<ul style="list-style-type: none"> # Transparent environmental protection # Keep apprised 	<ul style="list-style-type: none"> # Engagement # Consultation

Table 11: Synergas: - Understanding the needs and expectations of interested parties.

5.3 Determining the scope of Risk and OH&S management systems

The scope of the management system should include everything under the organisation’s control or influence that could impact its OH&S performance. The credibility of the organisation’s OH&S management system will depend on the extend of the defined boundaries. The scope should include the activities, products or services that have or could have the potential to impact the organisation’s OH&S performance, or to avoid its legal and other requirements.

The scope if not determined properly, could weaken the credibility of the organisation’s OH&S management system with its interested parties and reduce its ability to achieve the intended outcomes of the risk and OH&S management systems. The scope is a realistic statement of the organisation’s operations or business processes to be included within its Risk and OH&S management system boundaries. The organisation should maintain the scope of Risk and OH&S management systems as documented information and make it available to interested parties. When documenting its scope, the organisation should consider using an approach that

identifies the activities or processes involved, the products or services that develop, and the location, where they occur.

The scope of the safety and health management system is to describe the provisions in order to:

- a. Ensure a safe and healthy working environment for employees, subcontractors, visitors, customers and other partners, the community and other interested parties;
- b. Perform operations without accidents, damage to health and/or the environment;
- c. Specify the responsibilities of the executives / associates regarding hygiene and safety;
- d. Recognise and implement the applicable Cypriot legislation, EU guidelines and international codes of practice;
- e. Identify, evaluate, and manage all potential risks through the implementation of risk reduction program (at acceptable levels) and to minimise the hazards of the working environment;
- f. To achieve continuous improvements in the company's performance in health and safety at work and minimise accident outlays and costs.

The scope of the risk management system is to describe the provisions in order to:

- a. Stress the importance of risk to the senior management and embed it to the corporate governance of the organisation;
- b. Provide a generic understanding of the risk management process and create communication patterns with interested parties to promptly identify risks and opportunities;
- c. Improve stakeholders' and interested parties' confidence and trust;
- d. Promptly identify and treat risks throughout the organisation and improve operational effectiveness, efficiency, and economics;
- e. Implement risk management framework and processes based on the risk management plan in appropriate organisational areas, levels, and functions;

- f. Align and integrate the principles into all aspects and elements of general organisation's management system;
- g. Describe how risks are treated or modified as required by the organisational context;
- h. Establish a mechanism for assessing the likelihood of occurrence and impact of threats, based on multiple impact dimensions;
- i. Prepare treatment and contingency plans for preventive impairment of the likelihood of occurrence of high-risk scenarios.

5.4 Risk and OH&S management systems

Organisations need to recognise that the risks result from uncertainty brought to light by failures to recognise potential hazards. Hazards may be seen as a consequence of failures to implement plans and processes, at least to a sufficient degree. The fundamental aim of assessing and managing risks is to facilitate effective and efficient improvements in OH&S management system.

ISO 45001:2018 is a specification for occupational safety and health management system. This specification has been developed to be compatible with environmental management (EN ISO 14001:2004) and quality management systems (EN ISO 9001:2015), with the aim of facilitating the integration of ISO 45001:2018 with ISO 31000:2018.

Compliance with ISO 45001:2018 specifications is complementary to the legal obligations to which the company is subject to. The organisation has established a safety and health management system to:

- a. recognise, evaluate and minimise/eliminate the risks to which employees and third parties (visitors, partners, customers) are exposed due to the company's work;
- b. implement, maintain and continuously improve safety and health standards;
- c. aim at continuing to improve the well-being of workers;
- d. deepen cooperation between the company and the employees;

- e. recognise and satisfies legislation on safety and health issues. In particular, the requirements of the following laws and regulations: N89(I)1996, N158(I)2001, N25(I)2002, N41(I)2003, N99(I)2003, K.D.P. 134/1997, K.D.P. 172/2002, K.D.P. 173/2002 and K.D.P. 174/2002, CPR 521/2014, CPR 522/2014 and CPR 330/2017;
- f. confirm the company's compliance with the defined safety and health policy;
- g. demonstrate and communicate such compliance to interested parties.

The structure and documentation of the safety and health management system is as follows:

- a. Safety and health policy statement;
- b. Safety and health management system manual;
- c. Safety and health procedures;
- d. Working /safety instructions;
- e. Forms;
- f. External Documents (legislation, technical guides, material specifications, etc.);
- g. Filing.

Based on legislation, EU directives, international regulations and standards, with the support of management and the contribution of all executives as well as the continuous effort to improve, the organisation strives to achieve a safe working environment, where risks are eliminated or minimised and prevent accidents or other incidents that may cause harm to human health and/or the environment.

The organisation through the experience of its staff, the relevant legislation, regulations, aids of available literature and the Department of Labour Inspection, the technological developments and equipment available, it has established and maintained procedures for the continuous identification of risks and dangerous situations, the assessment of occupational risks and the implementation of the required control measures. The procedures shall be such that the risks to the health and safety of staff and third parties are assessed and as far as possible controlled.

Moreover, within the framework of its programming for the management of safety and health, the organization has established and maintained a programme to achieve its objectives by specifying:

- a. the relevant responsibilities/authorities and mechanisms at the different levels of the organisation;
- b. the means and time requested to achieve its objectives;
- c. the possibilities of review and changes to confirm the suitability of the programme.

Chapter 6

Leadership and Worker Participation

Risk management and OH&S management are interrelated with the strategic management process. Both management systems cannot blossom without the support of the leaders of the organisation. Risk and OH&S management involve strategic planning throughout the organisation, requiring executive direction, authorities, and resources. Mandate and commitment, according to Hutchins G. (2016), are essential *'to effectively design the framework for managing risk'*. The effectiveness of the OH&S system depends on the level top management is providing the necessary resources, strategic direction and communication to achieve the desired results.

It is clear that OH&S risk management strategy must be driven by senior management to be successful in an organisation. Senior managers represent the level of management responsible for making critical decisions in terms of organisational values, priorities and future directions. Risk management is denoted to be more effective when it is integrated into the initial stages of business and strategic planning.

The top management must take overall responsibility and accountability for the prevention of work-related injury and ill health as well as the provision of a safe and healthy workplace. Hence, top management must be involved in all stages of the processes in order to develop, lead and promote a culture that supports risk management and OH&S system.

Deming W.E. (1986), introduces 14 principles known as Deming's principles (see table 12), that best fit to the application of OH&S management system. Among the principles Deming encourages senior managers to become 'superleaders'. To learn how to listen to people and their opinions, teach them to identify problems and find the best way to solve them, inform them on the actions taken to improve the level of quality of working conditions, encourage managers to inform their superiors on the matters requiring adjustments in terms of quality of working conditions, and so on.

Principle	Application
→ Responsibility of managers	<ul style="list-style-type: none"> a. Define vision in terms of OH&S consistent with policy of the organisation b. Leaders to be aware of the role of OH&S c. Responsibility assigned and rules for implementing the vision and policies adopted regarding the principle of continuous improvement
→ New way of thinking	<ul style="list-style-type: none"> a. Accept new safety and health at work management philosophies b. Determine direction of efforts to realise adopted vision c. Specify the rules to improve safety and working conditions
→ Lack of belief in efficiency of mass final control	<ul style="list-style-type: none"> a. Introduce high-quality working conditions b. Evaluation of the quality of working conditions-not only based on accidents and occupational diseases records c. Define the factors affecting the quality of working conditions
→ Change in decision making on purchasing concerning the price criteria	<ul style="list-style-type: none"> a. Implement method of assessing the cost of safe operation-decide whether to allocate resources to different areas of OH&S management b. Consider the costs of decentralisation c. Middle managers to get involved in decision making contributing to the improvement of safety
→ Continuous improvement of processes	<ul style="list-style-type: none"> a. Audit, assess and improve actions taken regarding the quality of working conditions b. Focus attention on improving safety

Principle	Application
→ Courses and training	<ul style="list-style-type: none"> a. Ensure that all employees are educated, trained b. Introduce modern methods of training and development c. Improve employee competences
→ Leadership	<ul style="list-style-type: none"> a. Become 'Superleader' b. Learn to listen to people and their opinions c. Teach people to identify problems & solve them d. Inform people on the actions taken to improve quality of working conditions e. Encourage managers to inform superiors on matters requiring adjustment and improvement
→ Elimination of fear from management	<ul style="list-style-type: none"> a. Encourage employees not to be afraid to talk about risks and problems b. Inform about poor state of safety, threats, risks c. Ask questions and listen
→ Break barriers in communication	<ul style="list-style-type: none"> a. Remove obstacles to cooperation between employees in different levels b. Build teams to solve problems c. Top management participate in team structure
→ Eliminate slogans and inciting workers to overcome shortages and to a higher level of performance	<ul style="list-style-type: none"> a. Eliminate slogans on safety at work- appreciation for people working to improve safety b. Create opportunities for the creation programs and measures to warn about the dangers in the workplace
→ Limit standards on quantity	<ul style="list-style-type: none"> a. Do not impose quantitative targets to improve safety b. Analysis of statistical data on accidents and diseases is not sufficient to develop safe behaviour
→ Remove barriers that rob workers of pride from their job	<ul style="list-style-type: none"> a. Ensure appreciation to employees and managers who obtain positive results b. Build loyalty systems c. Motivate people to follow good practice
→ Introduce training and self-learning schemes	<ul style="list-style-type: none"> a. Introduce specific form of professional skills & learning b. Provide full understanding of employees on roles they play and their actions – adequate level of quality of working conditions
→ Commitment of all the employees	<ul style="list-style-type: none"> a. Apply the cycle of continuous improvement b. Teach employees and executives using the appropriate methods and tools c. Develop shared sense of responsibility

Table 12: Deming's 14 points for workplace safety

6.1 Leadership commitment & worker participation

Leadership commitment and dynamic support from top management are critical for the success of the OH&S and risk management systems and for the achievement of their intended outcomes. In that sense, top management must take responsibility for the effectiveness of the organisation's OH&S and risk management systems and ensure that their intended outcomes are achieved. Workers need to become confident that top management is taking seriously the responsibility for the implementation of both management standards in order to enhance positive culture towards risk and OH&S management, throughout the organisation.

According to Annex L and ISO 45001:2018 and ISO 31000:2018 guidelines, top management shall demonstrate leadership and commitment with respect to both management systems by:

- a. Ensuring that OH&S and risk management policy and objectives are established and are compatible with the strategic direction of the organisation;
- b. Ensuring the integration of the ISO 31000 and ISO 45001 management systems' requirements in the organisation's business processes;
- c. Ensuring that the resources needed for both management systems are available and in place;
- d. Communicating the importance of effective ISO 31000 and ISO 45001 management and of conforming to both management system's requirements;
- e. Ensuring that both management systems achieve their intended outcomes;
- f. Directing and supporting persons to contribute to the effectiveness of the management systems;
- g. Promoting continual improvement;
- h. Supporting other relevant managerial roles to demonstrate their leadership as it applies to their areas of responsibility;

- i. Encourage workers and other related parties to get actively involved in improving OH&S and risk management performance;
- j. Promote open discussion about OH&S and risk management matters;
- k. Taking overall responsibility and accountability for the prevention of work-related injury and ill health, as well as the provision of safe and healthy workplace and activities.

Senior management need to create a culture that encourages people, at all levels, to actively participate in the OH&S and risk management systems. Delegation of authority and decision-making participation and motivation are useful means to promote commitment and loyalty to the purpose stemmed from a safe working environment. Active participation of workers, cooperation and communication founded on mutual trust, shared perceptions of the importance of the OH&S and risk management systems by active involvement in the detection of opportunities and the effectiveness of preventive and protective measures, gives the impetus for the creation of a safe working environment. This culture must encourage workers to report incidents, hazards, risks and opportunities without the fear of dismissal or any disciplinary action.

6.2 Risk management and OH&S policy

Risk management policy is describing the direction, intent, implementation and assurance of an organisation's risk management system. Senior management must establish, implement and maintain an OH&S policy parallel with the risk management policy. The OH&S policy is a set of principles stated as commitments in which top management outlines the long-term direction of the organisation to support and continually improve its OH&S performance. Policy provides the appropriate framework to set organisational objectives and take actions to achieve the intended outcomes of the OH&S and risk management systems. These commitments are then cascaded down the organisation and reflected in the processes, activities and procedures ensuring a reliable and flexible OH&S and risk management system.

According to Annex L, top management shall establish, implement and maintain a policy that:

- a. Includes commitment to provide safe and healthy working conditions for the prevention of work-related injuries and ill health and is appropriate to the purpose, size and context of the organisation and to the specific nature of its OH&S risks and opportunities;
- b. Provides a framework for setting the related to the OH&S and risk management objectives;
- c. Includes a commitment to fulfil legal requirements and other related requirements;
- d. Includes a commitment to eliminate hazards and reduce or mitigate risk exposure;
- e. Includes a commitment to continual improvement of the OH&S and risk management system;
- f. Includes a commitment to consultation and participation of workers;
- g. Includes the organisation's risk attitude and risk appetite.

The continuous supervision of safety and health conditions and the constant effort to improve, is the key to the success of this effort. It has been developed and approved by the Secretary/Director of Synergas, Health and Safety Policy (see Appendix 7) which includes a reference to the following:

- a. The health and safety objectives of the organisation;
- b. The methods of achieving the objectives;
- c. The company's commitment to harmonised with Cypriot and European legislation, implementing this policy and achieving continuous improvement.

It is vital to share the organisation's commitments with all interested parties including workers, contractors and close partners so that they understand top managements' expectations and enhance work related performance that contributes to meeting these expectations. Making policy publicly available or available on request, provides

assurance to the interested parties that the organisation is working on the right path to sustain business continuity and achieve positive outcomes.

6.3 Organisational roles, responsibilities and authorities

All people involved in OH&S and risk management systems, should have a clear understanding of their roles, responsibilities, authorities and accountabilities for achieving the intended outcomes of both management systems. Top management shall ensure that the responsibilities and authorities for relevant roles within the scope of both ISO 45001 and ISO 31000 management systems, are assigned and communicated at all levels within the organisation. While top management has the ultimate responsibility of the systems, workers should be enabled to report hazardous situations so that actions to be taken and where possible to assume responsibility for those aspects of risk management and OH&S management, over which they have control. Although, day to day decisions, related to OH&S management system are delegated to others, the primary responsibility lies on the high-level management. What is delegated and to whom should be clearly and unambiguously communicated so that everybody understands who is responsible for what.

According to Annex L, top management shall ensure that responsibilities and authorities for relevant roles are assigned and communicated within the organisation. Top management shall assign the responsibility and authority for:

- a. Ensuring that the OH&S and risk management systems conform to the requirements of ISO 45001 and ISO 31000;
- b. Reporting on the performance of the OH&S and risk management systems to top management.

In the case where other management systems are in place, such as ISO 9001, synergies may exist where there are similar roles and responsibilities. This will enhance ownership of OH&S and risk management across the organisation and potentially create efficiencies. Care should be taken, however, at the interfaces between different

functions and departments of the organisation and different level of management in order to avoid confusion and ambiguity.

Synergas, under the responsibility of the top management, has defined, documented and appropriately assigned the roles, responsibilities and authorities of the staff in order to manage, implement and assure proper actions taken to avoid risks associated to the safety and health of the workplace. The secretary/director of the company is responsible for making relevant administrative and managerial decisions and making available all necessary resources for the implementation of the health and safety programme. At the same time, he has a binding responsibility for the implementation of the system.

The health and safety officer, is responsible for the management of all safety issues in the company, which includes:

- a. Recognise and evaluate relevant laws, regulations and directives related to the safety and health issues;
- b. Participate in the work of the health and safety committee and coordinate the activities of it. Collects, summarises, analyses and disclose the required information;
- c. Preparing and maintaining written risk assessment, safety and health plan and safety archive;
- d. Correction and effective implementation of the risk assessment provisions;
- e. Recognise the need to establish and document new health and safety provisions;
- f. Implement decisions to comply with and improve safety and health standard;
- g. Ensuring that workers are aware of the safety policy, their position responsibilities and the procedures and requirements of the health and safety programme;
- h. Ensuring that the executives have the skills and capabilities to perform their duties and responsibilities and where necessary to provide recommendations and organise related training courses on OH&S issues;
- i. Manage cases of accidents or other incidents;

- j. Carrying out inspections to assure compliance with the company's OH&S rules and regulations and the operating activities.

The management of the organisation, in consideration of the above, provides all the necessary resources for the implementation, control and improvement of the performance of the OH&S management system. Company's staff is responsible for the implementation and the compliance with the requirements of the system. The workers are participating in information gathering, counselling and communication and to the identification of hazards and dangerous situations within the company. The secretary/director in cooperation with the health and safety officer of the company, are responsible for the implementation of the programme whilst acting as liaisons between the staff, the board of directors, the customers and contractors in order to sufficiently and explicitly communicate related outcomes.

Chapter 7

Planning

Planning for OH&S and risk management systems, the organisation needs to consider the context of the organisation, the requirements and needs of interested parties and the scope of the management systems, as explained in sections 5.1, 5.2 and 5.3 respectively to be able to determine the risks, hazards and opportunities that need to be addressed. Planning also need to take into consideration all business activities as firstly analysed by Porter M. (1985) and illustrated in Figure 12.

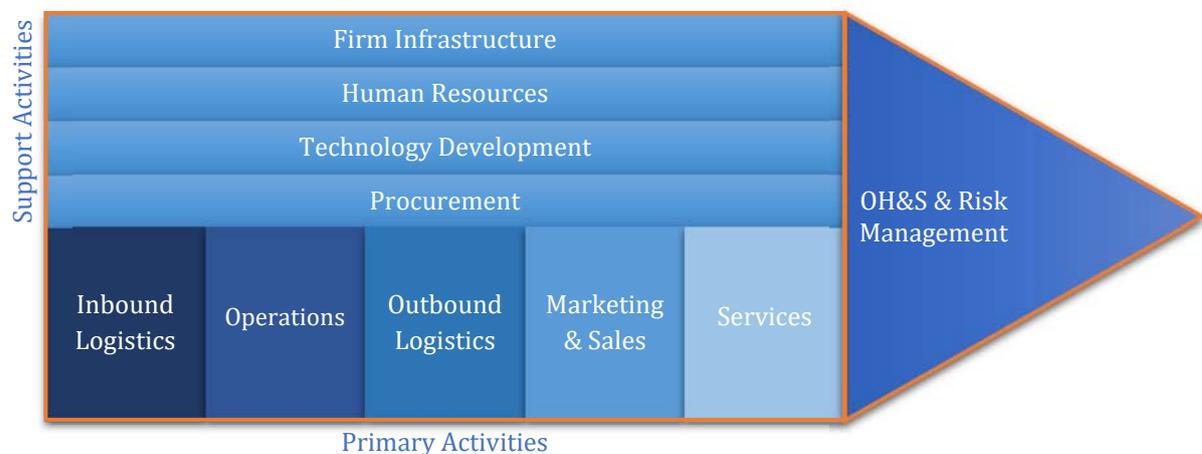


Figure 12: Porter's value chain analysis

The model explains the primary activities of the organisation as well as the supportive activities deemed to affect the overall performance:

- a. Firm infrastructure: Leadership, management, finance, legal, planning, compliance;

- b. Human resources: professional development, employee relations, employee motivation, performance appraisals, recruiting and selection, training and development, teamworking, ethics;
- c. Technology development: Integrate delivery system, real time information, research and development, customer database maintenance, statistics, communication with customers and suppliers, online payment system, etc.;
- d. Procurement: real time inventory, communication with suppliers, trusting relationship with vendors, purchasing raw materials, assets and overheads, machines and equipment;
- e. Inbound Logistics: automated inventory control, supply schedule, specialised materials importation, storage, real time inventory data, quality control;
- f. Operations: manufacturing (bottling), production control, quality control, maintenance, technological innovation, supply chain management;
- g. Outbound logistics: order and delivery processing, invoicing, dispatching, distribution channels;
- h. Marketing and sales: customer management, pricing strategy, promotion, sales analysis, market research, communication;
- i. Services: after sales customer service, technical support and maintenance, installations, repairs, customer relation management (CRM).

