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THE IMPACT OF RISK MANAGEMENT ON PROJECT SUCCESS IN THE CONTEXT OF HSE

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Osama Alshriefy

TIIVISTELMÄ

Tekijä	Osama Alshriefy
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Opinnäytetyö tutkii kriittistä suhdetta riskienhallintakäytäntöjen ja projektin onnistumisen välillä terveyden, turvallisuuden ja ympäristön (HSE) kontekstissa. Tehokas projektinhallinta on erittäin tärkeää organisaatioiden tavoitteiden saavuttamiseksi, erityisesti silloin kun käsitellään projekteja, joilla on suora vaikutus HSE-kysymyksiin. Tässä yhteydessä on välttämätöntä ymmärtää, miten riskienhallintastrategioiden toteuttaminen voi vaikuttaa projektin tuloksiin.

Tutkimus käyttää tapaustutkimusmenetelmää, ja tietojenkeruumenetelmiin kuuluu puolistrukturoituja haastatteluja ammattilaisten ja asiantuntijoiden kanssa projektinhallinnan alalla. Nämä haastattelut tarjoavat käytännön näkökulman haasteisiin, parhaisiin käytäntöihin ja menestystekijöihin, jotka liittyvät riskienhallintaan HSE-liittyvissä projekteissa.

Tutkimuksen löydökset perustuvat haastateltavien vastauksiin, jotka edistävät kattavaa ymmärrystä siitä, miten riskienhallintakäytännöt vaikuttavat projektin onnistumiseen, erityisesti HSE-kontekstissa. Tutkimus tunnistaa myös kriittiset menestystekijät, kuten selkeät tavoitteet, sidosryhmien osallistuminen ja alustava suunnittelu, sekä haasteet, kuten riskinarviointi, reaktiivinen hallinta ja viestintäkatkokset, joita organisaatiot kohtaavat hallitessaan riskejä HSE-vaikutuksilla varustetuissa projekteissa.

Yhteenvedona tämä maisterintutkielma valaisee symbioottista suhdetta riskienhallinnan ja projektin onnistumisen välillä, erityisesti HSE-kontekstissa. Tällä tutkimuksella on potentiaalia ohjata organisaatioita saavuttamaan parempia projektituloksia samalla kun turvataan sidosryhmien terveys, turvallisuus ja ympäristö.

Avainsanat Projektinhallinta, riskienhallinta, HSE-hallinta, terveys, turvallisuus, ympäristö, HSE, projektin onnistuminen.

ABSTRACT

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The thesis investigates the critical relationship between Risk Management practices and Project Success within context of Health, Safety and Environment (HSE). Effective Project Management is very important for organizations to achieve their objectives, particularly when dealing with projects that have a direct bearing on HSE concerns. In this context, it is imperative to understand how the implementation of Risk Management strategies can influence project outcomes.

The thesis uses a case method approach, and the data collection methods includes semi-structured interviews with professionals and experts in the field of Project Management. These interviews provide a real-world perspective on the challenges, best practices, and success factors associated with Risk Management in HSE-related projects.

The study's findings based on the interviewee's answers contribute to a comprehensive understanding of how Risk Management practices influence Project Success, with a specific focus on the HSE context. They also identify the critical success factors, such as clear objective, stakeholder involvement, and initial planning and challenges such as risk assessment, reactive management and communication gaps that organizations encounter when managing risks in projects with HSE implications.

In conclusion, this master's thesis sheds light on the symbiotic relationship between Risk Management and Project Success, particularly in the context of HSE. This research has the potential to guide organizations in achieving better project outcomes while safeguarding the health, safety, and environment of stakeholders.

Keywords Project Management, Risk Management, HSE Management, Health, Safety, Environment, HSE, Project Success.

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ABBREVIATIONS

PMBOK®	Project Management Body of Knowledge
IPMA	International Project Management Association
SMART	Specific, Measurable, Achievable, Relevant, and Time-bound
PDCA	Plan – Do – Check – Act
KPIs	Key Performance Indicators
WBS	Work Breakdown Structure
SHAMPU	Shape, Harness, And Manage Project Uncertainty
RCA	Recourse Cause Analysis
PMI	Project Management Institute
ERM	Enterprise Risk Management
ISO	International Organization for Standardization
ISO 31000	International Standard for Risk Management
COSO	Committee of Sponsoring Organizations
HSE	Health Safety and Environment
PPE	Personal Protective Equipment
NEBOSH	National Examination Board in Occupational Safety and Health
ILO	International Labour Organization
OSH	Occupational Safety and Health
SMS	Safety Management System

OHSMS	Occupational Health and Safety Management System.
POPMAR	Policy, Organizing, Planning, Measuring performance, Auditing and Review
ILO-OSH 2001	Guidelines on Occupational Safety and Health Management Systems
ISO 45001	Health and Safety Management Standard
ISO 14001	An Internationally Recognized Environmental Management Standard
EMS	Environmental Management System
AI	Artificial Intelligence

1 INTRODUCTION

1.1 Background and Main Objective

In general, Risk Management plays an important role in Project Success, particularly in fields prioritizing HSE standards (Kozhavska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019). Project Success for all kinds of projects is critical for organizations across various industries (Pinto & Slevin, 1988). Risk Management associated with these projects plays a pivotal role in achieving desired outcomes (Chapman & Ward, 2003). HSE aspect of Project Management pertains to the protection of human life, the environment, and the overall well-being of the work-force, making it a particularly sensitive and crucial dimension (NEBOSH, 2022; HSE, 2013).

Historically, projects that lack a comprehensive approach to Risk Management have faced increased weaknesses, including cost overruns, schedule delays, damage to an organization's reputation, and most significantly, potential harm to people and environment (Pinto & Slevin, 1988; Wysocki, 2019). In contrast, projects that prioritize in HSE and Risk Management often exhibit a greater likelihood of success, characterized by on-time completion, adherence to budget constraints, and a demonstrated commitment to HSE (NEBOSH, 2022; HSE, 2013).

Risk Management strategies encompass a wide array of practices and methodologies aimed at identifying, assessing, mitigating, and monitoring potential risks associated with projects (Pinto & Slevin, 1988; Chapman & Ward, 2003; Bartlett, 2004; Hillson, 2009; Kendrick, 2009; B. Tayntor, 2010; Koradecka, 2010; Wysocki, 2014). The application of these strategies is vital for ensuring the successful execution of projects while minimizing negative impacts on HSE (NEBOSH, 2022; HSE, 2013). However, there continues to be significant interest to research into the integration of Risk Management practices within Project

Management and their specific impacts on Project Success within the HSE context (Kozhovska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019).

In this context, this master's thesis aims to explore the intricate relationship between Risk Management and Project Success, with a particular focus on the HSE aspect. It seeks to address the key questions shown in Figure 1.

The researcher became interested in this subject because of:

1. Academic interest
2. The concerns for HSE issues in the Project Management have increased. Recently HSE performance has become an important measure for evaluating Project Success.
3. During research proposal presentation, the researcher got these constructive questions and comments.

The lack of awareness regarding the significance of HSE among the attendees was evident, prompting me to delve deeper into the subject. The questions and comments raised by the participants provided me with added incentive to proceed with this research topic, in order to provide comprehensive explanations and address their inquiries. Additionally, the researcher aims to underscore the paramount importance of HSE in both Project Management and everyday tasks.

Drawing from the researcher's professional experience, it becomes apparent that HSE plays a pivotal role in the initiation of any project (Kozhovska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019). In the absence of HSE standards, commencing project implementation becomes a challenging proposition (NEBOSH, 2022). This is particularly salient due to the critical role that Risk Management assumes within the realm of Project Management, and its capacity to enhance project outcomes significantly (Kozhovska, 2018; Wysocki, 2014). Within the HSE, the importance of Risk Management stands out because it has a direct influence on

the safety and well-being of personnel, in addition to its implications for environmental preservation (Kozhovska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019).

The primary objective of this research is to investigate and assess the impact of Risk Management on Project Success, specifically within HSE. By exploring the relationship between Risk Management practices, HSE performance, and project outcomes, the research will provide visions into how Risk Management and HSE performance can be effectively implemented to improve each other's and Project Success.