Planning is not a single event but an ongoing process, anticipating changing situations and continually determining risks and opportunities. Undesired effects can include work-related injury and ill health, noncompliance with legal requirements and other requirements or damage to reputation. Planning considers the relationships and interactions between the activities and requirements for the management system. OH&S opportunities address the identification of hazards, how the hazards are communicated, and the analysis and mitigation of hazards identified. Other opportunities address system improvement strategies.

7.1 Actions to address risks and opportunities

Organisations need to establish a methodology that enables leaders to effectively identify risks and hazards as well as opportunities as part of the planning process. The risks and opportunities should be relevant to the context of the organisation as well as to the interested parties and the scope of the management system. The risks and opportunities that need to be addressed confronts the following purpose:

- a. Give assurance that the OH&S and risk management systems can achieve their intended outcomes;
- b. Prevent or reduce undesired effects;
- c. Achieve continual improvement.

When determining the risks and opportunities and the intended outcomes of the management systems, the organisation should take into consideration the:

- a. Hazards;
- b. OH&S risks and other risks;
- c. OH&S opportunities and other opportunities;
- d. Legal requirements and other requirements.

In the attempt to plan actions to:

- a. Address risks and opportunities;
- b. Address legal requirements and other requirements;
- c. Prepare for and respond to emergency situations.

And plan the way to:

- a. Integrate and implement the actions into its OH&S management system processes or other business processes;
- b. Evaluate the effectiveness of the actions taken.

Comprehensive identification of workplace hazards and associated risks, according to Dentch M.P. (2018), *'is the cornerstone on which successful OH&S management system*

is built'. Similarly, risk management plan is providing organisational resilience and confidence enhancing the ability towards a rigorous decision-making and planning process, provides the flexibility to respond to latent threats, takes advantage of opportunities and provides competitive advantage, equips managers with tools to anticipate changes and threats and allocate appropriate resources, provides confidence to top management and stakeholders that critical risks will be identified and managed promptly, and enables better business resilience and compliance management.

According to ISO 45001:2018, the organisation needs to establish, implement and maintain a process for hazard identification that is ongoing and proactive. The process should consider but are not be limited to:

- a. The primary as well as the supporting activities as previously described;
- b. How work is organised, social factors, leadership and culture;
- c. Past relevant incidents;
- d. Potential emergency situations;
- e. People, including those with access to the workplace including visitors and those in the vicinity of the workplace affected by the organisation's activities;
- f. Changes in organisation, operations, processes, activities and OH&S management system;
- g. Changes in knowledge and information about hazards.

The hazard identification process involves the identification of all business activities and processes performed by individuals within the scope of the organisational performance. The risk planning process, as determined by Dentch M.P. (2018), is illustrated in Figure 13.

The organisations shall establish, implement and maintain processes to assess OH&S risks from the identified hazards, while taking into account the effectiveness of existing controls and also determine and assess the other risks related to the establishment, implementation, operation and maintenance of the OH&S management system.

The related process maintained should also assess OH&S opportunities to enhance OH&S performance, while taking into account planned changes and other opportunities for improving the OH&S management system. The organisation shall determine and gain access to the legal requirements and other requirements related to applicable hazards, OH&S risks, determine how these legal requirements and other requirements apply to organisation and take the legal requirements and other requirements into account when establishing, implementing, maintaining and continually improving its OH&S management system.

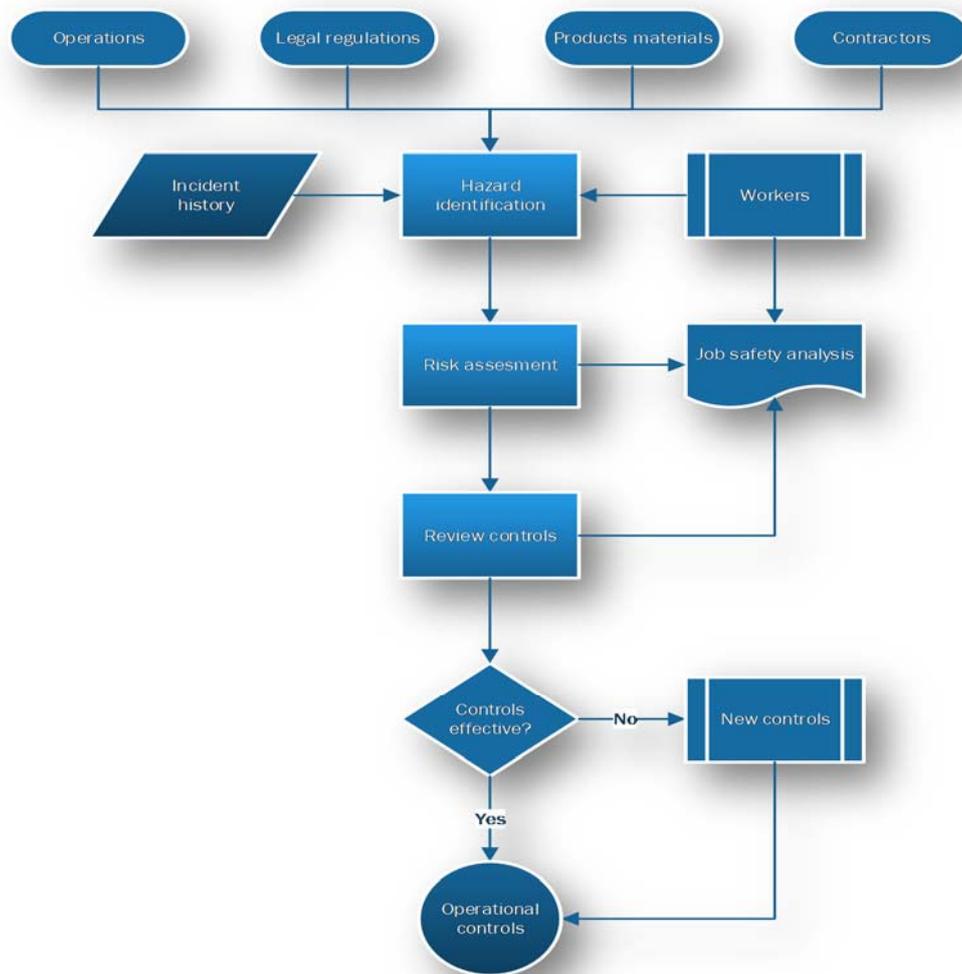


Figure 13: Risk planning process

The hazard identification process begins at the conceptual design stage of the workplace, facility, product or business. Hazard identification assists to the recognition and understanding of hazards within the workplace in order to promptly assess, prioritise and eliminate or reduce their impact. Synergas has adopted the methodology

referred hereto as Appendix 8, in the attempt to identify all hazards applied to workplace, work-related activities and people. In total, Synergas has identified and assessed 86 hazards.

Hazards have the potential to cause injury or ill health, so they need to be identified before the risks associated with these hazards be assessed. In the case were no controls exist or are inadequate, effective controls should be established according to the hierarchy of controls as illustrated in Figure 14. Hazard identification should aim to proactively determine all sources, situations or acts, arising from organisation's activities with a potential to harm in terms of injury or ill health or damage to a property.

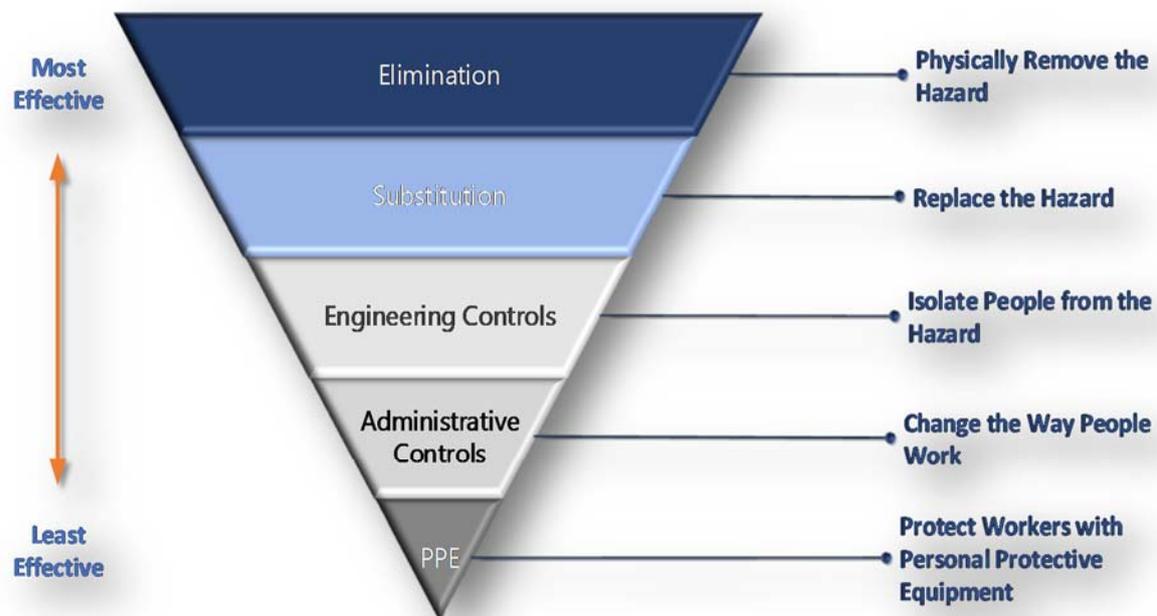


Figure 14: Hierarchy of controls. (Source: The National Institute for Occupational Safety and Health, USA)

Hazard identification is fundamental in the planning process to prioritise actions to address risks and opportunities. Hierarchy of controls requires the organisation to conduct risk assessment based on business primary and supportive activities. During this process, the organisation should be confident that is adhering to the latest applicable legal and other binding requirements.

7.2 Risk management and OH&S objectives and planning to achieve them

Following the hazard identification process, the organisation should plan actions to reduce risks. These should consider the consequences of these actions before the actions are introduced. Planning actions and including the introduction of control measures must be within the framework of OH&S management system.

The organisation should establish OH&S objectives consistent with the OH&S policy. The objectives must be measurable or at least capable of performance evaluation and take into account when set:

- a. The applicable requirements;
- b. The results of the assessment of risks and opportunities;
- c. The results of consultation with workers.

The objectives should then be monitored, communicated and be updated as appropriate. Objectives are established in order to maintain and improve OH&S performance and should be linked to risks and opportunities and performance criteria which the organisation has identified for the achievement of the intended outcome. Objectives can be strategic, tactical or operational. Plan to achieve objectives the organisation should examine the resources available and the resources required to achieve objectives associated with an indicator which can be strategic, tactical or operational. Finally, communication should be established to convey objectives throughout the organisation to support and generate a positive OH&S culture.

Organisations need to take into account the legal requirements, OH&S risks, technological options and financial, operational and business requirements together with the views of relevant interested parties when the objectives are established. Consideration should also be given to possible injuries and accidents occurred during the prior years in order to set proper measures for improvement.

According to ISO 45001: 2018 guidelines, when planning to achieve OH&S objectives, the organisation shall determine:

- a. What will be done;
- b. What resources will be required;
- c. Who will be responsible;
- d. When it will be completed;
- e. How the results will be evaluated;
- f. How the actions to achieve OH&S objectives will be integrated into the organisation's business processes.

The plan should be reviewed on intervals and adjusted as necessary in order to ensure that the objectives are achieved. The status of the plan should be tracked and communicated to the interested parties in a timely manner until the objectives are fully accomplished.

Chapter 8

Support

8.1 Allocating resources

The organisation shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the OH&S and risk management systems. Resources are needed to be in place in order to fulfil the requirements identified in the planning process to sustain continuous improvement. These resources are mainly including people, infrastructure, technology, financial, and natural resources.

It is important to allocate resources wisely in order to achieve and sustain efficiency and effectiveness and the allocation to have the full support of senior management to drive the maintenance of a safe work environment. The organisation, during the resource identification process, needs to gather the information collected during the planning process to acknowledge potential risks and opportunities and resulting objectives in the attempt to allocate sufficient resources to mitigate or manage them.

Support resources cover requirements for the organisation to ensure allocation of appropriate resources which can include, but are not limited to:

- a. Determine the competence, skills and experience as well as professional development and training needs of persons to support OH&S and risk management systems;
- b. Create awareness of the requirements of the management systems and potential risks and opportunities affecting employees and interested parties within the business environment;

- c. Plan and implement a process for internal and external communication, information and knowledge relevant to the management systems;
- d. Create, update and control documented information, processes and procedures, methods and tools required by ISO 45001:2018 and ISO 31000:2018.

8.2 Competence

Organisations in order to effectively and efficiently operated and developed, must employ competent workers. It is essential for the workers been competent to have access to information and been appropriately trained to prevent accidents or ill health to themselves and co-workers. Also, competent employees needed to be suitably trained in order to be able to identify potential risks and opportunities and align planned objectives with corporate strategy. Competence can include and take into consideration the following attributes:

- a. Define methods of recruitment with consideration the organisation's safety culture requirements;
- b. Legal requirements and other related requirements;
- c. Awareness of hazards and risks associated with the environment and processes of the business;
- d. Individual capabilities including working experience, language skills, literacy and diversity;
- e. Duties and responsibilities associated with the tasks and roles;
- f. Education, training, qualifications and experience necessary to undertake the role;
- g. The preventive and control measures resulting from the risks assessment processes;
- h. The requirements of both OH&S and risk management systems.

The organisation should also consider the competence of external providers including the procurement of contractors conducting tasks on site. The external procurement process may provide the structure for management of task providers including

evidence of capability to perform the task, and the competency necessary to accomplish the task. In either case, senior management should provide appropriate mechanisms to enable workers to competently undertake the appointed tasks.

Synergas for instance, employs competent executives and subcontractors who carry out work related on safety and health in the workplace. This capacity is determined according to appropriate education, training and related experience.

In order to achieve and confirm the above capacity, the company has established and applied the 'Human Resources' process which includes provisions for the following:

- a. Hiring of employees;
- b. Informing new employees;
- c. Employee training;
- d. Employee filing.

All employees and subcontractors shall be able to know the following issues as directed by the company:

- a. The importance of compliance with safety and health policy and procedures, as well as the requirements of the management system;
- b. The direct or indirect effects on the safety and health of their actions at work and the benefits of their improved performance (risk assessment results);
- c. The security measures and instructions;
- d. The roles and responsibilities to achieve compliance with safety and health policy and procedures;
- e. The action in case of emergencies.

Specific qualifications such as pre-service, special training, certificate of competency or professional qualifications are required for certain jobs or tasks. These qualifications shall be recorded on a minimum qualification form. The company, through the Secretary/Director, shall recognise these qualifications and shall request

that evidence be provided before the worker or subcontractor in question undertakes the work or task.

The safety and health officer, in cooperation with the Secretary/Director of the company (responsible for personnel and training), recognises the needs for training of personnel in safety and health issues and plan their training accordingly.

The training takes place in-house or externally (multi-operationally):

- a. In-house is carried out with guidance from the responsible for safety and health during work monitoring or with updates or trainings at the organisation's premises (before the start or after the work);
- b. External (multi-operational) is carried out with the participation of the executives in training programs carried out by educational organisations.

All new employee entrants receive initial training and information from the health and safety officer, who gives general directions and instructions on OH&S issues, as well as related printed material, before taking up work. This training includes but are not limited to:

- a. Data on the safety and health management system as implemented by the company;
- b. General risks present in different places/jobs (provide means and ways of dealing with them);
- c. Specific risks exist in specific places/jobs/processes (provide means and ways of dealing);
- d. Identification and assessment of dangerous situations;
- e. Selection and use of appropriate personal protective equipment;
- f. Response in emergency situations;
- g. Other issues related to OH&S.

The head of health and safety confirms the ability of the executives and subcontractors to perform their responsibilities and duties and verifies that the right person is

appointed in the right job. At the same time, confirms that each executive takes care of the health and safety of both colleagues and third parties (subcontractors, co-workers, visitors, etc.). Exercises are regularly performed in virtual emergency situations so that staff are always on standby and alert.

8.3 Awareness

Organisations need to create awareness of the requirements of the OH&S management system for both internal and external workers. There must be a clear understanding of the organisation's OH&S policy and become aware of the existing hazards and risks to enable themselves to be protected and protect others. Awareness training initiates prior to work commencement and may include, but are not limited to:

- a. OH&S policy and requirements;
- b. Hazards associated with the environment and processes;
- c. Means to report incidents and receive related information;
- d. Means to report near misses or safety critical defects;
- e. Structure of supervision and monitoring;
- f. Provision of information including work instructions and personal protective equipment available;
- g. Encourage and promote safety culture.

In Synergas, the health and safety officer and the safety committee are the link between management and executives, so that all interested parties are informed and consulted appropriately and in a timely manner. Safety and health officials are informed through regular visits by the OH&S officer and through the representation of workers in the health and safety committee. The executives of the organization, through their jobs and experience, are involved in the development and upgrading of safety and health measures and procedures.

The OH&S officer shall ensure that all employees are aware of:

- a. The company's security policy;
- b. The health and safety processes;
- c. The rights and obligations;
- d. The role of the health and safety officer and the safety committee;
- e. The results of the latest risk assessment;
- f. The current security and safety measures;
- g. Actions taken in the event of emergencies;
- h. The purpose and content of the safety and health management system.

The safety and health officer is responsible (in cooperation with the Secretary/Director where necessary), for informing subcontractors and other suppliers, visitors etc. about the OH&S policy and procedures. In order to protect those entering the company's premises or those within, the safety and health officer ensures that there is an entry check and that the necessary marking (prohibition, warning and rules) is provided.

In cases where assistance will be required by government services (e.g. police, local authorities, fire service), they are informed in a timely manner by the health and safety officer. In the event of accidents or other emergencies (such as fire) where communication with the state departments (police, fire department, civil defense department, hospital, etc.) is required, the emergency procedure is followed.

The company has prepared a safety report in accordance with the requirements of the SEVESO III Directive and is in constant contact with the competent services to ensure required readiness, cooperation and information.

In case information on safety and health issues or related regulations is needed, the safety and health officer communicates with the officers of the department of Labour Inspection, with the safety and health association, the competent municipal/community authorities and other bodies involved.

8.4 Communication and consultation

Communication channels should be defined and established either internally or externally and inline to the policy of the OH&S and risk management systems. The process of communication is deemed to be endorsed by senior management of an organisation. Senior management can foster formal communication networks through which interactive, constant and unbiased communication is gathered.

Synergas coordinates provisions that ensure appropriate safety and health information is distributed to/by executives, subcontractors and other stakeholders (e.g. DoLI, partners, customers, etc.).

At regular intervals, the company informs its executives and subcontractors through presentations, information guides, brochures and announcements on basic safety and health standards and various developments in the field. The written aids are distributed and/or posted on bulletin boards in the premises under the responsibility of the health and safety officer.

Subcontractors and other partners are invited to information meetings (before the start or during their cooperation with the organization). They can also be provided by printed material.

The purpose of communication is vital in risk management and OH&S management systems. As Figure 15 illustrates, the communication process must be encoded by the sender and decoded by the receiver and vice versa when feedback is engendered, accurately and without changing the meaning of the original message during transmission. This can be obtained by avoiding any biases (noises) facilitating effective communication, accurately, understandably and timely and within the scope of OH&S and risk management processes.