This master's thesis will contribute to a deeper understanding of the relationship between Risk Management practices and the achievement of successful project outcomes, with a specific emphasis on the critical HSE dimension. Highlighting on the dynamics of Risk Management, it aims to provide valuable insights for project managers and organization helping them make more informed decisions and adopt best practices in the pursuit of both Project Success and HSE excellence.

1.2 Research Gap

While extensive research has been conducted on the relationship between Risk Management and Project Success in various industries, there is a notable gap in the literature specifically addressing the unique context of HSE within Project Management. This research gap necessitates an in-depth investigation into how Risk Management Practices and strategies influence the overall projects success that prioritize HSE considerations. While some studies (Ershadi, Edrisabadi, & Shakouri, 2019; Hajipour, Amouzegar, Gharaei, Abarghoei, & Ghajari, 2021; Ahmadvand, Arjmandi, Mohammadi, Mazloumi, & Mirzahosseini, 2020; Khalid, Sagoo, & Benachir, 2021; Kozhovska, 2018; Kazerouni, Chinniah, & Agard, 2013) have touched upon the importance of HSE in Project Management, a comprehensive understanding of the specific mechanisms, tools, and best

practices related to Risk Management and Project Success within the HSE context remains underexplored. Thus, there is a need for empirical research to bridge this gap and contribute to the knowledge base, enabling more effective Project Management in sectors where HSE is a critical concern.

1.3 Research Questions

The purpose of this master's thesis is to explore the profound relationship between Risk Management and Project Success within the context of HSE. It is well understood that effective Risk Management is fundamental to Project Success, as it allows for the proactive identification, assessment, and mitigation of potential issues, thereby minimizing disruptions and enhancing project outcomes. However, in the specific realm of HSE, the interplay between Risk Management practices and Project Success remains a subject that demands deeper examination. This research seeks to address several key questions in an effort to comprehensively understand the dynamics at play within the intersection of Risk Management, HSE, and Project Management.

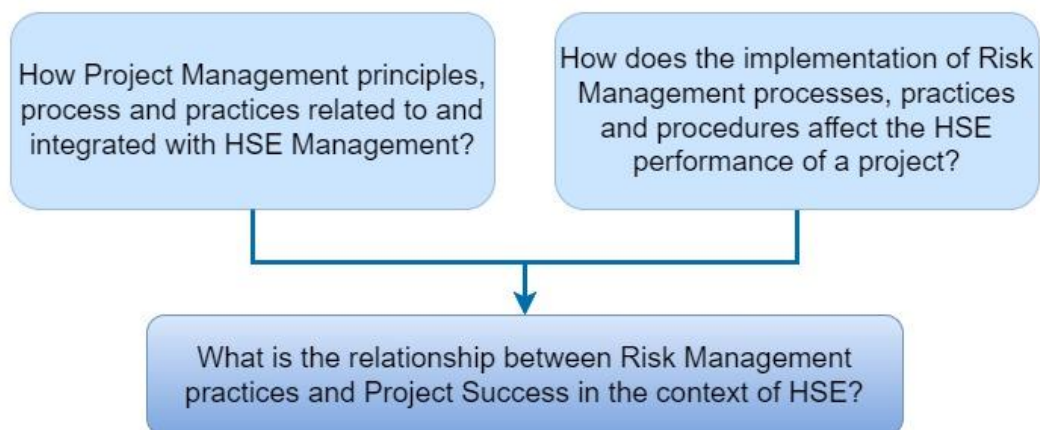


Figure 1. Research Questions

In the following sections, we will delve deeper into each of these research questions, drawing upon relevant literature, data analysis, and expert opinions to illuminate the complex interplay between Risk Management, HSE, and Project Success.

1.4 Theoretical Framework

The theoretical framework of this thesis is considered integrating concepts from various academic disciplines such as Project Management, Risk Management, and HSE Management as it shown in Figure 2.

Project Management is the first part to explain the fundamental principles, processes and practices of Project Management to know how they relate to HSE Management.

Risk Management is the second part to explain the processes, and practices of Risk Management and their contribution to Project Success, and to understanding how Project Management practices could be integrated with HSE Management practices to ensure Project Success.

The last part is HSE Management to explain the principles and practices of HSE Management and their contribution to Project Success.

According to the three parts above, both first and second sub research question will be answered: *“How Project Management principles, process and practices related to and integrated with HSE Management?”* *“How does the implementation of Risk Management processes, practices and procedures affect the HSE performance of a project?”*

The main research question will be answered based on interviews and last case studies related: *“What is the relationship between Risk Management practices and Project Success in the context of HSE?”*

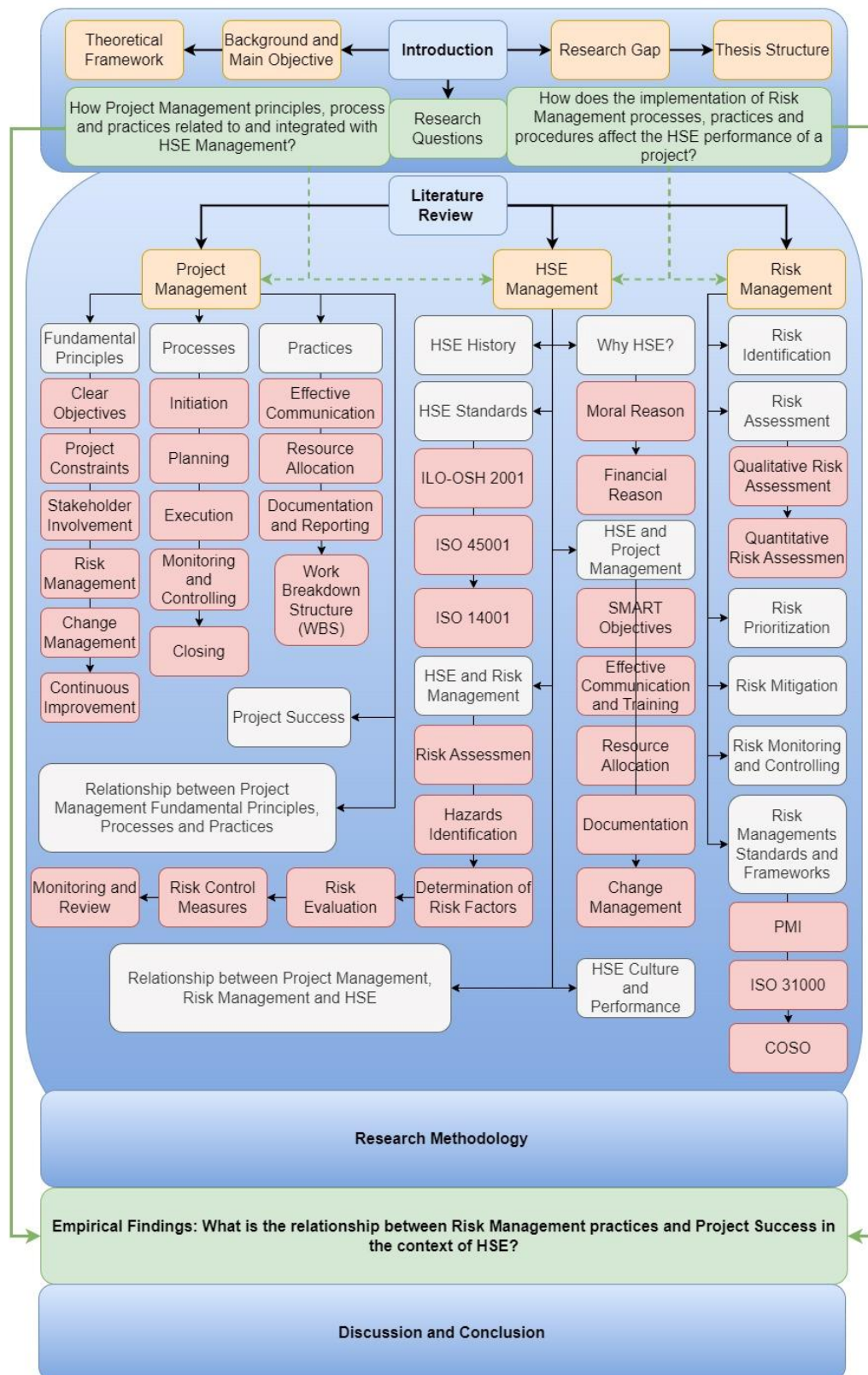


Figure 2. Theoretical Framework

1.5 Literature Review

In the dynamic landscape of contemporary Project Management, the successful execution of projects has become increasingly reliant on a comprehensive understanding and effective management of risks (B. Tayntor, 2010; Wysocki, 2014). The integration HSE considerations into the Project Management framework has further compounded the intricacies of this field (Kozhovska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019). As organizations across the globe grapple with the dual imperatives of achieving Project Success and safeguarding the health and well-being of their employees and the environment, the interplay between Risk Management and HSE practices has emerged as a critical determinant of project outcomes (Kozhovska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019).

The complex and often unpredictable nature of projects in various industries, including construction, engineering, and manufacturing, renders them inherently susceptible to a wide array of risks (B. Tayntor, 2010; Chapman & Ward, 2003; Wysocki, 2014; PMBOK® Guide). These risks, if left unaddressed or inadequately managed, can have significant consequences, not only in terms of project delays and cost overruns but also in terms of human safety and environmental sustainability (NEBOSH, 2022; Koradecka, 2010; Kishk & Ukaga, 2008; OSHA, 1970). In response to these challenges, organizations have increasingly recognized the need to develop robust Risk Management strategies that account for HSE considerations, leading to the emergence of a specialized domain where Risk Management and HSE converge (Kozhovska, 2018; Ershadi, Edrisabadi, & Shakouri, 2019).