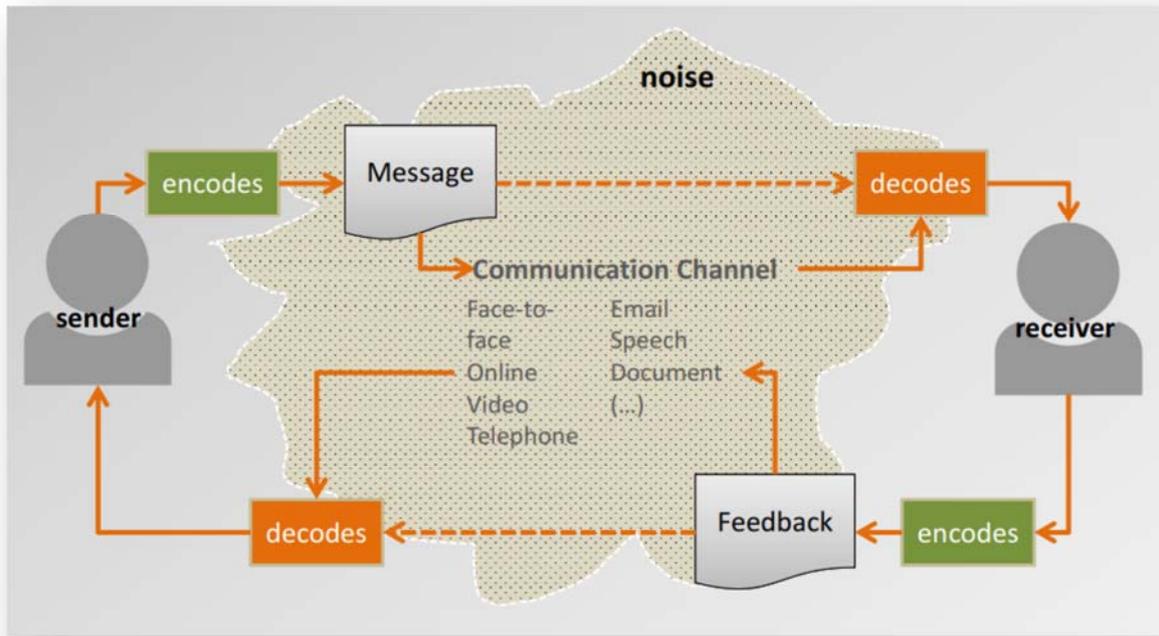


Figure 15: The communication Cycle (Source: Dr Nikitas Kioutsoukis)

The purpose of communication and consultation is to assist internal and external stakeholders in understanding risk, the basis on which decisions are made and the reasons why particular actions are required. Communication seeks to promote awareness and understanding of risk, whereas consultation involves obtaining feedback and information to support decision-making.

According to ISO 31000:2018, communication and consultation aims to:

- a. Bring different areas of expertise together for each step of the risk management process;
- b. Ensure that different views are appropriately considered when defining risk criteria and when evaluating risks;
- c. Provide sufficient information to facilitate risk oversight and decision-making;
- d. Build a sense of inclusiveness and ownership among those affected by risk.

8.5 Documented information

The risk management process and its outcomes should be documented and reported through appropriate mechanisms. As with all management systems the extent of documented information will vary depending on the size, scope and complexity of processes within the organisation.

According to ISO 31000:2018, reporting and documentation aims to:

- a. Communicate risk management activities and outcomes across the organisation;
- b. Provide information for decision-making;
- c. Improve risk management activities;
- d. Assist interaction with stakeholders, including those with responsibility and accountability for risk management activities.

Synergas has established and kept documented data (in paper or electronic form) describing the following:

- a. The specifications, methods and procedures of the organisation in relation to the provisions of ISO 45001:2018;
- b. The program and results of health and safety management;
- c. The results of the risk assessment;
- d. The measures/safety and health guidelines of the company;
- e. Health and safety incidents.

This documentation shall cover all documents which are valid and up to date to ensure that the management system is understandable, appropriate and efficient. The safety and health management system shall have the following types of documents:

- a. Safety and health management system manual;
- b. Health and safety management system procedures;
- c. Health and safety system forms;

d. Working instructions.

The company maintains this documentation in such a way that it is simple in its structure but also complete as defined by the requirements of ISO 45001:2018 and the procedures of the organisation.

Documented information assists in business protection as well as to provide sources of information for workers relating to hazard identification. The documented information should always be available to all stakeholders and the system of control of the documented information to remain simple in order to ensure workers are always aware of the latest requirements relating to OH&S and risk management systems and in preventing unintended use of obsolete documented information.

Synergas has established and maintained procedures to check all documents and data contained in the safety and health management system to ensure that they:

- a. Can be identified;
- b. Reviewed periodically where necessary and approved by authorised personnel;
- c. Valid/applicable versions of the relevant documents and data are available at all locations and levels of operation of the organisation;
- d. Obsolete documents and data are appropriately withdrawn from all points used, or appropriately certified not to be used;
- e. Documents and file data, kept for legal reasons or for the purposes of maintaining their information, shall be appropriately identified and recognised.

Chapter 9

Operation

The organisation must meet the requirements and implement the actions determined in the planning process by setting criteria for the processes, implementation of controls of the processes attached to the criteria set, keep documented information as necessary to assure compliance with the plan and adapt work techniques to the ability of workers.

9.1 Operational planning and control

Fundamental processes in OH&S management system include the identification of hazards, reduction of risks and maintenance conformance to legal regulations and other related regulations. The hazard and risk process necessitates a review of the safety hazards that may inherently prevailed and requires a job safety analysis to determine the risks and the appropriate controls to protect workers from injury. The application of the hierarchy of controls should be considered when applying OH&S controls in order to:

- a. Eliminate hazards – e.g. Stopping using hazardous materials, applying ergonomics, eliminate monotonous work, etc.
- b. Provide substitutes with less hazardous processes, operations, materials, equipment e.g. adapting to technical progress, online guidance procedures, combating OH&S risks at source, etc.
- c. Provide engineering controls and reorganisation of works e.g. isolate people from hazard, implement protective measures collectively, addressing mechanical handling, reducing noise, protecting against falls, etc.

- d. Provide administrative controls, including training e.g. periodic equipment inspections, conducting training, conducting induction training, providing instructions, changing work patterns, etc.
- e. Provide adequate personal protective equipment (PPE) e.g. clothing and gear (safety shoes, safety glasses, hearing protection aids, gloves) etc.

The hierarchy of controls, according to ISO 45001:2018, is intended to provide a systematic approach to enhance OH&S, eliminate hazards and reduce or control OH&S risks.

It is apparent that accidents can occur while processes deviate from designated control measures. This may include changes in competent supervision and workers, the introduction of new materials and equipment, machinery and processes. Under these circumstances, the organisation must define and implement a process which takes into consideration the change throughout the organisation. Change process could incorporate a mechanism to assess and prevent the introduction of new hazards.

A dynamic procurement process is essential to control product and services inputs into an organisation. Inputs may include raw materials, equipment, consumables and so on. An assessment is required of the impact on safety of products and services prior to purchase. The organisation should verify that equipment, installations and materials are safe for use by workers by ensuring:

- a. Equipment is delivered according to specifications;
- b. Installations are commissioned to ensure proper functioning;
- c. Materials are delivered according to specifications;
- d. Any usage requirements, precautions or other protective measures are communicated and made available.

Many businesses, however, may use external contractors/providers to fulfill gaps in processes or activities and to complete special tasks. The organisation, should conduct an assessment including due diligence of the contractor and selection criteria. It is also important that necessary checks been made to ensure that contractor is competent and

compliant with the rules, regulations, work instructions and safety measures provided by the organisation.

Synergas shall continuously recognise those activities and actions related to identified risks or legislative requirements for which control measures or related procedures should be implemented. The company shall plan these activities in order to:

- a. No deviations from the policy and the safety and health objectives exist;
- b. Agree with the operational criteria of the procedures;
- c. Cover the recognised risks of OH&S from materials, equipment and services used by the organisation and requirements for communication with suppliers and subcontractors;
- d. Cover the design of the working environment, processes, facilities, mechanical equipment, the implementation and operation of processes and work organisation, including adaptation to human capacities in order to eliminate or minimise the risks to safety and health at source.

The safety and health officer, carrying out risk assessments on the company's facilities, operations and locations, internal inspections and audits, assess hazards according to the severity, probability and any impact they may have on human health and/or the environment. The health and safety officer then adopts safety measures and guidelines to reduce or eliminate risks.

Materials, equipment and services used by the company are controlled by the officials of the various departments under the supervision of the safety and health officer.

Through the quality management system, suppliers and subcontractors are assessed so that their services, as well as the equipment and materials they provide, are not at risk to the company's employees and/or third parties. All subcontractors and suppliers are obliged to comply with the company's safety and health procedures and shall be informed thereof. They also sign a cooperation agreement with the company. The health and safety officer is actively involved in their evaluation and approval process.

Any materials or equipment that poses risks and may cause harm to human health and/or the environment, are accompanied by appropriate instructions for use and Material Safety Data Sheets (MSDs) and certificates/declarations complying with European standards (e.g. CE marking). Such materials or equipment are, among other things, chemicals in liquid or gaseous form (irritants, toxic, flammable, explosive, etc.), personal protective equipment (PPE), tools and machinery.

The equipment of the organisation shall be recorded in a relevant register and a maintenance program shall be established. Upon completion of a maintenance or repair job, the register of equipment and maintenance is updated. All repairs must be carried out by appropriately trained and experienced technical staff or subcontractors.

Equipment for maintenance must be out of service. Maintenance ensures that it is impossible to operate the equipment out of carelessness. Appropriate notification markings for equipment maintenance are also being posted.

For each machine there is a copy for the user and operation manual so that its operators and maintenance managers be aware of how it operates and its safety and maintenance measures. Certificates and machine licenses are also retained (for what is required by applicable law). For each machine or vehicle that requires a licensed operator – as required by law – there is an appropriately trained person who has the relevant license.

In cases of new equipment (new technology) all future operators are trained by experienced trainers of the supplier – manufacturer. In the case of welders, the licenses shall be checked for their suitability and for their validity by the health and safety officer.

9.2 Risk and hazard assessment

Risk assessment is a critical step in management risk process. Identifying risks and hazards, undertaking risk evaluation and analysis and provide treatment and control

measures are key aspects of risk management. The aim of OH&S risk management is to reduce the likelihood of an incident with sometimes severe consequences. It is a planned and systematic process for controlling OH&S hazards through examination of all aspects of the work undertaken and identify, analyse, and treat risks associated with the business activities. Figure 16 explains the steps needed to be undertaken in order to manage potential risks and hazards.

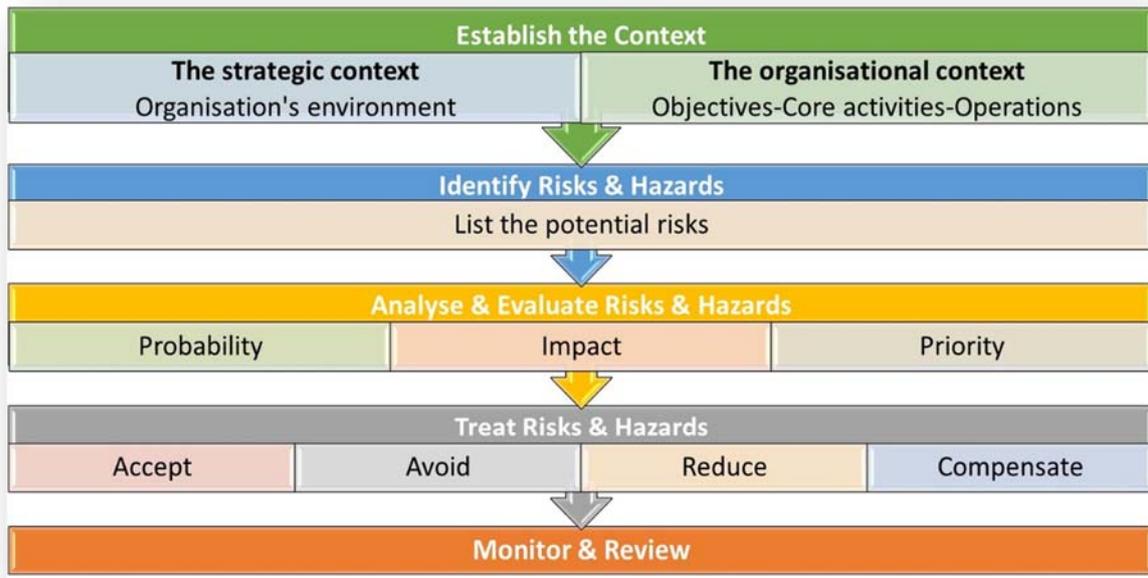


Figure 16: Steps to manage risks and hazards

9.2.1 Risk and hazard identification

Risk and hazard identification are processes that involve finding, recognizing, and describing the risks and the risks associated to hazards that could influence the achievement of objectives. The purpose is to identify potential sources of risk in addition to the events and circumstances that could influence the achievement of objectives. The processes further include the identification of possible causes and potential consequences. Important sources of information to identify risks and hazards are the use of historical data, theoretical analysis, informed opinions, expert advice, and stakeholders' input.

Tables 13 and 14 are listing the risks and hazards respectively as identified in Synergas. The rating assessment codes (RAC) used to determine the likelihood of potential risks/hazards and the impact of the risks/hazards to the company's strategic objectives, is illustrated in Appendix 9.

#	Risk Category	Description of associated risks	Likelihood	Impact	L x I = R
1	Project Risks	Risks associated to projects (cost, time, quality, etc)	5	3	15
2	Global Risks	Political, legal, commercial and environmental	4	5	20
3	Holistic Risks	Market share, reputation, value, technology, shareholder's perception, safety and quality	2	5	10
4	Static Risk	Loosing markets by not risking the introduction of new products or services	5	4	20
5	Dynamic Risk	Risking the loss of something certain for the gain of something uncertain	1	5	5
6	Inherent Risk	Threat of fire, explosion and environmental impairment	2	5	10
7	Contingent Risk	Event beyond company's direct control but on which it has a dependency	4	5	20
8	Customer Risk	Dependency on small number of customers with high turnover	5	5	25
9	Fiscal/Regulatory Risk	Potential changes in the fiscal/regulatory environment	3	3	9
10	Purchasing Risk	Commercial activities, suppliers, contracts, substitutes	5	4	20
11	Reputation/Damage Risk	Failure to respond to complaints, lack of respect, fraud	1	5	5
12	Organisational Risk	Poor infrastructure can lead to weak controls and poor communication	1	5	5
13	Interpretation Risk	Management and staff cannot communicate effectively	2	4	8
14	IT Risk	Effectively developing and adopting IT	1	3	3

#	Risk Category	Description of associated risks	Likelihood	Impact	L x I = R
15	The OPEC Risk	Adjust oil prices and supplies causing inflation rise and commodities price increase	5	3	15
16	Process Risk	Management process-fundamental requirements for processes e.g. decision-making, communication, documentation etc	1	2	2
17	Heuristics	Risks associated with human factor	3	3	9
18	Decommissioning Risk	Operational plant back to brown field	5	2	10
19	Institutional Risks	Beauracracy, culture and poor practice	1	5	5
20	Subjective & Acceptable Risks	Risk aversion or risk preference	2	3	6
21	Fundamental & Particular Risks	Natural disasters-affecting society	1	4	4
22	Natural/Physical Risks	Weather conditions and seasonality	5	5	25
23	Force Majeure	Abnormal, unforeseen and out of control events e.g. pandemic, earthquakes, flood, 'black swan event' etc.	3	5	15

Table 13: Potential Risk identification for Synergas

The following hazards were grouped in 11 main categories for the purpose of the present thesis. The total number of hazards identified and reported in Synergas was 86.

#	Hazard Category	Description of associated risks
1	Noise	Noise becomes harmful when it exceeds 75 decibels (dB) and is painful above 120 dB. It is recommended noise levels be kept below 65 dB during the day
2	Weather Conditions	Exposure to heat, cold, rain, snow, wind

#	Hazard Category	Description of associated risks
3	Chemical Intoxication	Chronic exposure to toxic chemicals may lead to insidious health effects
4	Cleaning Products	Detergents, soaps, liquids use for cleaning surfaces or hands. Eco-friendly products suggested
5	Chemical Products	Include salt, chlorine, caustic soda, acids, titanium dioxide, hydrogen peroxide, phosphates, ammonia, potash chemicals
6	Metal Dust & Fumes	Metal Dust and fumes containing harmful metal produced during metalworking processes such as welding, thermal cutting, sanding and polishing
7	Position & Movement	Awkward posture, prolonged sitting or standing causing pain in the muscles of the legs, back and neck, vein inflammation Joints in the spine, hips, knees and feet may become immobilised or locked
8	Heavy Objects Movement	Back injuries, Muscle injuries, Spinal Injuries, Injuries to hands, wrists, fingers, toes, shoulders
9	Lighting	Improper lighting might cause slips, stumbles, falls, electric shock and burns, or the inability to exit a space, eye discomfort
10	Machinery & Equipment	Cutting, catching, shearing, crushing, thrown objects, pull in accident, wrap, pinch
11	Fire & Explosion	Combustion engines, hot surfaces, welding, lightning, electrostatic, sparks from tools, grinding, friction, etc
12	Falling Objects	Bruises, fractures, strains, sprains, fatalities
13	Transportation	Distraction, impairment, negligence Fog and low visibility, ice on roads, heavy rain, sun blinding, darkness, thunderstorm
14	Electricity	Electrocution causing shock, burns, or death Electricity faults could cause fires Fire or explosion where electricity could be the source of ignition

Table 14: Potential hazards identification for Synergas

9.2.2 Risk and hazard analysis

Risk analysis is a process that is used to understand the nature, sources, and causes of the risks and the risks associated with hazards, that already identified and reported, aiming to estimate their level of risk exposure and risk severity. Analysis includes the study of impacts and the consequences and the examination of available controls. The depth of risk analysis depends upon the risks, the purpose of the analysis, the information, and the resources available.

Potential hazards as identified in Synergas where grouped in major categories and enumerated and divided in sectors as presented in table 15. The rating was conducted using the criteria for risk assessment codes (RAC) as specified in table 16.

Sector	Hazards															Fs	%s
	No of Workers	Physical			Chemical			Ergonomic			Accidents						
Description	No of Workers	Noise	Climate Conditions	Chemical Intoxication	Cleaning Products	Chemical Products	Metal Dust & Fumes	Position & Movement	Heavy objects	Lighting	Machinery & Equipment	Fire & Explosion	Falling Objects	Transportation	Electricity	Fs	%s
Bottling LPG	9	3	3	3	1	1	3	3	1	1	6	9	1	0	9	396	36%
Cylinder Maintenance	6	3	3	6	0	6	6	3	6	1	3	9	1	0	1	288	26%
Machinery Maintenance	3	0	1	0	1	1	1	6	3	3	6	6	3	0	9	120	11%
LPG Delivery/Distribution	4	1	6	0	1	0	1	6	3	1	1	9	1	6	0	144	13%
Technical Support & Installations	2	1	6	0	1	1	1	6	3	1	6	9	1	3	9	96	9%
Administration	6	0	0	1	3	0	0	3	0	1	0	0	0	0	1	54	5%
Fh		51	84	69	36	50	72	117	72	36	106	207	30	30	138		
%h		4.6%	7.7%	6.3%	3.3%	4.6%	6.6%	10.7%	6.6%	3.3%	9.7%	18.9%	2.7%	2.7%	12.6%		

Table 15: Hazard matrix for Synergas

RAC	Description
0	Not present hazard in the sector
1	The exposure to the hazard is occasional
3	The exposure to the hazard is continuous
6	The exposure level of the hazard can damage property or harm people
9	The exposure level of the hazard can cause severe damage or death

Table 16: Risk Assessment Code (RAC)

One of the high risks identified in Synergas was the customer risk. It is important to mention that 15 out of 2.000 customers the company is in business with, contribute 70% to the annual turnover. This condition entails the following implications to the company:

- a. Accumulated credit risk;
- b. Risk of losing significant sales volume;
- c. Lobbying to get better prices;
- d. Extra investment to meet the needs of large customers;
- e. Force selling prices to fall without respective fall in cost prices.

Another important risk identified, was the static risk which is mainly associated with the implications yield on trading only one product, the LPG:

- a. There is no alternative source of income;
- b. No other option to offer to customers;
- c. Loosing considerable market share;
- d. Competitive drawback;
- e. Restraint of business activities.

Sales of LPG depend heavily on weather conditions. This situation is coercing the expansion of the gap between winter and summer period, strengthening the implications of seasonality to the annual turnover of the business, creating unproductive and underperforming periods and increased investment to cover winter period excessive demand.

In order to evaluate the implications of weather conditions to the sales turnover of Synergas, information was gathered from the Department of Meteorology of the Republic of Cyprus, regarding the average temperature and average rainfall in the island between the years 2016 and 2019 (4 years statistics). The results of the research were analysed through regression analysis between cylinders and bulk LPG as illustrated in Figures 17 and 18 respectively.

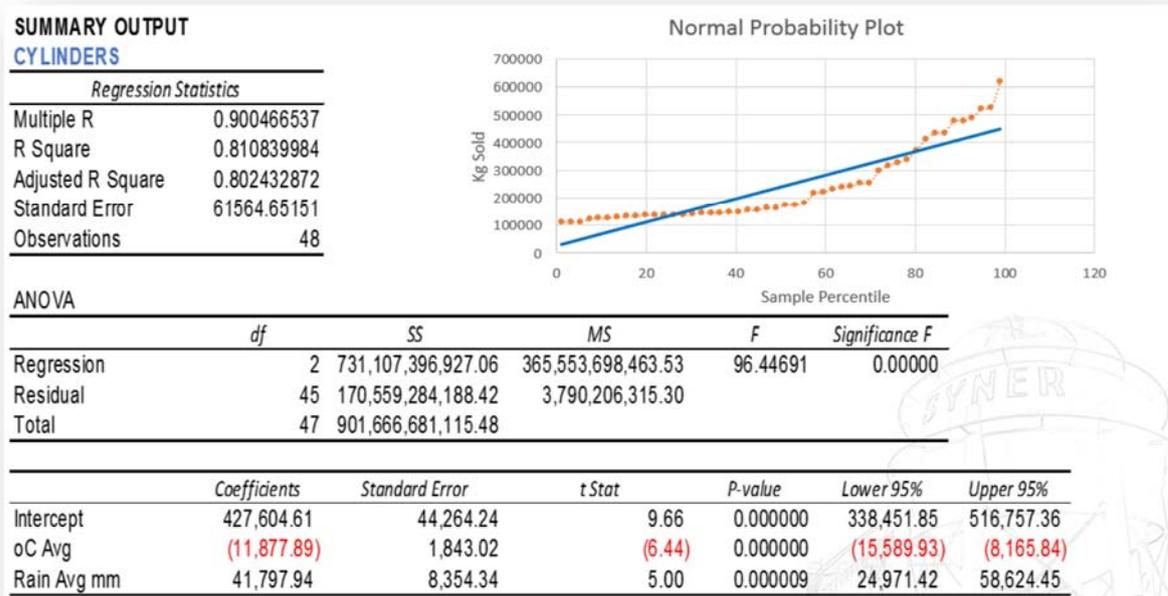


Figure 17: Sales analysis of cylinders as affected by temperature and rainfall

The research has highlighted the immense effect of rainfall to the sales turnover. An increase of one unit (mm) of rain causes the sales of LPG in cylinders to increase on average by 42 metric tons (MT), whereas one degree increase in temperature (°C) is causing the sales of LPG in cylinders to fall on average by 12MT.

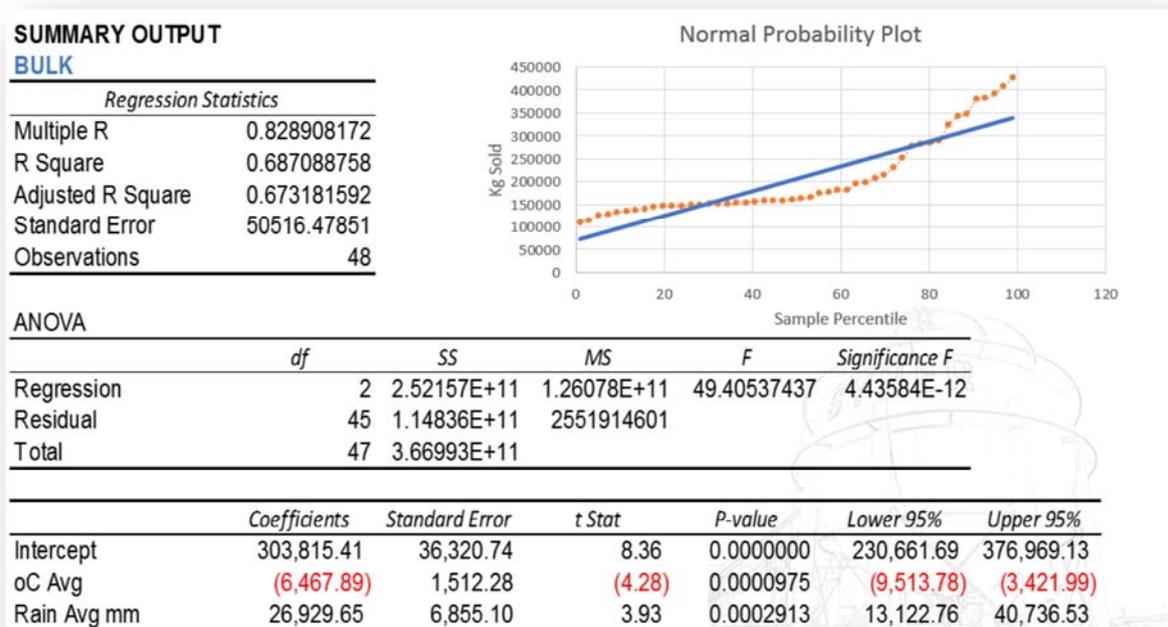


Figure 18: Sales analysis of bulk gas as affected by temperature and rainfall

Figure 18 also highlighted the effect of rainfall and temperature to the sales turnover of bulk LPG in metric tons (MT). An increase of one unit (mm) of rain causes the sales of Bulk LPG to increase on average by 27 metric tons (MT), whereas one degree increase in temperature (°C) is causing the sales of Bulk LPG to fall on average by 6MT.

Figures 19 and 20 shows the degree the seasonality is imposing on the sales of both LPG in cylinders and bulk LPG. Apparently, the sales of LPG during the second and third quarter of the year (April to September) are falling significantly, especially the sales of LPG in cylinders. The effect on bulk LPG is also significant but on a lesser degree as figure 20 demonstrates.



Figure 19: The implications of seasonality on Cylinder Sales



Figure 20: The implications of seasonality on bulk gas sales

The risk associated with product substitution is also of great importance and worth further analysis when is engaging in the formation of the corporate strategy of Synergas. As formerly described, Synergas is dealing with one product only, yielding on the depression of the following threats:

- a. Natural gas will affect sales directly (Hotels, Industrial units, farms, etc);
- b. Natural gas will affect sales indirectly (e.g. lower electricity cost);
- c. Renewable energy sources (Promoted through governmental policy and European directives);
- d. Other fossil oils (e.g. heating diesel, mazut, diesel in transport, etc.).

Synergas also is suffering the niche market potentials. The market of LPG in Cyprus is considerable small in relation to other European countries therefore it is difficult to realise competitive prices and stock volumes of LPG to enable hedging.

The purchase of LPG:

- a. Depends on the available resources of the surrounding geographical area and on the stocks of neighbouring refineries;
- b. Imports are incorporated by one vendor;
- c. High import and transportation costs;
- d. Limited access to purchasing activities, LPG markets and vendors.

Coronavirus has intruded to everybody's life threatening giant organisations to kneel, especially those in the industry of tourism and civil aviation and transportation. Synergas has also been affected by the lockdown and the intensive safety measures imposed by the government. The outbreak of Covid-19 had the following implications to the company:

- a. The temporal closure of HoReCa² forced sales of bulk LPG to fall dramatically;
- b. Cash flow deficiency due to decreased in sales and overdue customer balances;

² The term HoReCa is a syllabic abbreviation of the words **H**otel/**R**estaurant/**C**atering or **C**afé. | 126

- c. Budget restructuring and investment suppression;
- d. Concerns on OH&S measures. The employees are exposed apart from the virus infection, to chemicals used for disinfection;
- e. Employees were removed from the workplace especially those characterised (by law) as vulnerable;
- f. Stressful, awkward and depressed situation for all.

9.2.3 Risk and hazard evaluation

Risk evaluation is a process that is used to compare risk analysis results with risk criteria in order to determine whether a specified level of risk is acceptable or tolerable. The purpose of risk evaluation is to provide more support for decision making, based on the results of the risk analysis by evaluating what risks need treatment and the priority is given to implement related treatment.

The risks previously identified and rated are placed in the following table (Table 17) according to the degree of their severity, taking into consideration their likelihood to occur and impact in case of risk is raiding. Emphasis should be given in risks placed in the red area since they have the tendency to have more acute implications on corporate objectives than the rest of risks.

		Impact				
		5	4	3	2	1
Likelihood	5	8, 22	10, 4	1, 5	18	
	4	2, 7				
	3	23		9, 17		
	2	3, 6	13	20		
	1	5, 11, 12, 19	21	14	16	

Table 17: Rank and prioritise risks identified for Synergas

Analysing the results of hazard matrix as previously identified and rated, the hazards and hazardous sectors are prioritised given the relevant percentage. The results of the prioritisation are presented in the following table (Table 18):

#	Hazard	%
1	Fire & Explosion	18.9%
2	Electricity	12.6%
3	Position & Movement	10.7%
4	Machinery & Equipment	9.7%
5	Climate Conditions	7.7%
6	Metal Dust & Fumes	6.6%
7	Heavy Objects Movement	6.6%
8	Chemical Intoxication	6.3%
9	Chemical Products	4.6%
10	Noise	4.6%
11	Cleaning Products	3.3%
12	Lighting	3.3%
13	Falling Objects	2.7%
14	Transportation	2.7%
#	Hazardous Sectors	%
1	Bottling LPG	36%
2	Cylinder maintenance	26%
3	LPG Delivery/distribution	13%
4	Machinery Maintenance	11%
5	Technical support and LPG Installation Systems	9%
6	Administration	5%

Table 18: Prioritise hazards and hazardous sectors of Synergas

The conclusion derived from the analysis conducted, given the highly flammable characteristics of LPG, the most relevant hazard is related to fire and explosion consequence of LPG ignition, giving emphasis to the number of people working in the plant. The top priority when comes to mitigate and control hazards would be to address overall the threat of fire and explosion and in particular the threat of fire and explosion within LPG bottling plant.

One way to experimentally address the high risk hazard of fire and explosion in the LPG bottling plant, is to design a Bowtie diagram to get familiar with potential threats (Fault tree analysis), actions needed to be taken to avoid the high risk event to be developed and escalated with severe implications (Event tree analysis) and relief

measures. Figure 21 is examining the sources that might contribute to the ignition of fire and the consequences in the case of event escalation.

Bowtie analysis is displaying the way the organisation is able to manage the risks that are evolving from their business operations. The focus must be on the barriers set in order to prohibit the development or the escalation of high-risk scenarios and the measures taken by the organisation to mitigate the impact in the case were the high-risk event is triggered with severe for the organisation consequences.

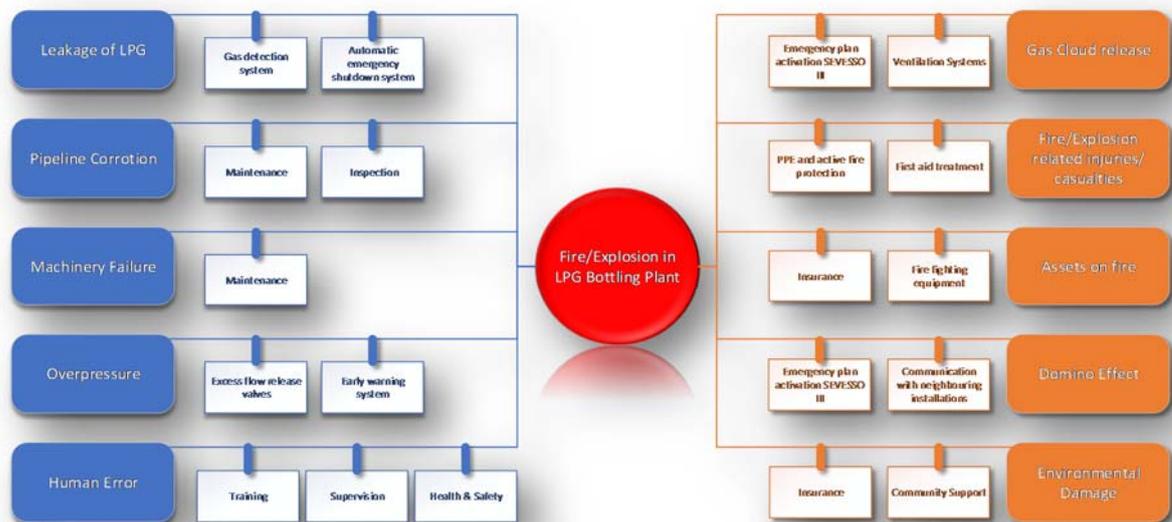


Figure 21: Bowtie analysis of hazard event occurred in LPG bottling plant of Synergas

9.3 Risk and hazard treatment

Having identified, analysed and evaluate the risks, the next step is to select and apply the most appropriate measures in order to modify, reduce or eliminate the risk exposure. The risk treatment options available are illustrated in Figure 22.

The risk treatment usually consists of the following strategic options:

- a. Risk avoidance: avoid the risk by deciding to stop, postpone, cancel, divert or continue with an activity that contributes to the risk exposure;
- b. Risk acceptance: accept the risk at its present level and form which is within the risk appetite of the organisation;
- c. Risk reduction or risk control: reduce or eliminate the likelihood of the negative outcomes or the consequences of undesirable event;
- d. Risk transference or risk sharing: share the risk with other parties e.g. insurance, partnerships, joint ventures or diversification.

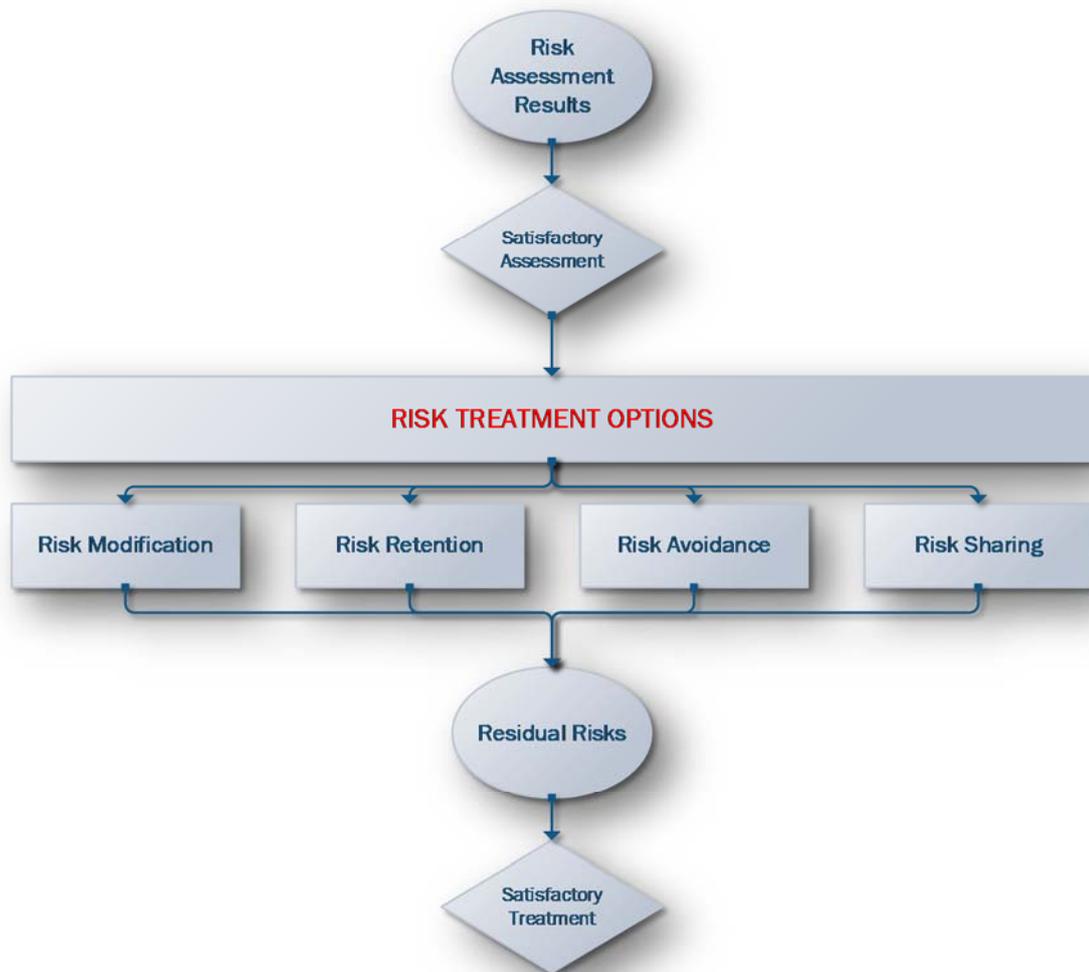


Figure 22: Risks treatment options

Risk treatment is a cyclical process of assessing the effectiveness, efficiency and economics of the application of a control or risk treatment and determining whether the residual risk is within the organisation’s risk appetite as explained in Figure 23.

Treatment is an interactive process of determining what is acceptable to the organisation in terms of its risk appetite. If the risk treatment is greater than the risk appetite, then additional treatment or control will need to be applied to bring the risk within the organisation's risk appetite. Treatment also will be assessed for effectiveness and efficiency, based upon a cost benefit analysis.



Figure 23: Risks treatment cycle

It is important to consider all direct and indirect costs and benefits whether tangible or intangible to measure in financial or other terms. In the event that available resources (e.g. budget), for risk treatment are not sufficient, the risk management decision makers should set the necessary priorities and identify the order in which individual risk treatment actions should be taken. It is however important to consider when setting priorities of risk treatment, to evaluate the legitimacy and the legal obligations borne by the business context.

Risk treatments might not produce the expected outcomes and instead could produce unintended consequences. Monitoring and review need to be an integral part of the

risk treatment process to assure that treatment strategies become and remain effective. The treatment however might also introduce new risks that need to be managed or create residual risks that need to be elaborated within business risk appetite and measures of control. Stakeholders need to be aware of the nature and extent of the residual risk after the realisation of the risk treatment.

Based on risk treatment options, Synergas has adopted the following measures in order to mitigate the risk exposure or reduce the likelihood of undesirable outcomes always within the company's risk appetite and available resources:

- a. Customer risk: 15 out of 2.000 customers make up 70% of total sales:
 - i. Dispersion of credit risk with the acquisition of smaller customers;
 - ii. Long term contracts with customers;
 - iii. Personal interaction, direct service, problem solving techniques, promotions, incentives are certain conditions for strengthening customer relations;
 - iv. Get feedback through questionnaires (Synergas is using the questionnaire as presented in Appendix 6).

- b. Static Risk: One product-LPG:
 - i. Invest in other energy sources such as oil and petrol;
 - ii. Creation of low-cost service petrol stations.