This thesis seeks to explore the multifaceted relationship between Risk Management and Project Success within the context of HSE. It aims to delve into the theoretical underpinnings and empirical evidence surrounding this intersection, shedding light on the pivotal role played by Risk Management

practices in the achievement of project objectives, the enhancement of HSE performance, and the overall sustainability of projects. Moreover, this research will also consider the reciprocal influence, where HSE concerns themselves may impact Risk Management strategies, shaping the broader project landscape.

In an era where project failures can result in profound financial losses, damaged reputations, and even legal liabilities, it is crucial to understand how Risk Management tailored to HSE requirements can mitigate or avert adverse consequences (Chapman & Ward, 2003; Hillson, 2009; Wysocki, 2014). Furthermore, as global awareness of environmental and safety concerns continues to rise, an examination of how Risk Management intersects with HSE practices provides valuable insights for organizations aiming to align their Project Management strategies with sustainable and ethical principles (NEBOSH, 2022).

This literature review aims to provide a comprehensive survey of the existing body of knowledge on the impact of Risk Management on Project Success within the HSE context. Through a systematic analysis of prior research, theoretical frameworks, case studies, and practical insights, this study seeks to identify patterns, gaps, and areas of consensus in the field.

1.6 Thesis Structure

Table 1 shows a summary of the thesis structure, consisting of seven main chapters. Table 2 shows the summary of research background, with the topic to be focused on with the scientific resources.

Table 1. Thesis Structure

Section	Method	Description
2 Project Management	Literature Research	Clear definition of Project Management, to identify the real factors for Project Success, Risk Management and HSE.
3 Risk Management	Literature Research	
4 HSE Management	Literature Research	
5 Research Methodology		To assign research design, research methods, and the approach to collecting and analyzing data. To find the evaluation criteria of reliability and validity.
6 Empirical Findings	Interviews	Collecting data by interviews to be ready for identification step, then analyzing these data to be ready to answer the main research question and find the conclusion.
7 Discussion and Conclusion	Data Synthesis	Synthesis between Interviews and Literature to find the relationship between Risk Management, Project Success and HSE.

Table 2. Summary of Research Background

Topic	Scholars
Project Management	(Atkinson, 1999) (B. Tayntor, 2010) (Wysocki & McGary, 2003) (Wysocki, 2014) (Turner, 1996) (Wirth & Tryloff, 1995) (PMBOK® Guide) (PRINCE2 methodology) (Oisen, 1971) (Kerzner, 2022)
Project Success	(Cooke-Davies, 2002) (Jugdev & Müller, 2005) (Kishk & Ukaga, 2008) (Pinto & Slevin, 1988) (Shenhar, Dvir, Levy, & Maltz, 2001) (Atkinson, 1999) (B. Tayntor, 2010) (Wysocki, 2014) (Turner, 1996) (Wirth & Tryloff, 1995) (PMBOK® Guide) (Kerzner, 2022) (Lim & Mohamed, 1999)
Risk Management	(Bartlett, 2004) (Chapman & Ward, 2003) (Junior & Carvalho, 2013) (Kendrick, 2009) (Kishk & Ukaga, 2008) (Sabir, et al., 2020)
Risk Management Standards	(Edirimanna, 2019) (IRM, 2002) (IRM, 2018 b) (IRM, 2018 a) (ISO-31000, 2018) (Kumar, 2021)
HSE Management	(NEBOSH, 2022) (OSHA, 1970) (HSE, 1974 - 2023) (HSE, 2013) (ILO, 1919 - 2023) (Koradecka, 2010)
HSE Standards	(ILO-OSH 2001, 2009) (ISO-45001, 2018) (ISO-14001, 2015)
HSE Management, Project Management and Risk Management	(Ahmadvand, Arjmandi, Mohammadi, Mazlouni, & Mirzahosseini, 2020) (Ershadi, Edrisabadi, & Shakouri, 2019) (Kazerouni, Chinniah, & Agard, 2013) (Khalid, Sagoo, & Benachir, 2021) (Kozhovska, 2018) (Hajipour, Amouzegar, Gharaei, Abarghoei, & Ghajari, 2021)
Research Methodology	(Bloomberg & Volpe, 2019) (Bairagi & Munot, 2019) (Bryman, 2012) (Yin, 2018)

2 PROJECT MANAGEMENT

First, we need to define Project Management because a clear definition of Project Management can help to ensure that everyone involved in any project to understand the roles and responsibilities of the project manager, the project team, and the stakeholders to reach the Project Success. Project Success is one of the main elements in main research question.

Atkinson (1999) mentioned that there are many attempts to define Project Management, Oisen (1971) referencing views from the 1950's, may have been one of the early attempts. Project Management is the application of a collection of tools and techniques to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints (Atkinson, 1999). Project Management could be described as the art and science of converting vision into reality (Turner, 1996).

Wirth and Tryloff (1995) compare six different documents that attempt to define the Project Management Body of Knowledge (PMBOK®), they didn't provide a single definition of Project Management, but their article helped to define Project Management by providing a comprehensive overview of the different aspects of Project Management.

Tayntor (2010) defines management as "the act or art of directing". She defines a project as a unique, finite set of multiple activities intended to accomplish a specific goal. It should be noted that the adjectives in this definition are critical, because they differentiate a project from other types of activities (B. Tayntor, 2010).

PMBOK® Guide defines a project as a temporary endeavor undertaken to create a unique product, service, or result. A project is temporary in the sense that it has a definite beginning and end. It is also unique in that it is different from other projects that have been done before.

Wysocki (2014) offer two definitions and he mentioned the that second one is better for our consideration, first he is defined project as a sequence of unique, complex, and connected activities that have one goal or purpose and that must be completed by a specific time, within budget, and according to specification. The second one is a project is a sequence of finite dependent activities whose successful completion results in the delivery of the expected business value that validated doing the project.

By highlighting on the two of the most popular and widely used Project Management methodologies, namely the PMBOK® Guide and the PRINCE2, so we will try to find a suitable definition of Project Management.