- c. Climate conditions and seasonality:
 - i. Search for customers in other industries e.g. tourist industry to cover part of the reduced sales occurred during the summer period;
 - ii. Replacement of other fuel material with LPG (such as mazut and heating oil);
 - iii. Invest in LPG stations either in joint venture or share gathering.

- d. Substitutes:
 - i. Invest in areas that may not be affected by the introduction of natural gas;

- ii. Invest in sectors not affected by natural gas, for instance petrol stations hosting vehicle rechargeable terminal.

- e. Purchasing risk: LPG Supply
 - i. Relocation to the new energy centre in Vasilikos area;
 - ii. Cooperation with other companies in regard to the importing of LPG.

- f. Force Majeure: Coronavirus COVID-19
 - i. Take precautions necessary to protect employees and visitors from the virus;
 - ii. Protect workplace upon learning of coronavirus exposure;
 - iii. Follow the instructions disseminated by the appropriate ministry;
 - iv. Provide employees with personal protective equipment and means to disinfect;
 - v. Arrange frequent disinfection of the workplace by professionals;
 - vi. Employees are working in shifts and remotely where possible;
 - vii. Emergency plan in case virus is observed in any of the employees;
 - viii. Support from other LPG companies in case of emergency;
 - ix. Incorporate pandemic precaution measures to the OH&S manual.

Chapter 10

Performance Evaluation

The organisation must establish a system that involves the monitoring, measurement, analysis and evaluation of the OH&S and risk management performance. Internal audits must be established followed by regular management reviews in order to evaluate the progress towards the achievement of OH&S and risk management objectives. Performance evaluation aims to improve operations and constitutes important aspect of the PDCA model prescribed in section 3.3.

10.1 Monitoring, measurement, analysis and performance evaluation

The organisation should establish a system that involves a systematic approach for monitoring and measuring its performance frequently and constantly as an integral part of its management system. In particular, the organisation must determine the performance of the OH&S and risk management and evaluate their effectiveness by measuring:

- a. The extent to which legal and other obligations are fulfilled;
- b. Characteristics of activities and operations related to the identified hazards, risks and opportunities;
- c. Progress in the achievement of the organisation's OH&S and risk management objectives;
- d. Effectiveness of operational and other controls.

The determination of criteria against which the organisation's OH&S and risk management performance is evaluated, including appropriate indicators to measure

the criteria set, is required. The organisation should set criteria to evaluate its performance such as benchmarking against other organisations, standards and codes, the organisation's own codes and objectives and OH&S and risk management statistics.

If for example, the criterion is a comparison of incidents, the organisation could choose to look at frequency, type, severity or number of incidents then the indicator could be the determined rate within each of these criteria and in case the criterion is a comparison of completions of corrective actions, then the indicator could be the percentage completed on time.

Examples of what can be proactively monitored and measured can include, but are not limited to:

- a. Work related incidents, injuries and ill health and complaints;
- b. The effectiveness of operational controls and emergency exercises;
- c. Competencies;
- d. Complaints related to health and safety environment of workers;
- e. Assessment of compliance with legal and other requirements;
- f. Completion of statutory and other audit schedules;
- g. Legally binding agreements;
- h. The status of identified gaps in compliance;
- i. Insurance requirements;
- j. Corporate and other policies, rules and regulations.

Monitoring can involve continual examination, supervising, observing or determining the status in order to identify deviation from the performance level required or expected or the appropriate processes so to evaluate how well the organisation is performing based on risks and opportunities. Monitoring can be applied to the OH&S and risk management systems to processes or to formed controls.

Measurement involves the assignment of numbers to objects or events. It is the basis for quantitative data analysis and is associated with the performance evaluation of programmes and observations.

Analysis is the process of examining data to reveal relationships, patterns and trends. This can entail the use of statistical operations, including information from other similar organisations to help draw related conclusions.

Performance evaluation is an activity undertaken to determine the suitability, adequacy and effectiveness of the subject matter to achieve the objectives of the OH&S and risk management systems.

For the control and management of corrective and preventive actions relating to safety and health issues, Synergis has adopted the following:

- a. Process and methods for measuring, monitoring and controlling the performance of the system, with a view to continuous improvement of the system;
- b. Procedures and methods for handling and investigating the causes of accidents or other incidents that have occurred, as well as deviations and non-compliances observed and recorded, so as not to be repeated in the future;
- c. A procedure for the management, preservation, recognition and time of compliance with system records;
- d. Internal inspections and audits.

The company has established and maintains procedures to monitor and measure safety and health performance on a regular basis. These include:

- a. Both qualitative and quantitative measures and instruments, appropriate to the needs of the company;
- b. Monitoring the extent to which the company's objectives are achieved;
- c. Monitoring the effectiveness of controls;
- d. Preventive measures to monitor compliance with the safety and health programme, operational criteria, applicable relevant legislation and its requirements;

- e. Corrective measures to monitor and investigate the causes of accidents, occupational diseases, incidents and other historical evidence which diverge from the safety and health performance;
- f. Recordings of data and follow-up results of measures to assist in the analysis of preventive and corrective actions.

The company has established and has a procedure to record, investigate and analyse events in order to:

- a. Identify suspected deficiencies and other factors that may have caused or contributed to the cause of the incident;
- b. Recognise the needs for corrective actions;
- c. Recognise opportunities for preventive actions;
- d. Recognise opportunities for continuous improvement;
- e. The results of investigations.

In addition, the company has established and is in a procedure to:

- a. Non-compliances are recognised and corrected actions deployed to minimise their safety and health effects;
- b. Non-compliances are investigated, identifying their causes and taking action to avoid recurrence;
- c. Assessing the needs for actions to prevent non-compliances and take the necessary steps to prevent their occurrence;
- d. The results of corrective and preventive actions are recorded and communicated;
- e. The effectiveness of corrective and preventive actions is reviewed.

10.2 Internal audit

The organisation is needed to conduct internal audits to provide necessary information on whether the management systems are conforming to organisation's

overall policy and objectives and the requirements of both ISO 31000:2018 and ISO 45001:2018 are met. The extend of the audit programme should be based on the complexity and level of maturity of the management systems.

An internal audit is a systematic method to check organisational processes and procedures as well as the requirements of the management standards. Internal audit ensures the processes in place are effective and the procedures are being adhered to. Audit provides the opportunity to improve the management systems and therefore to reduce risks and the risks associated to hazards as well as the wellbeing and culture within the organisation.

Auditors should be independent with no conflict of interest over the company. When performing an internal audit, the auditors should consider the results of the previous audits and any non-conformities reported. The audit frequency should be based upon what is reasonable for the organisation in terms of size, obligations, business activities and related risk exposure level. Furthermore, audit involves:

- a. Monitor compliance with policy and objectives;
- b. Provide evidence that all necessary checks are appropriately performed;
- c. Ensure all legislative and other binding requirements are met;
- d. Assess the effectiveness of risk management system;
- e. Enhance safety culture;
- f. Supports continual improvement.

Synergas, through the Safety and Health officer, has established and maintains a procedure for the planning and execution of inspections and audits of the management system in order to:

- a. Determine whether or not the system complies with the prescribed requirements, whether it is implemented or not, whether it is effective and achieves the company's policy and objectives;
- b. Acknowledge if necessary checks are carried out at all levels of the company's activities (places/jobs);

- c. Verify that the results of previous inspections and audits reviewed and/or evaluated;
- d. Ensure information of the results of inspections and audits is provided to the administration.

The inspection and audit programme shall be based on the results of the assessment of occupational risks, the activities of the company and the results of previous inspections and assessments.

The programme is drawn up to cover all sectors/activities of the company and may be changed on a case-by-case basis at the request of the safety and health officer and the Secretary/Director.

The inspections are carried out by the safety and health officer and/or by other appointed officials (properly trained, experienced and capable of carrying out inspections impartially, meticulously and constructively). Inspections and audits are carried out by independent staff (not directly related and accountable) to the sector/activity inspected.

Indicatively, the following are part of the audit activities:

- a. The implementation, maintenance and effectiveness (performance) of the safety and health management system;
- b. The maintenance of the workplace in a satisfactory state in terms of order and hygiene (cleanliness, provision of sanitary facilities, catering, etc.);
- c. The selection of staff in the appropriate job (capacity);
- d. The conditions for the transport of personnel and various materials;
- e. The arrangement of material storage areas;
- f. The conditions and ways of collecting the hazardous materials used, as well as waste or other waste materials;
- g. Regular maintenance and pre-operation control, as well as periodic inspection of installations and all mechanical devices and equipment in general;

- h. The adjustment according to the work, the actual duration for the different stages and types of work;
- i. The interactions of activities within the workplace;
- j. Cooperation between all members of the organisation (management and employees);
- k. The implementation of the suggestions of external partners responsible (DoLI, contractors, clients);

The results of the inspections, together with comments on corrective and preventive actions and related proposals for improvement, shall be communicated to the person responsible for the inspected sector/activity, shall be notified to the administration and reviewed at the next management review.

10.3 Management review

Senior management must review at least annually the organisation's OH&S and risk management system to ensure suitability and continuity, adequacy and effectiveness.

ISO 45001:2018 defined suitability, adequacy and effectiveness as follows:

- a. 'Suitability' refers to how the OH&S management system fits the organisation, its operations, its culture and business systems;
- b. 'Adequacy' refers to whether the OH&S management system is implemented appropriately;
- c. 'Effectiveness' refers to whether the OH&S management system is achieving the intended outcome.

The management review should take into consideration all the changes occurred to the internal and external context of the organisation, including the needs and expectations of interested parties, legal requirements, risks and opportunities, incidents, nonconformities, corrective actions, continual improvement, monitoring and

measurement results, audit reports, adequacy of resources and consultation and participation of workers.

The results of the management review and the related conclusions drawn should related to:

- a. The sustainability of suitability, adequacy and effectiveness of the overall management system in achieving the intended outcomes;
- b. Opportunities for continual improvement;
- c. Any need for changes to the systems;
- d. Additional resources needed;
- e. Implications to the strategic direction of the company;
- f. Communication of the relevant output of the management review to the interested parties.

The aim of the management review is for the management to assess the performance of the system to ensure that it has been effective and suitable for the needs of the organisation, ultimately preventing injury or harm to workers, review the objectives and when necessary set new ones.

The company shall review the safety and health management system at intervals to be determined in order to continuously ensure its suitability, adequacy and effectiveness. As a minimum, the review is carried out once a year, but it can be done more often depending on the needs that arise.

During the management review process, the health and safety officer collects, analyses and evaluates all necessary information so that management can evaluate the system and further improve it if necessary. Consultation points and decisions are documented and reported (minutes are kept).

The management review identifies the potential needs for changes in policy, objectives and other elements of the management system, so that the commitment to continuous improvement of the system prevails.

Data examined, studied and evaluated during the review are indicative of performance of the safety and health management system, accident statistics (severity indicators, frequency, etc.), taking safety and health measures (identification of new risks, new/modern technology, new equipment, etc.), reports of emergencies, allocation of safety and health resources, as well as the granting of personal protective equipment, petitions, observations and/or suggestions from competent external bodies (DoLI, certification body).

Chapter 11

Improvement

The organisation must be actively alert to tackle any potential opportunities for improvement that will expedite the achievement of the intended outcome, related to the OH&S and risk management systems. The results from the analysis and evaluation of the performance of both systems should be considered as well as the evaluation of compliance, internal audits and management review when performance improvement is intended.

11.1 Incident analysis and corrective action

The organisation should have properly design and establish a system for reporting and investigating incidents and/or nonconformities and take actions to correct and deal with their consequences. ISO 45001:2018, is giving examples of incidents, nonconformities and corrective actions as follows, but are not limited to:

- a. Incidents: same level fall with or without injury, broken leg, asbestosis, hearing loss, damage to buildings or vehicles where they can lead to OH&S risks;
- b. Nonconformities: protective equipment not functioning properly, failure to fulfil legal requirements and other requirements, prescribed procedures not being followed;
- c. Corrective actions: eliminating hazards, substituting with less hazardous materials, redesigning or modifying equipment or tools, developing procedures, improving the competence of workers, changing the frequency of use, using personal protective equipment.

It is important that organisations promptly react to nonconformities and incidents occurred and take appropriate actions to control, correct, cope with and eliminate their source to prevent recurrence. Root cause analysis (see Figure 24) can be used to investigate all possible factors associated with an incident in order to be able to promptly identify, isolate, manage and if possible, remove the root of the ‘faulty tooth’ or the non-conformity to sustain business continuity. The aim of incident investigation is to determine exactly what happened, why it happened and what can be done to prevent the incident from happening again. It is needed also to determine whether similar incidents or non-conformities exist or there is a potential to occur, leading to appropriate corrective actions.

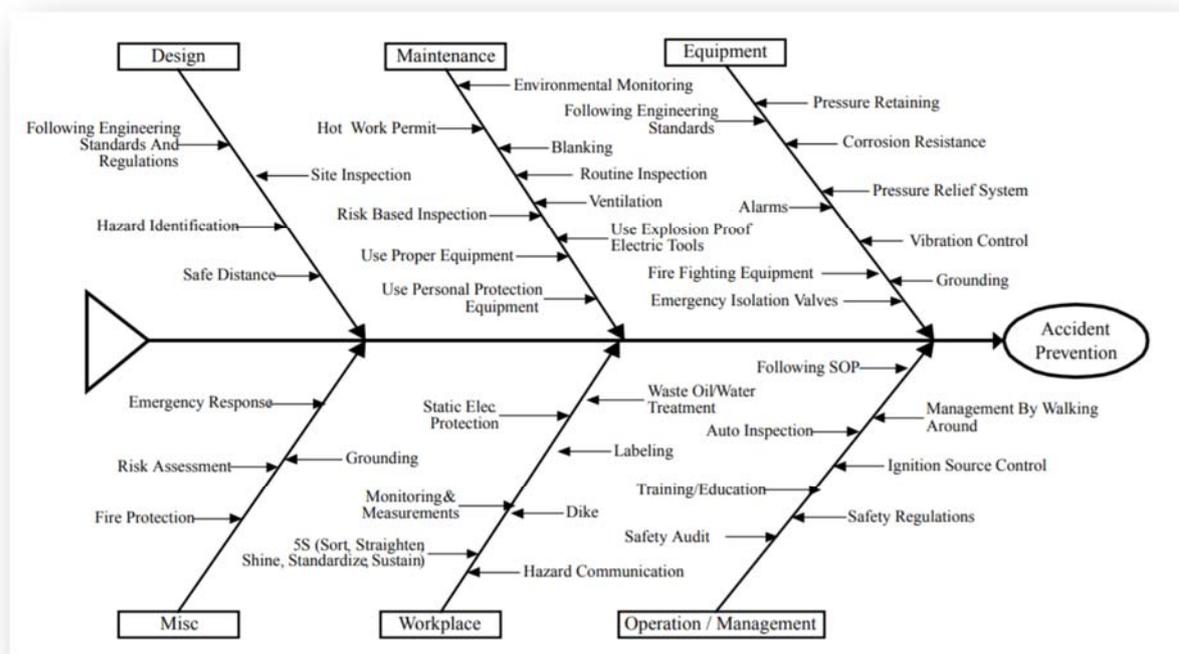


Figure 24: Root cause analysis – Ishikawa fishbone
 (Source: Elsevier Journal of loss prevention in the process industries, 2006)

When determining the root cause of an incident or nonconformity, the organisation should use methods appropriate to the nature of the incident or nonconformity being analysed. The focus of root cause analysis is prevention. This analysis can identify multiple contributory failures, including factors related to communication, competence, fatigue, equipment or procedures.

11.2 Continual improvement

To sustain continual improvement, the organisation must create a work culture that priority is given to safety. Risk management has an inherent strategic and tactical perspective that focuses on continual improvement including enhancing competitiveness and ensuring organisational sustainability. To achieve continual improvement, the organisation shall establish management systems that:

- a. Prevent the occurrence of incidents and non-conformities;
- b. Promote a positive health and safety and risk safe culture;
- c. Enhance OH&S and risk management performance;
- d. Address changes occurred in the internal and external context to improve value;
- e. Appoint hierarchy of control measures to reduce exposure to potential risks;
- f. Induct training and competence for workers and interested parties to facilitate continual improvement;
- g. Improve OH&S and risk management frameworks and systems so as to be cost effective;
- h. Intergrade both management systems into the corporate governance and management functions.

The PDCA cycle, is commonly used to review changes on smaller scale that allows continuous improvement (see figure 25). The process is particularly effective when intending to proceed with minor changes to a process and when the end objective is properly set. Repeating the cycle frequently allows to implement Kaizen³ and other continuous improvement initiatives. PDCA cycle encourages a methodical pattern for problem solving techniques and the deployment of solutions.

During the planning phase, the problem and objectives are clearly identified, analyse the current situation, identify solution alternatives and select and schedule the most

³ Kaizen is a concept referring to business activities that continuously improve all functions and involve all employees from the CEO to the assembly line workers. Kaizen is the Sino-Japanese word for "improvement". 145

auspicious solution. The solution is then tested on a small-scale basis in the 'Do' phase. This phase involves implementation of the solution, acquire feedback for later analysis and measuring progress. Check involves analysis of the data collected and comparing the actual results against planned objectives. The phase is examining the effectiveness of the solution and applies improvements if necessary. A plan should be established after evaluating the costs and benefits for each alternative solution.

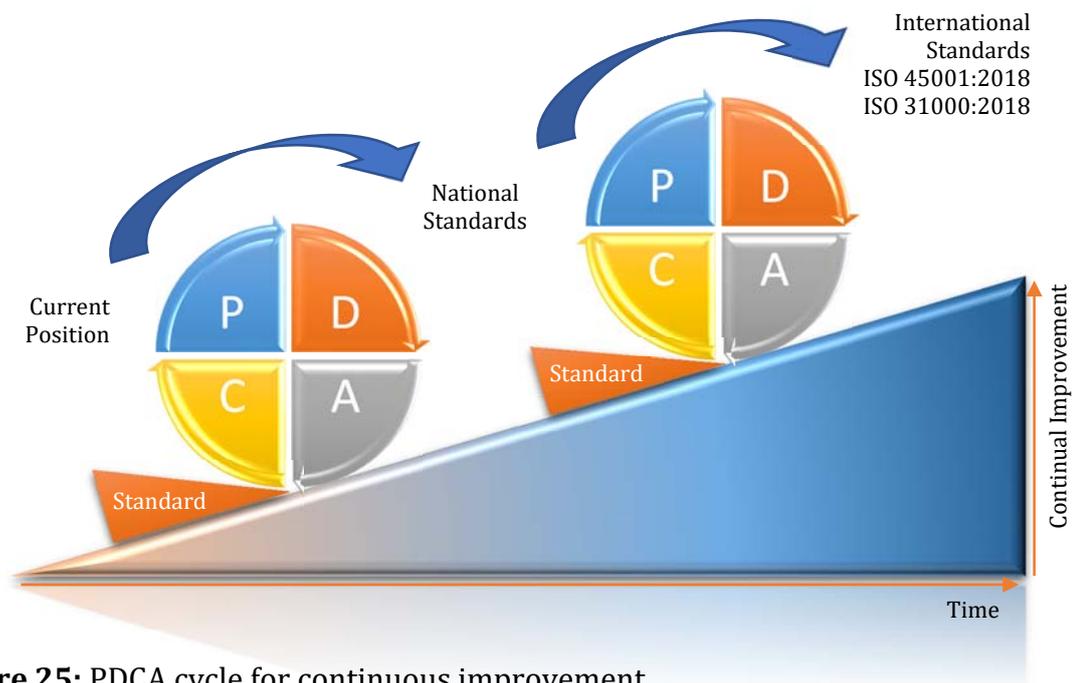


Figure 25: PDCA cycle for continuous improvement

The PDCA cycle can be repeatedly applied in a process of continuous improvement. Each cycle enriches knowledge and brings the organisation closer to its objectives and goals and to the enhancement of OH&S and risk management systems.