The PMBOK® Guide published by IPM is the most widely used PMBOK document in the world. IPMA's system facilitates project managers and organizations to ensure that they have the right Project Management skills in place to deliver their projects (Turner, 1996). It is a comprehensive guide to Project Management that covers all aspects of the project lifecycle, from initiation to closure. PMBOK® Guide defines Project Management as an application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

PRINCE2 methodology (developed by the UK government) is a more structured approach to Project Management that is focused on delivering projects on time, within budget, and to the required quality standards. The PRINCE2 methodology defines Project Management as an application of a structured approach to the management of a project to ensure that it meets its objectives in terms of time, cost, quality, and benefits to the business.

In the researcher's perspective, it is difficult to find specific definition of Project Management, because Project Management is a complex and multifaceted system that can be applied to a variety and wide projects, but it is so easy to find common elements, principles, processes, tools and techniques these are generally included in most definitions of Project Management.

So, we can say Project Management is a structured approach to planning, executing, controlling, and closing projects in order to achieve specific goals and objectives within defined constraints such as time, budget, scope and quality.

2.1 Project Success

Pinto and Slevin (1988) provide a foundational understanding of how Project Success can be defined and measured. It emphasizes the need for clear criteria and discusses the importance of multiple success dimensions. Atkinson (1999) challenges the traditional iron triangle view of Project Success (cost, time, and quality) and suggests considering other criteria to evaluate Project Success. Lim and Mohamed (1999) offer an in-depth exploration of criteria for Project Success, highlighting the importance of stakeholder satisfaction and other dimensions beyond traditional constraints. Cooke-Davies (2002) discusses the significance of real success factors, emphasizing the broader context in which projects operate and the influence of organizational culture on success. Shenhar, Dvir, Levy, and Maltz (2001) introduce the concept of multidimensional Project Success, which considers both the project's efficiency and its strategic impact. Jugdev and Müller (2005) provide a retrospective view of the evolving understanding of Project Success, emphasizing the importance of aligning success criteria with the project's nature and objectives.

Pinto and Slevin (1988) discuss that Project Success is a complex phenomenon that cannot be adequately captured by a single measure. They propose a framework for measuring Project Success that includes three dimensions: technical validity, organizational validity, and organizational effectiveness. They mention that each of these dimensions is important for Project Success, and that a project cannot be considered successful if it meets only one or two of these criteria. They also discuss that it is important to consider the perspectives of different stakeholders when measuring Project Success. Atkinson (1999) mentioned that the traditional success criteria for Project Management as triple

constraints: cost, time, and quality are not sufficient, and focusing on these three criteria to the exclusion of others can lead to inaccurate assessments of Project Success. Atkinson calls these constraints two best guesses and a phenomenon because cost and time are difficult to estimate accurately at the beginning of a project, and quality is a complex and subjective concept. Atkinson (1999) suggest other success criteria in addition to the three constraints, such as **stakeholder satisfaction**, **customer benefit**, and **strategic alignment**. In Figure 3, these three other success criteria could be represented as The Square Route to understanding Project Management success criteria.

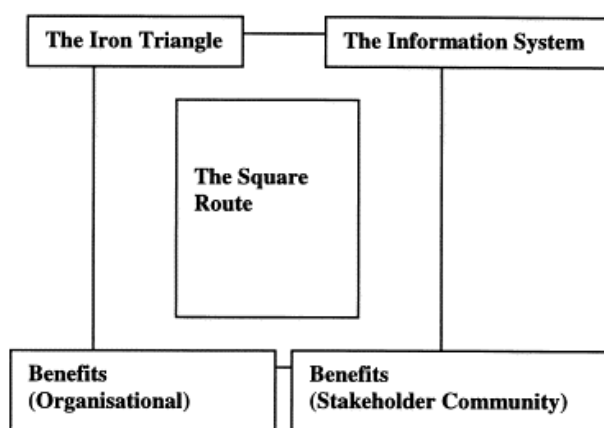


Figure 3. The Square Route (Atkinson, 1999)

The Square Route is framework for measuring Project Success created by Atkinson (1999). In the researcher's opinion, it is correct that the traditional triple constraints are not sufficient for Project Success. Consequently, the researcher has decided to adopt alternative success criteria in this thesis.