Continual improvement issues include, but are not limited to:

- a. New technology and digital transformation;
- b. Good practices, both internal and external to the organisation;
- c. Suggestions and recommendations from interested parties;
- d. New knowledge and understanding of OH&S related issues;
- e. New or improved materials;

- f. Changes in worker capabilities or competence;
- g. Achieving improved performance with fewer resources.

11.3 Recording and reporting

The risk management process and related outcomes should be documented and reported through appropriate mechanisms. Recording and reporting, according to ISO 31000:2018, aims to:

- a. Communicate risk management activities and outcomes across the organisation;
- b. Provide information for decision making;
- c. Improve risk management activities;
- d. Assist interaction with stakeholders, including those with responsibility and accountability for risk management activities.

Decisions concerning the creation, retention and handling of documented information should take into consideration but not be limited to their use, information sensitivity and the external and internal context.

Reporting is an integral part of the organisation's governance and should enhance the quality of dialogue with stakeholders and support top management and oversight bodies in meeting their responsibilities. Factors to consider for reporting include, but are not limited to:

- a. Differing stakeholders and their specific information needs and requirements;
- b. Cost, frequency and timeliness of reporting;
- c. Method of reporting;
- d. Relevance of information to organisational objectives and decision making.

Given the wide range of risks, regular reporting is giving the opportunity to management at all levels, to promptly define significant changes in risk exposures and

hazards. The selection of risk indicators and leading indicators in particular, is crucial to enable proactive respond and actions taken to improve controls, rather than only responding to risk events that have already emerged.

The focus of OH&S and risk management officer, when reporting to decision makers should be on the degree of selectivity of reporting. Providing too much information runs the risks associated to crucial matters being disregarded and in contrary a report that does not underpins crucial information related to high risk exposure that needs immediate attention, drives the organisation towards the 'edge of the cliff'.

Hazards identified must be recorded and reported to the appropriate personnel. If the hazard can be remedied immediately, then appropriate action should be taken in consultation with the health and safety officer. If a hazard requires greater investigation and attention and requesting the pursuing of risk controls, this should be recorded and reported to the top management in consultation with the health and safety officer.

Technology and digital reform, plays a crucial role to the process of recording and reporting since all the information requested by the appropriate personnel and decision makers, can be transmitted promptly and direct to the point without any bias or bureaucratic procedures that need time and effort to transmit and entails latent risks of confusion, misunderstanding and late report and respond.

Chapter 12

Conclusion and Findings

It is rather profound that the European Union has imposed high controls on the occupational health and safety requirements, controls that conveyed to the oil industry in Cyprus especially after the induction of the country to the EU in 2004. Since then, the OH&S statistics in the industry has shown considerable improvement through programmes, directives and regulations promoted by EU.

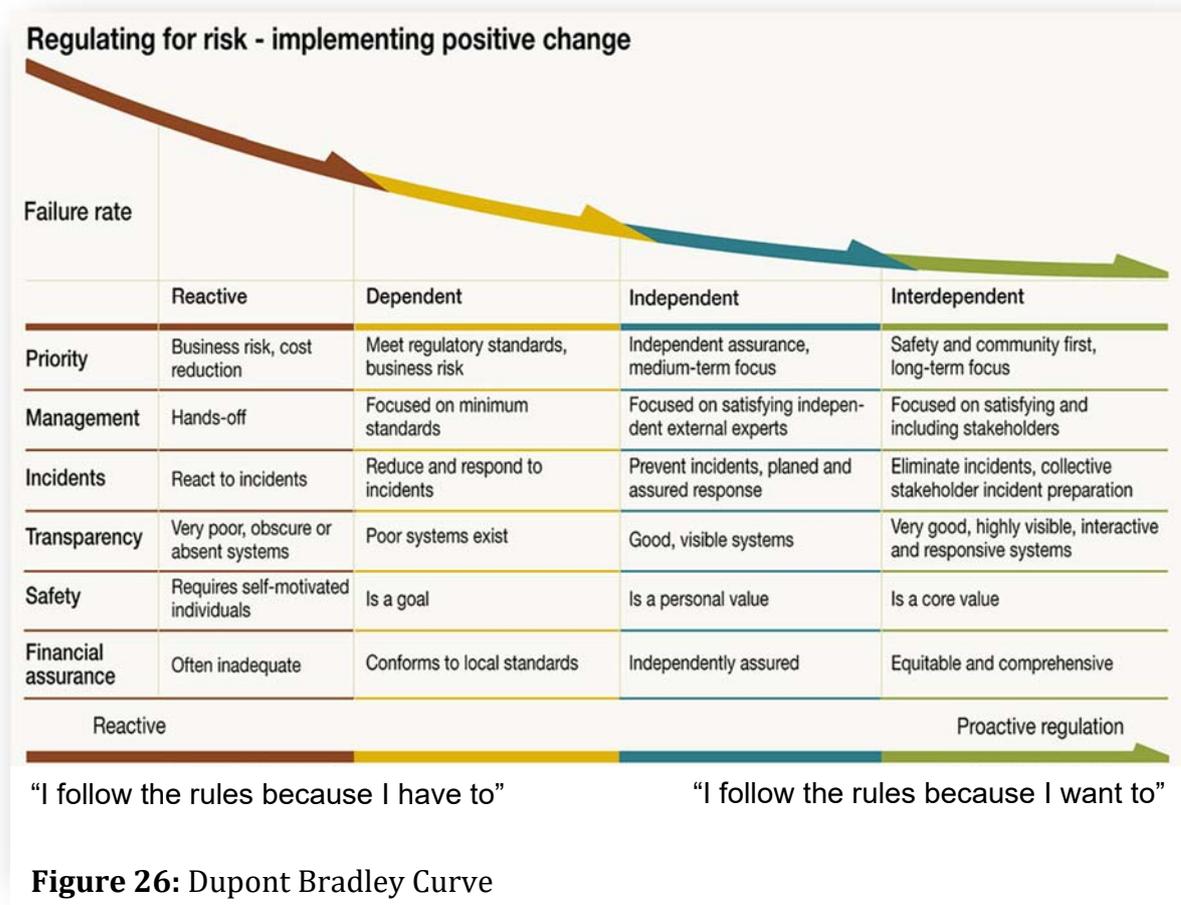
Occupational health and safety has not only proven as a legal and moral obligation for organisations but also is determined as a leading process towards prosperity, success social responsibility and reputation enhancement in the eyes of its stakeholders. Organisations that shows poor or limited health and safety records are perceived as high-risk organisations that set all interested parties, including stockholders at a stake.

In the light of the literature review, safety culture has a profound significance in the pursuit to improve OH&S performance. The collaboration of all employees and interested parties is needed to embrace a safety culture in which individual attitude is directed to ensure not only personal safety but also the safety of others.

The results emanating from the empirical research conducted in Synergas can lead us to the conclusion that although there is an overall positive perception towards safety, several inadequacies were also identified and reported. The organisation under examination, although it provides a positive and mature attitude towards safety, has not yet reached the desired safety stage.

The components that determine the maturity of the safety culture are attributed to the collective commitment, employee involvement, accountability, risk awareness and compliance, competency, learning from incidents, communication, and cooperation.

According to Dupont model, as illustrated in Figure 26, the safety culture can be reactive, in which there is no motivation or desire to prevent incidents, dependent implying that only particular individuals are involved in OH&S therefore not everyone takes responsibility, independent in which employees starts to assume personal responsibility for their own safety or interdependent stage in which employees do not only care about their own safety but also concerned about the safety of the fellow co-workers.



The research performed in Synergas has indicated a positive attitude towards safety, but the feedback received was not characterised by the attributes of interdependent safety culture. Health and safety performance is by virtue an organisational goal and not yet personal aspiration. The overall positive perception prevailed in Synergas, especially the concern adhered to senior management, is an encouraging indication of an attitude towards interdependent safety culture.

The positive safety characteristics observed in Synergas are the following:

- a. Management commitment with strong sense of care towards personnel;
- b. Management is giving priority to OH&S issues;
- c. Employees tend to spend more time to complete a task in order to ensure safe execution;
- d. Management is paying attention to employees' safety suggestions and takes appropriate measures when necessary;
- e. OH&S performance is regularly communicated to interested parties;
- f. Open door policy is regarded on safety issues;
- g. Regular job risk assessments are performed to ensure safe behaviour;
- h. The organisation is learning from past incidents and takes all appropriate preventive measures to avoid recurrence;
- i. Employees undergo intensive training on health and safety;
- j. Employees preserve the appropriate knowledge and skills to work in a safe manner;
- k. The management demonstrates professionalism on incident investigation;
- l. Employees were informed and they are aware of potential hazards within work environment;
- m. The organisation is investing immense amount of money on safety measures;
- n. Work procedures and instructions are followed closely;
- o. The organisation retains a culture of 'no blame' when incidents or near miss incidents occurred;
- p. Safety is part of employment conditions;
- q. On-line communication with adjacent oil terminals as well as with governmental bodies.

The negative characteristics observed or the characteristics that conceptually keep Synergas away from the interdependent safety culture, are the following:

- a. There is not strong tendency between workers to assist each other to comply with safety expectations;

- b. Management does not show much trust to employees' abilities to identify risks in the workplace;
- c. Employees gives limited emphasis on coaching others in doing work safely;
- d. Not all employees are involved in decision making related to safety;
- e. Hazard identification is not considered part of the workers job. They are assigning full responsibility to the management;
- f. The perception of 'good safety performance leads to good business performance' is not strongly embedded;
- g. Employees tend to withhold safety information such as near miss incidents even if 'no-blame' culture prevails;
- h. Although working safely is expected, it is not recognised by everybody;
- i. The are no incentives available to promote safety.

The above observations, especially the shortfalls acknowledged, lead us to the conclusion that a positive change approach should be applied through employee engagement, enhancement and reinforcement. There are several models that can be applied such as Lewin's change model, Kotter's 8 step change model, McKinsey 7s model, PDCA and some more, but since change is directly dependent upon employees for successful implementation, the ADKAR model (see figure 27), helps individuals to process change through clearly defined stages that enable them to understand and accept change.

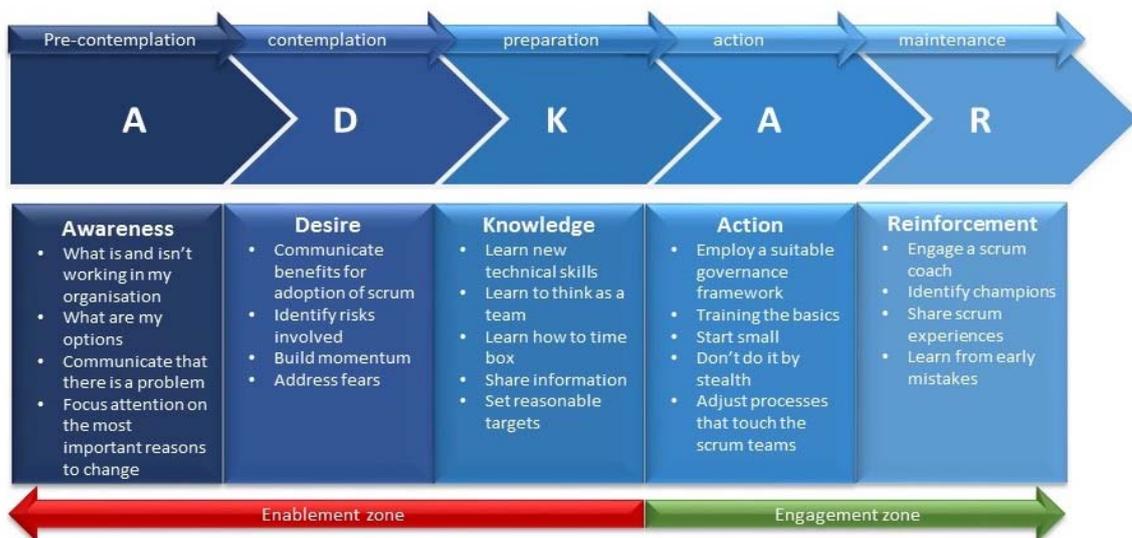


Figure 27: ADKAR change model (Source: Hiatt J.M., 2006)

The most effective way to change culture is to engage employees in the process whilst imposing limited supervision or tight controls. Lewin's model, according to Lynch R. (1997), *'tends to treat people as the objects of manipulation and does not involve them in the change process at all'*. Management it is needed to enhance recognition and provide employees with incentives to promote safety adhered to appropriate training and safe working practices to avoid recurring failures which cause employee demotivation and reduced productivity. In order to sustain excellent health and safety performance, it is crucial that regular safety assessments are conducted to re-evaluate the effectiveness of the culture changes and to identify areas that need improvement.

The safety culture can always be improved. The observation revealed that employees have the tendency to withhold safety related information or discouraged from informing management in regard to safety incidents, as a culture of guilt predominates and mere compliance to safety standards is considered adequate.

In the attempt to recognise employee behaviour and capture relevant information as to the root-cause forces that direct employee behaviour, the culture of the organisation should be perused acutely. Schein E. (2010), supports that organisational culture is characterised by three layers known as artefacts, espoused beliefs and values and basic assumptions (see Figure 28).

Culture, according to Schein E.H. (2010) is like an iceberg. The top of the iceberg (surface) contains the artefacts, the visible elements of an organisation such as systems, structures and processes. The espoused values referred to established norms, adopted values and behaviour patterns in the organisation whereas the basic underline assumptions and dynamics (deepest level of the iceberg), are values deeply embedded and unconscious, taken for granted beliefs, perceptions, thoughts, feelings and dynamics. The latter layer interacts with the espoused values and together they influence the visible outcomes and actions at the top of the iceberg.

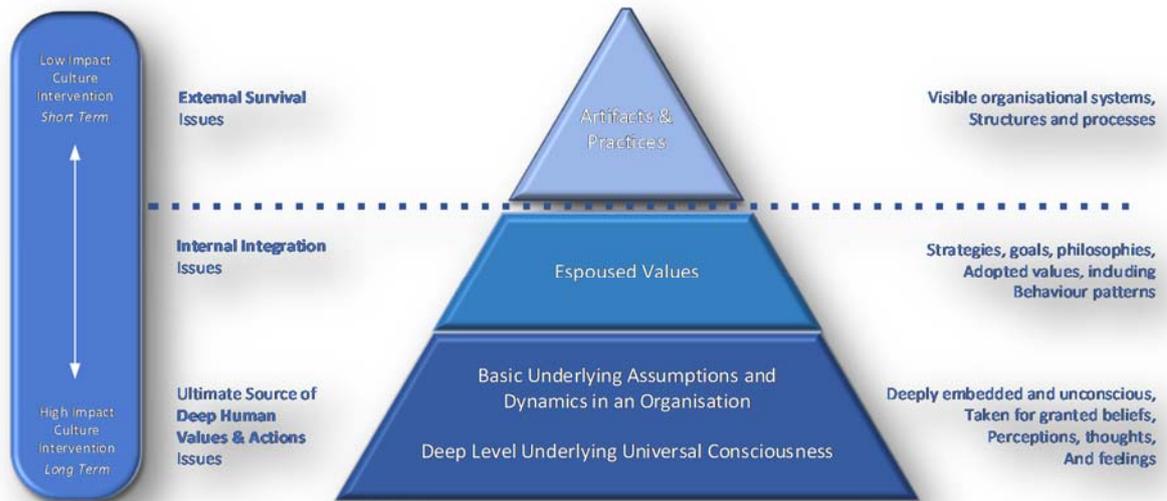


Figure 28: The three layers of culture.

Organisations is critical to show sensitivity in effective learning from incidents (LFI) to reinforce safe work environment in ways to prevent future incidents. Observation gave insights on incidents occurred and actions taken to avoid recurrence of the incidents. Although several actions have been taken place in Synergas, no formal procedure was established towards learning from incidents (LFI). Lukic D. et al. (2012), introduced the LFI model as illustrated in Figure 29.

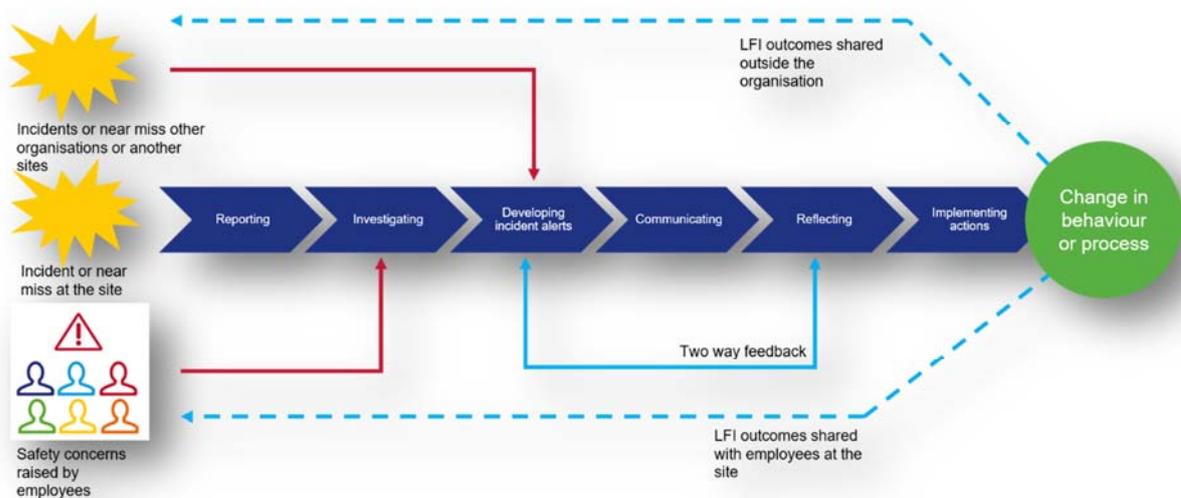


Figure 29: The LFI process model (Source: D. Lukic et al./safety science 50, 2012)

The LFI process model consists of six phases: reporting incidents, investigating incidents, developing incident alerts, disseminating information, contextualising information and implementing actions.

Reporting an incident, including a near miss, is essential in raising awareness and allowing for preventing actions to be enabled. Investigation of the incident or near miss incident is initiated at the second stage of the process to determine the factors contributed to the accident or near miss incident. Based on the results of the investigation, recommendations for improving safety or changing practices are developed and shared across to create incident alerts in order to help employees to avoid recurrence of same or similar incidents. Feedback of incident alerts can be received and from other adjacent organisations based on safe practice coordination in the realm of domino effect. Circulation of information regarding the incident and incident alerts should be granted and contextualised in order to assess related information and reflected upon within each employee's workplace context. The last phase requires implementation of actions by utilising the assessed information in order to change behaviour or processes with the aim of preventing similar incidents to occur in the future.

Synergas has not in place processes to comply with ISO 31000:2018. Instead, the company retains a non-formal process of identifying, rating and proposing treatment options which is updated once a year taking into consideration the current situation of the company. The management was not doing enough to discharge his responsibility to oversee the effectiveness of risk management processes.

While risk management may vary from company to company, every management should be certain that:

- a. The risk appetite implicit in the company's business model, strategy, and execution is appropriately established;
- b. The expected risks are corresponding with the expected compensations;

- c. Management has implemented a system to manage, monitor, and mitigate risk and that system is appropriate given the company's business model and corporate strategy;
- d. The risk management system informs the stakeholders of the major risks the company is facing;
- e. Identify risk owners to assess risks and apply associate controls;
- f. An appropriate culture of risk awareness exists throughout the organisation;
- g. There is recognition that management of risk is essential to the successful execution of the corporate strategy;
- h. Internal audit must assess and report on the effectiveness of the risk management processes once established;
- i. The risk management processes should include not only financial risks but all components of business operations that involves risk areas including safety, environment, regulatory compliance, product quality, customer service, supply chain;
- j. Establish mechanisms to promptly address risks and opportunities.

Synergas is operating in a high-risk industry as inherently LPG entails. This type of industries prerequisite a strict safety and risk management policy and adaptation to a number of safety precautions and safety measures. The observation conducted, revealed that Synergas has adopted the following measures and systems, (some are abiding by the applicable law), including:

- a. Seveso III directive⁴;
- b. ATEX directive⁵ (Atmosphere Explosives);
- c. Health and Safety manual;
- d. Health and Safety Risk Assessment Report (Quantitative);
- e. ISO 45001:2018;
- f. ISO 9001:2018.

⁴ The Seveso III Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances lays down the rules for prevention of major industrial accidents involving hazardous substances and for limiting the consequences of such accidents for human health and the environment.

⁵ The ATEX directive consists of two EU directives describing what equipment and workspace is allowed in an environment with an explosive atmosphere.

Pasman H.J. et. al (2017), have introduced the six steps of quantitative risk assessment (QRA) which represents a specific model for hazardous operations and areas, including LPG plants. The model, as illustrated in Figure 30, takes into consideration all steps necessary to shield all hazardous processes and provide safe working conditions. The system encompasses plant, people, and procedures, including energy, materials, technology, and information flows.

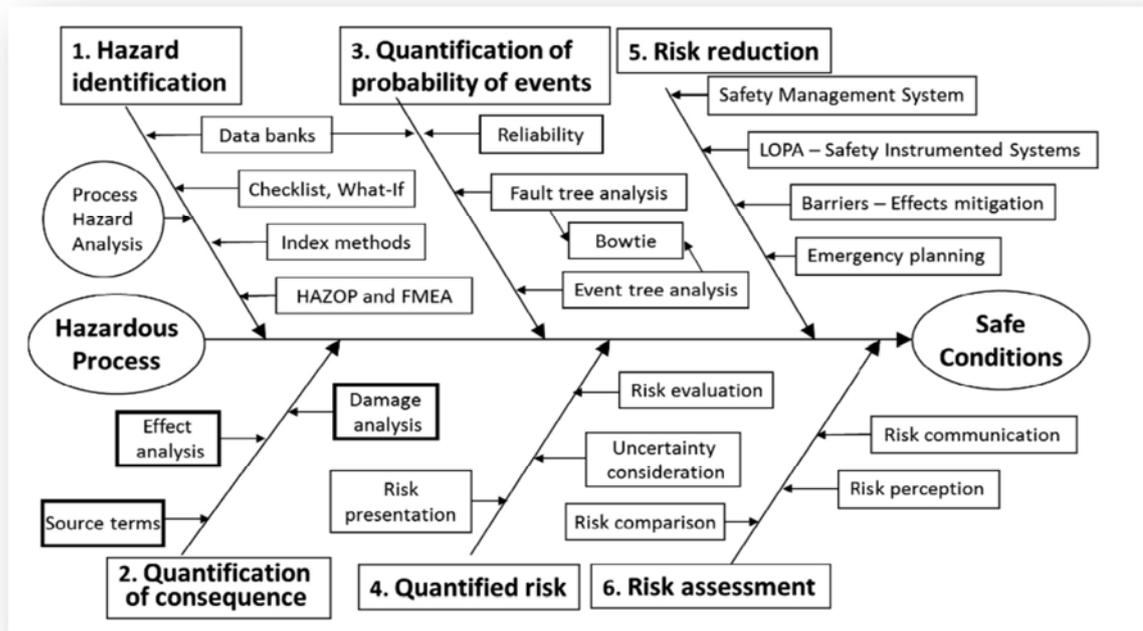


Figure 30: The six steps of a QRA in industrial processes (Source: Pasman et al., 2017)

- **Hazard identification:** the process of hazard analysis focuses on finding all hazards and identifying all possible scenario definitions;
- **Quantification of consequence:** calculation of physical effects of an incident scenario and potential damage consequence distribution;
- **Quantification of probability of events:** determination of a scenario probability distribution;
- **Quantify risk:** risk distribution as the combination of consequence;
- **Risk reduction:** probability distributions, considering risk reduction measures;
- **Risk assessment:** risk tolerability and acceptance measures.

All the systems put in place to prevent risks and hazards (barriers), certain weaknesses or deficiencies (holes) might lead to incidents and fatalities when aligned. Reason J. (2000) compares human systems to layers of swiss cheese (see Figure 31). Each layer is a defence against something going wrong (mistakes & failure). There are 'holes' in the defence remind us that no human system is perfect. Something breaking through a hole isn't a huge problem since things can go wrong occasionally. Within the systems there are several 'layers of defence' (slices of Swiss Cheese) depending on the company's risk appetite and tolerability. Incidents become a major problem when failures follow a path through all of the holes in the swiss cheese. All of the defence layers have been broken by the time the holes have lined up.

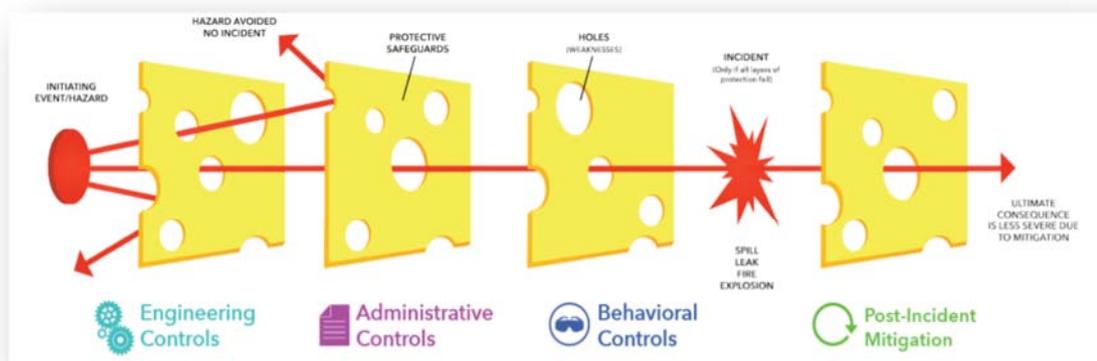


Figure 31: Swiss Cheese Model (Reason J., 2000)

Synergas, in the attempt to avoid any incidents for occurring or escalating of events to lead the organisation to an emergency situation, it is suggested to methodically integrate a holistic approach based on a comprehensive system of hierarchy of controls and at the same time establish protective and preventing layers of control to mitigate or alleviate potential impact, yielded on systems failure by the time all holes are aligned.

According to a research conducted in a petroleum industry, human factors are more common than equipment failure in oil industry accidents which many times led to fatalities. Employee involvement and worker participation in the OH&S and risk management system is a key requirement of effective safety and risk management as it enables the organisation to make informed decisions. Based on the same research

and literature review, communication and involvement of all stakeholders would reduce incidents and enhance productivity and safety.

As observation in Synergas has revealed, there is a restrain on participation of workers to OH&S and risk management decision making process, hence there is a burden on the organisation to:

- a. Provide processes, training and resources deemed necessary for consultation and participation;
- b. Provide, in a timely manner, access to relevant information about the OH&S and risk management system;
- c. Identify and remove obstacles to participation such as failure to respond to worker suggestions, language or literacy difficulties, policies that discourage worker participation;
- d. Encourage consultation with non-managerial workers relating to a range of OH&S and risk management issues;
- e. Encourage the participation of non-managerial workers in a range of OH&S and risk management activities, procedures, processes and decisions.

The results emanating from the empirical research stress the overall positive perception towards occupational safety and health culture, but the organisation has not yet reached the desired safety culture maturity stage of interdependence.

The literature review and the research conducted for the purpose of the present thesis, have shown that ISO 31000 is more effective and deemed to achieve the established objectives and policies if collectively integrated with ISO 45001. Both management standards provide the framework towards a holistic management system that takes into consideration all direct or indirect variables that can harm the organisation. Interactive processes and procedures to monitor all changes in the context of the organisation are deemed to be critical factors in search of excellence and business survival.

Striving to achieve the safety at the highest level, brings many financial and social benefits and above all helps to reduce the number of accidents, to develop a broad culture of prevention, improve the quality of work environment, develop human sensibility and lack of tolerance to safety and health deficiencies and sustains continual business improvement paradigm.

Organisations focusing in continuous improvement of their performance, are not just interested in fulfilling the legal requirements relating to safety. Protecting the health of workers, continuous improvement of competence in the area of safety excellence and taking actions to improve the design of technological processes and work related safety principles, become unconditional requirements.

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Appendices

Appendix 1(a)

Comparing Annex L (HLS) with ISO 45001:2018 and ISO 31000:2018 structure

Annex L (HLS)		ISO 45001:2018		ISO 31000:2018	
1	Scope	1	Scope	1	Scope
2	Normative references	2	Normative references	2	Normative references
3	Terms and definitions	3	Terms and definitions	3	Terms and definitions
4	Context of the organisation	4	Context of the organisation	4	Context of the organisation
4.1	Understanding the organisation & its context	4.1	Understanding the organisation & its context	5.4.1	Understanding the organisation & its context
4.2	Understanding the needs & expectations of interested parties	4.2	Understanding the needs & expectations of workers & other interested parties		
4.3	Determining the scope of XXX management system	4.3	Determining the scope of the OH&S management system		
4.4	XXX management system	4.4	OH&S management system		
5	Leadership	5	Leadership and worker participation	5	Framework
5.1	Leadership & commitment	5.1	Leadership and commitment	5.2	Leadership and commitment
5.2	Policy	5.2	OH&S policy		
5.3	Roles, responsibilities and authorities	5.3	Organisational roles, responsibilities and authorities	5.4.3	Assigning organisational roles, authorities, responsibilities and accountabilities
		5.4	Consultation and participation of workers	5.4.5	Establishing communication & consultation
6	Planning	6	Planning	6	Process
6.1	Actions to address risks and opportunities	6.1	Actions to address risks & opportunities		
		6.1.1	General		
		6.1.2	Hazard identification and assessment of risks and opportunities		
		6.1.3	Determination of legal requirements and other requirements		
		6.1.4	Planning action		
6.2	XXX objectives & planning to achieve them	6.2	OH&S objectives and planning to achieve them		
		6.2.1	OH&S objectives		
		6.2.2	Planning to achieve OH&S objectives		
7	Support	7	Support		
7.1	Resources	7.1	Resources	5.4.4	Allocating resources
7.2	Competence	7.2	Competence		
7.3	Awareness	7.3	Awareness		
7.4	Communication	7.4	Communication	6.2	Communication and consultation
		7.4.1	General		
		7.4.2	Internal communication		

Annex L (HLS)		ISO 45001:2018		ISO 31000:2018	
		7.4.3	External communication		
7.5	Documented information	7.5	Documented information		
7.5.1	General	7.5.1	General		
7.5.2	Creating and updating	7.5.2	Creating and updating		
7.5.3	Control of documented information	7.5.3	Control of documented information		
8	Operation	8	Operation	6	Process
8.1	Operational planning and control	8.1	Operational planning and control		
		8.1.1	General		
		8.1.2	Eliminating hazards and reducing OH&S risks		
		8.1.3	Management of change		
		8.1.4	Procurement		
		8.2	Emergency preparedness and response		
9	Performance evaluation	9	Performance evaluation	5.6	Evaluation
9.1	Monitoring, measurement, analysis & evaluation	9.1	Monitoring, measurement, analysis & performance evaluation	6.6	Monitoring and review
		9.1.1	General		
		9.1.2	Evaluation of compliance		
9.2	Internal audit	9.2	Internal audit		
9.2.1	General	9.2.1	General		
9.2.2	Internal audit programme	9.2.2	Internal audit programme		
9.3	Management review	9.3	Management review	6.6	Monitoring and review
10	Improvement	10	Improvement	5.7	Improvement
10.1	Nonconformity & corrective action	10.1	Incident, nonconformity & corrective action	5.7.1	Adapting
10.2	Continual improvement	10.2	Continual improvement	5.7.2	Continually improving

Appendix 1(b)

Align ISO 31000:2018 and ISO 45001:2018 to Annex L (HLS)

Annex L (HLS)		ISO 45001:2018		ISO 31000:2018	
1	Scope	1	Scope	1	Scope
2	Normative references	2	Normative references	2	Normative references
3	Terms and definitions	3	Terms and definitions	3	Terms and definitions
4	Context of the organisation	4	Context of the organisation	4	Context of the organisation
4.1	Understanding the organisation & its context	4.1	Understanding the organisation & its context	4.1	Understanding the organisation & its context
4.2	Understanding the needs & expectations of interested parties	4.2	Understanding the needs & expectations of workers & other interested parties	4.2	Understanding the needs & expectations of interested parties
4.3	Determining the scope of XXX management system	4.3	Determining the scope of the OH&S management system	4.3	Determining the scope of Risk management system
4.4	XXX management system	4.4	OH&S management system	4.4	Risk management system
5	Leadership	5	Leadership and worker participation	5	Leadership
5.1	Leadership & commitment	5.1	Leadership and commitment	5.1	Leadership & commitment
5.2	Policy	5.2	OH&S policy	5.2	Risk management policy
5.3	Roles, responsibilities and authorities	5.3	Organisational roles, responsibilities and authorities	5.3	Organisational roles, responsibilities, authorities and accountabilities
		5.4	Consultation and participation of workers	5.4	Integration
				5.5	Implementation
6	Planning	6	Planning	6	Planning
6.1	Actions to address risks and opportunities	6.1	Actions to address risks & opportunities	6.1	Actions to address risks & opportunities
6.2	XXX objectives & planning to achieve them	6.2	OH&S objectives and planning to achieve them	6.2	Risk management objectives & planning to achieve them
		6.2.1	OH&S objectives	6.2.1	Risk management objectives
		6.2.2	Planning to achieve OH&S objectives	6.2.2	Planning to achieve risk management objectives
				6.3	Principles
7	Support	7	Support	7	Support
7.1	Resources	7.1	Resources	7.1	Allocating resources
7.2	Competence	7.2	Competence	7.2	Competence
7.3	Awareness	7.3	Awareness	7.3	Awareness
7.4	Communication	7.4	Communication	7.4	Communication & Consultation
		7.4.1	General		
		7.4.2	Internal communication		
		7.4.3	External communication		
7.5	Documented information	7.5	Documented information	7.5	Documented information

Annex L (HLS)		ISO 45001:2018		ISO 31000:2018	
7.5.1	General	7.5.1	General	7.5.1	General
7.5.2	Creating and updating	7.5.2	Creating and updating	7.5.2	Creating and updating
7.5.3	Control of documented information	7.5.3	Control of documented information	7.5.3	Control of documented information
8	Operation	8	Operation	8	Operation
8.1	Operational planning and control	8.1	Operational planning and control	8.1	Operational planning and control
		8.1.1	General	8.1.1	General
		8.3	Hazard assessment	8.3	Risk assessment
		8.3.1	General	8.3.1	General
		8.3.2	Hazard identification	8.3.2	Risk identification
		8.3.3	Hazard analysis	8.3.3	Risk analysis
		8.3.4	Hazard evaluation	8.3.4	Risk evaluation
		8.4	Hazard treatment	8.4	Risk treatment
		8.4.1	General	8.4.1	General
		8.4.2	Selection of hazard treatment options	8.4.2	Selection of risk treatment options
		8.4.3	Preparing & implementing hazard treatment plan	8.4.3	Preparing & implementing risk treatment plan
9	Performance evaluation	9	Performance evaluation	9	Performance evaluation
9.1	Monitoring, measurement, analysis & evaluation	9.1	Monitoring, measurement, analysis & performance evaluation	9.1	Monitoring, measurement, analysis & performance evaluation
		9.1.1	General		
		9.1.2	Evaluation of compliance		
9.2	Internal audit	9.2	Internal audit	9.2	Internal audit
9.2.1	General	9.2.1	General	9.2.1	General
9.2.2	Internal audit programme	9.2.2	Internal audit programme	9.2.2	Internal audit programme
9.3	Management review	9.3	Management review	9.3	Management review
10	Improvement	10	Improvement	10	Improvement
10.1	Nonconformity & corrective action	10.1	Incident, nonconformity & corrective action	10.1	Incident analysis & corrective action
10.2	Continual improvement	10.2	Continual improvement	10.2	Continual improvement
				10.3	Recording and reporting

Appendix 2

Synergas Co-Operative Society Ltd

Synergas Ltd was established in **1965** with the aim to bottling and supply of gas in Cooperative Society companies throughout Cyprus.

Today the company has a modern and fully equipped LPG bottling system enabled to fill 6,000 bottles per day. The distribution channel of bottled LPG is on a nationwide basis via agents and subcontractors. In 2001 the company's activities expanded in the distribution of LPG in bulk through its own and subcontractor's fleet. The LPG is distributed on site at company's customer premises. Customers consist of factories, hotels, bakeries, farms, houses, etc., at gas supply systems which was assembly by highly trained staff.

The company is currently employing 20 employees with an annual turnover of €6m.

Vision

The continuous development of the activities of our Company, always upholding our quality at the highest levels, based on the Cooperative principles and values, with honesty, transparency and professionalism.

Mission

The provision of products and services based on quality and safety so that the requirements and needs of our customers are fully met and also ensuring a healthy and safe work environment for the staff of our Company.

Recognition of International Standards

The company has been certified with the Quality Management System according to the international standard EN ISO 9001: 2008 and the Health and Safety Management System in accordance with the British standard OHSAS 18001.

Particularly proud of these international awards, the Company is committed to consistent and faithful application of the rules governing both the quality management system and management system of health and safety at work, with full protection oriented and continuous improvement of the offered quality and safety provided to our customers.

The inspection was carried out by the certification body TUV Cyprus, member of the international inspection and certification organisation TUV NORD Germany.

Development Studies and Security Measures

LPG, even though it is a highly flammable material, the use is safe if all the necessary security precautions and measures are undertaken. Our Company, for ensuring the security and protection of personnel, the public and the environment in general, has tackled two major studies, which are:

- i. ATEX: - to prevent and avoid ignition of explosive atmospheres which in turn can cause large-scale incident.
- ii. Seveso III: - Measures of prevention, protection and safety of the public in the vicinity of our facilities in the case of high-risk incidents.

Both studies have been completed and successfully applied.

Business Policy and Action

Always aiming at a better and faster service to our customers, our company has constructed, in collaboration with another company in the sector, a gas terminal in Paphos district. For even more improved services provided to our customers, we have proceeded to the revamping and amplification of the electronic management system to enable faster, accurate and on time delivery of LPG.

The company is people and customer oriented. Both contributed in shaping the Company's core competence and market position. The management has managed in a short period of time to achieve the short-term company's objectives in full.

Corporate and Social Responsibility

Apart from the achievement of the above objectives, the Company managed to achieve another important objective which was to ensure public safety. In 2011 our company was awarded by the President of Cyprus, along with three other oil companies which, in cooperation with the Civil Defence and the Department of Labour Inspection, informed the public in the vicinity of our facilities on safety measures to be taken in case of emergency, after a large-scale incident.

Appendix 3 (a)

Questionnaire: - Assessment of the perceived OH&S in Synergas Ltd

Occupational Health and Safety Survey

You are invited to share your opinion about the work you are performing and how it affects your health and safety by taking this survey.

Please note that the survey is anonymous and it will be treated with confidentiality and in accordance with the GDPR regulations. Your answers will help the management of the company to pinpoint areas that may need improvement or further development.

Part 1: Workplace hazards

		Never	Once a year	For 6 months	For 3 months	Every month	Every week	Every Day
1	Manually lift, carry or push items heavier than 25kg at least 10 times during the day							
2	Do repetitive movements with your hands or wrists for at least 3 hours during the day							
3	Perform work tasks or use work methods that you are not familiar with							
4	Interact with hazardous substances such as chemicals, flammable liquids and gases							
5	Work in a bent, twisted or awkward work posture							
6	Work at a height that is 12 meters or more above the ground or floor							
7	Work in noise levels that are so high that you have to raise your voice when talking to people less than a meter away							
8	Experience being bullied or harassed at work							
9	Stand for more than 2 hours continually							

Part 2: Workplace policies and procedures

		Strongly Agree	Agree	Disagree	Strongly Disagree
10	Everyone receives the necessary workplace health and safety training when starting a job, changing jobs or using new techniques				
11	There is regular communication between employees and management about safety issues				
12	Systems are in place to identify, prevent and deal with hazards at work				
13	Workplace health and safety is considered to be at least as important as production and quality				

14	There is an effective health and safety committee and/or representative				
15	Incidents and accidents are investigated quickly in order to improve workplace health and safety				
16	Communication about workplace health and safety procedures is done in a way that I can understand				

Part 3: Occupational health and safety awareness

		Strongly Agree	Agree	Disagree	Strongly Disagree
17	I am clear about my rights and responsibilities in relation to workplace health and safety				
18	I am clear about my employer's rights and responsibilities in relation to workplace health and safety				
19	I know how to perform my job in a safe manner				
20	If I became aware of a health or safety hazard at my workplace, I know who I would report to				
21	I have the knowledge to assist in responding to any health and safety concerns at my workplace				
22	I know what the necessary precautions are that I should take while doing my job				

Part 4: Participation in occupational health and safety

		Strongly Agree	Agree	Disagree	Strongly Disagree
23	I feel free to voice concerns or make suggestions about workplace health and safety at my job				
24	If I notice a workplace hazard, I would point it out to management				
25	I know that I can stop work if I think something is unsafe and management will not give me a hard time				
26	If my work environment was unsafe, I would not say anything and hope that the situation eventually improves				
27	I have enough time to complete my work tasks safely				

Thank you for your participation!

Appendix 3 (b)

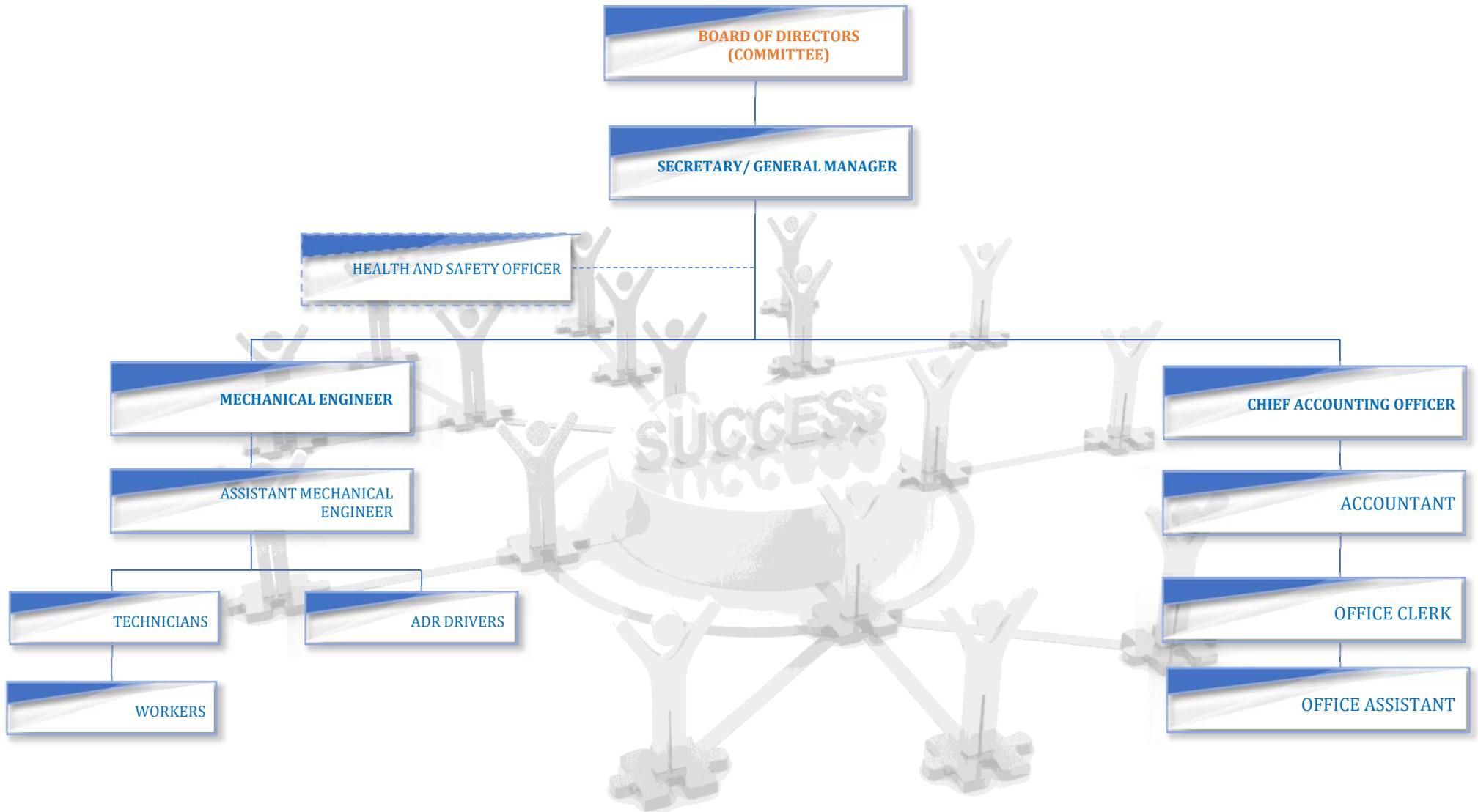
Questionnaire: - Assessment of the perceived safety culture in Synergas Ltd

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Management Commitment (MC)					
MC1	The company's management provides efficient work safety training for workers				
MC2	If I report a mistake to my supervisor, management supports me				
MC3	Management encourages workers to report every incident about safety to a supervisor				
MC4	Management strongly supports safety for workers				
MC5	Managers support work safety even if it causes a delay in work				
MC6	My managers sometimes ignore work safety violations				
MC7	My managers frequently speak unofficially with workers about safety				
MC8	My management allows workers to work by being sensitive to safety rules				
MC9	My supervisor gives importance to my opinion for improving work safety				
	-	-	-	-	-
Employees Personnel Attitude (EPA)					
EPA1	Work safety rules provide a safer work environment				
EPA2	I make sure to use necessary safety equipment				
EPA3	I alert my colleagues who act contrary to work safety rules				
EPA4	If my colleagues do not take any notice, I notify my manager about unsafe work				
EPA5	I try to follow work safety rules, even if they decrease my performance				
EPA6	It is more likely to have an accident in a workplace where there are no work safety rules				
EPA7	Work safety rules are important and necessary to prevent accidents at my work				
	-	-	-	-	-
Co-workers Safety Support (CSS)					
CSS1	Most workers notify personnel who are taking risks				
CSS2	Most workers support workplace safety policies				
CSS3	My colleagues usually suggest that I ignore work safety rules				
CSS4	My colleagues point out each other's deficiencies in work safety				
CSS5	My colleagues want to help each other with work safety				
CSS6	My colleagues attach importance to the assessment for incidents that can cause accidents				
	-	-	-	-	-
Workplace Pressure (WP)					
WP1	Completing work is more important than doing work in safe ways				
WP2	I sometimes compromise on safety to finish the work on time				
WP3	Sometimes, it is expected from me to do more work than to do it safely				
WP4	It is difficult to work when applying all work safety rules				
WP5	In my workplace, cutting corners and risky attitudes are common because of the heavy workload				
WP6	I am sometimes not sure if work can be done by following work safety rules				
WP7	I can easily get necessary safety equipment from my workplace				
	-	-	-	-	-

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Safety Management System (SMS)					
SMS1	Safety feedback and comments are always presented from and to management				
SMS2	There is an understanding that workers will be thanked for their safety performance				
SMS3	My company often offers incentives to site managers, site personnel and engineers				
SMS4	Safety rewards presented by my company are valuable				
SMS5	Safety responsibility and accountability are clearly described				
SMS6	Site managers and field personnel place importance of safety				
SMS7	There are dedicated safety agents, and they usually observe and correct field personnel's unsafe act				
SMS8	Field personnel are aware that unsafe performance will be punished and not tolerated				
SMS9	Unsafe performance is consistently punished with reasonable levels that fit the violation				
SMS10	Safety is always reinforced, even if a violation occurred without accident				
SMS11	Management places importance on safety, and it is a strategic concern for top management				
SMS12	Everyone is responsible for safety, not just safety staff				
SMS13	My company policies and actions demonstrate a sincere commitment to safety				
SMS14	Hazard analysis, prevention and control are very important and often performed at the site				
SMS15	Unsafe behaviour identification with necessary corrections is often performed				
	-	-	-	-	-
Violation Behaviour (VB)					
VB1	I feel it is essentially important to maintain safety at all times				
VB2	I believe safety in the workplace is a key issue				
VB3	I feel that it is compulsory to expend effort to decrease accidents and incidents at my workplace				
VB4	I feel it is important to encourage other to use safety practices				
VB5	I feel it is important to promote safety programs				
	-	-	-	-	-
Personnel Safety Motivation (PSM)					
PSM1	I am capable of following all safety regulations and procedures				
PSM2	it is clear to me how to follow work safety rules and procedures				
PSM3	I have made safety errors due to not knowing how to work safely				
PSM4	I have rarely made errors that caused risks in working				
	-	-	-	-	-
Personnel Error Behaviour (PEB)					
PEB1	I carefully follow safety rules and procedures when assigned a task				
PEB2	I can perform a task with which I am familiar without looking at written procedures & manuals				
PEB3	I intentionally bend formal procedures to finish work on time				
PEB4	I have ignored some parts of procedures & do not record these to make work easier in abnormal circumstances				
PEB5	I am conscious of my responsibility about work safety				
	-	-	-	-	-
	-	-	-	-	-

Appendix 4

Organisational Chart of Synergas Ltd



Appendix 5

Rating the effect of interested parties and workers

Power (<i>Effects of influence</i>) = Priority x Relevance		Priority of Interested Party (<i>Effects on decisions</i>)			
		No importance	Minor importance	Some importance	Major importance
Relevance of Interested Party (<i>Effects on activities</i>)	Not relevant	1	2	3	4
	Minor relevance	2	4	6	8
	Influential	3	6	9	12
	Significantly relevant	4	8	12	16

Score	Power of Interested Party (<i>Effects on decisions</i>)		
	Description	Strategy	Objectives
1 to 3	Low relevance with low importance	Monitor interest	Detect opportunities from growing interest
4 to 6	Low relevance with high importance	Keep satisfied	Build interest, monitor for changes
7 to 11	High relevance with low importance	Keep informed	Maintain interest, monitor for changes
12 to 16	High relevance with high importance	Manage closely	Maintain support, monitor for changes

Appendix 6

Synergas Customers' questionnaire

You are kindly requested to assess our company in relation to the following statements (Mark with the sign ✓ the appropriate column)	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
Employee Behaviour and support					
Respect of your property					
Compliance to Health and Safety rules and regulations					
Cooperation – Willingness - Flexibility					
Communication – Respond – Consistency					
Invoicing					
Quality of services and products					
Compliance to time schedule					
Problem solving capability and support					
General impression and terms of cooperation					
Will you recommend our company to others? Yes <input type="checkbox"/> No <input type="checkbox"/> Under certain terms <input type="checkbox"/> (please specify)					
Have you ever cooperated with other gas supply company in the past? Yes <input type="checkbox"/> No <input type="checkbox"/>					
Suggestions and Recommendations:					

Signature: _____

Date: _____

We Thank You for Your Collaboration and Support!
Our aim is to provide our valuable customers with better service & support!

Please return this questionnaire to our offices by using either of the following means: P.O.Box 40240, 6302 Larnaca, Email: info@synergas.com.cy, Fax: 24 642066.



YOU CAN NOW EASILY, SAFELY AND ECONOMICALLY SETTLE YOUR BILL THROUGH OUR WEB SITE OR THROUGH 

Appendix 7

Synergas' OH&S Policy

The Co-operative company SYNERGAS LTD, is recognising the particular risks involved in the health and safety activities of its employees, its customers and third parties and realises that it is responsible for ensuring a safe working environment, that is committed to maintaining a continuously improved health and safety management system, in accordance with the requirements of OHSAS 18001:2007 and the requirements of its customers and to all relevant legislation.

The ultimate purpose of these actions is:

- a. The protection of the lives and health of all employees, customers, subcontractors and the public;
- b. Avoiding damage to premises;
- c. Environmental protection;
- d. As much hazard reduction as possible that harm human health and/or the environment;
- e. The creation of a work culture sensitive to safety and health issues.

In order to achieve the above, the company has:

- ✓ Risk assessment;
- ✓ Safety and health management procedures and methodologies and safe work guidelines;
- ✓ Supervision by an experienced person in health and safety matters.
- ✓ Security Committee;
- ✓ Competent, experienced staff and subcontractors;
- ✓ Complete, convenient and reliable equipment and tools;
- ✓ Suitable welfare facilities;
- ✓ Suitable personal protective equipment;
- ✓ Action plans in case of emergencies and appropriate necessary equipment;
- ✓ Safety report in accordance with SEVESO III;
- ✓ Health and safety training;
- ✓ Environment for constructive communication;
- ✓ Preparation of a Study ATEX;
- ✓ Consultant ADR;
- ✓ Bottle Retesting Center.

Safety and health at work is a matter for all workers and subcontractors and as a result this policy is implemented by everyone.

Appendix 8

Synergas' Hazard Identification & Assessment

The purpose is to present the methodology for identifying, assessing and controlling dangerous situations that may cause physical harm, harm to human health (workers, third parties) and damage to property.

The methodology presented is based on the requirements of the "Occupational Safety and Health Management Regulations" (CIF 173/2002), the "Guide for preparing the written risk assessment in small businesses" (Ministry of Labour and Social Insurance) and other relevant literature.

In order to be able to carry out a risk assessment, a person must have the following skills:

1. Training or satisfactory experience in risk assessment methodologies;
2. Ability or experience to apply methodologies for risk assessment;
3. Very good knowledge of the flow of work, space, equipment, materials, strains and process environment;
4. Very good knowledge of the risks to safety and health and possible measures that can be taken.

The assessment is a systematic examination of all aspects of the work and should include the following:

1. The identification of dangerous sites and workers exposed;
2. Determination of the risk involved, quantitative or qualitative;
3. Risk prevention, elimination and control;
4. Revision of measures due to new knowledge;
5. Identification of sources of risk and affected areas;
6. Risk assessment;
7. The measures implemented are appropriate or it is needed to take new measures;
8. Reassessed after any change or modification.

Use of work equipment

1. Rotating or movable parts with insufficient precaution, which can crush, tighten, pierce, strike, grab or pull;
2. Free parts or material movement (drop, roll, slip, rollover, ejection, swing, crush), which can make a person hit;
3. Machinery and vehicle movements;
4. Risk of fire and explosion (e.g. from friction, pressure vessels);

5. Trapping.

Working conditions

1. Dangerous surfaces (sharp edges, corners, points, uneven surfaces, protrusions);
2. Work at great height;
3. Work with uncomfortable movements / stops;
4. Limited space (e.g. obligation to work between fixed parties);
5. Stumble and slip (wet or other slippery surfaces, etc.);
6. Job stability;
7. Effect of the use of personal protective equipment on other aspects of the work;
8. Techniques and working methods;
9. Entrance and work indoors.

Use of electricity

1. Electrical switches and sockets;
2. Grounding;
3. Access to electrical circuits and panels;
4. Electrical installations, e.g. primary circuits, lighting circuits;
5. Electrical equipment, controls, insulation;
6. Use of portable power tools;
7. Fire or explosion caused by electricity;
8. Overhead electrical lines.

Exposure to substances or preparations

1. Inhalation, intake and skin absorption of health-hazardous material (including aerosols and particulate matter);
2. Use of flammable and explosive materials;
3. Lack of oxygen (asphyxiation);
4. Presence of corrosive substances;
5. Active/unstable substances;
6. The presence of sensors.

Exposure to natural threats

1. Exposure to electromagnetic radiation (heat, light, X-rays, ionising radiation);
2. Exposure to noise, ultrasound;
3. Exposure to mechanical vibrations;
4. Exposure to hot substances/ means;
5. Exposure to cold substances/ means;
6. Presence of fluids under pressure (compressed air, steam, liquids).

Exposure to biological threats

1. Risk of infection due to accidental exposure to micro-organisms (e.g. legionella);
2. Presence of allergens.

Environmental factors and workplace climate

1. Insufficient or inappropriate lighting;
2. Improper temperature, humidity/ ventilation control;
3. Presence of pollutants.

Workplace interaction and human factors

1. The security system is dependent on the need to accurately receive and process information;
2. Dependence on the knowledge and skills of the staff;
3. Dependence on the ways of behaving;
4. Dependence on good communication and appropriate instructions to deal with changing conditions;
5. Impact of reasonably foreseeable deviations from safe working procedures;
6. Suitability of personal protective equipment;
7. Low motivation to work in a safe manner;
8. Ergonomic factors, such as the design of the job, so that it suits the employee.

Psychological factors

1. Difficulties of work (tension, monotony);
2. Dimensions of the workplace, claustrophobia, isolated work;
3. Confusion and/or role clash;
4. Contribution to decision-making, affecting work and tasks;
5. High requirements, small control of work;
6. Emergency reactions.

Organisation of work

1. Factors dependent on working processes (e.g. continuous work, shifts, night work);
2. Effective management systems and measures implemented for the organisation, planning, monitoring and control of health and safety measures;
3. Maintenance of equipment, including safety equipment;
4. Appropriate measures for the response to accidents and emergencies.

Various factors

1. Risks caused by other people (e.g. customers);
2. Adverse weather conditions;

3. Work near water;
4. Changing workplaces;
5. Procedures followed for the isolation of electrical appliances.

		Impact		
		Minor (1)	Serious (2)	Severe (3)
Likelihood	Unlikely (1)	Minor hazard / 1	Tolerable hazard / 2	Moderate hazard / 3
	Possible (2)	Tolerable hazard/ 2	Moderate hazard/ 4	Serious Hazard / 6
	Likely (3)	Moderate hazard / 3	Serious hazard / 6	Severe hazard / 9

Hazard Severity	Actions
<u>Minor</u>	No action needed
<u>Tolerable</u>	No forced improvement is needed, but registration and monitoring is recommended to ensure that all necessary checks are carried out. At this stage small improvements can be made.
<u>Moderate</u>	The aim is to minimise the risk but the costs for the success of such minimization, are large. It is recommended that a timetable be set up to determine the measures to be taken to reduce the risk and the time of completion.
<u>Serious</u>	When the risk involves work in execution, then immediate action must be taken. The task will start after all necessary actions taken and the risk has been reduced. For this purpose, there may be large costs.
<u>Severe</u>	Work must not start until the risk is reduced. If there is no way to reduce this risk, continuing work should be prohibited.

Appendix 9

Synergas' Risk Identification & Assessment

Likelihood scale

Rating	Likelihood
5	Almost Certain: will probably occur
4	Likely: high probability to occur
3	Possible: reasonable likelihood to occur
2	Unlikely: could occur
1	Rare: very unlikely to occur

Impact scale

Rating	Potential Impact
5	Disastrous
4	Major
3	Moderate
2	Minor
1	Negligible

Risk priority

		Impact				
		5	4	3	2	1
Likelihood	5	25	20	15	10	5
	4	20	16	12	8	4
	3	15	12	9	6	3
	2	10	8	6	4	2
	1	5	4	3	2	1
		Extreme risks-Likely to occur-Serious Consequences-Urgent attention				
		Major risks-Likely to occur-Serious Consequences-Attention/Investigation				
		Medium risks-Likely to occur-Serious Consequences-Attention				
		Minor risks-Low Consequences-Routine procedures				