Lim and Mohamed (1999) discuss that traditional criteria, such as on-time, on-budget, and within-scope completion are not sufficient to determine whether a project is truly successful. Instead, they suggest that we should consider two broader criteria: **completion** and **satisfaction**. They say that both completion and satisfaction are necessary for a project to be considered successful. A project may be completed on time and within budget, but if it does not meet the needs of its stakeholders, it cannot be considered a success. Conversely, a project may

not be completed on time or within budget, but if it meets the needs of its stakeholders, it can still be considered a success.

Cooke-Davies (2002) confirms that there are 12 critical factors for Project Success. He mentioned that the real success factors on projects are those that are essential for delivering value to stakeholders. These factors go beyond traditional Project Management practices and include things like clear and measurable objectives, top management support, and a skilled and motivated project team. He mentioned that Project Success is not just about meeting the project's objectives on time and within budget, but also about delivering the right project for the right reasons. He also believes that it is important to consider the organizational context in which projects are taking place. He argues that projects are more likely to be successful if they are aligned with corporate strategy and if they are supported by a culture that values Project Management. His point of view is that Project Success is a complex phenomenon that is influenced by a variety of factors. He believes that it is important to focus on the "real" success factors, which are those that are essential for delivering value to stakeholders.

Shenhar, Dvir, Levy, and Maltz (2001) mention that Project Success is a complex concept that can be viewed from multiple perspectives. They argue that traditionally, projects have been perceived as successful if they meet time, budget, and performance goals. However, they argue that this is a narrow view of success, and that there are other important dimensions that need to be considered such as: project efficiency, impact on the customer, direct business and organizational success, and preparing for the future. They emphasize that the importance of these different dimensions of Project Success can vary depending on the specific project, the stakeholders involved, and the time frame as it is shown in Figure 4. For example, a project that is developing a new product for a major customer may place a greater emphasis on customer satisfaction and

direct business success, while a project that is developing a new internal system may place a greater emphasis on efficiency and preparing for the future.

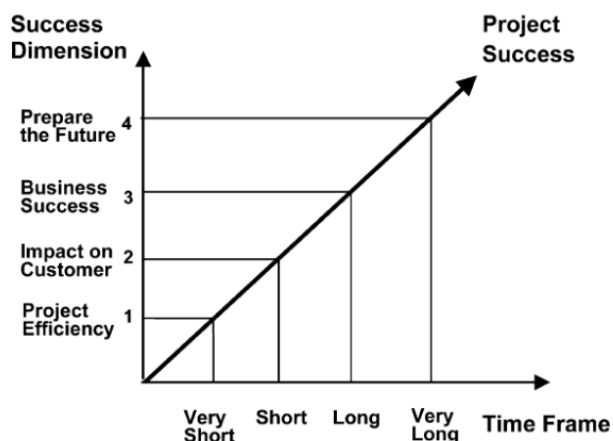


Figure 4. Time Frame of Success Dimensions (Shenhar, Dvir, Levy, & Maltz, 2001)

Shenhar, Dvir, Levy, and Maltz (2001) discuss that project managers need to have a broader understanding of Project Success, and that they need to work with stakeholders to identify the most important dimensions of success for each project. They also discuss that organizations need to create a culture that supports project managers in taking on a more strategic role, and that recognizes the importance of Project Success to the overall success of the organization.

Jugdev and Müller (2005) discuss that our understanding of Project Success has evolved from a narrow focus on the implementation phase to a more holistic view that encompasses the entire project and product lifecycle. They also argue that Project Success is increasingly being seen as a strategic asset, rather than simply an operational one. They support their argument by reviewing the literature on Project Success and identifying several key trends. First, they note that there has been a shift from defining Project Success in terms of meeting the original project goals to defining it in terms of delivering value to the organization. Second, they note that there has been a growing recognition of the importance of stakeholder satisfaction in Project Success. Third, they note that Project Success is increasingly being seen as a continuous process, rather than a

one-time event. Based on Jugdev and Müller (2005) analysis, they conclude that Project Success is a complex and multifaceted concept that cannot be defined by a single criterion. They emphasize that project managers need to take a holistic approach to Project Success, considering all of the relevant factors, including project goals, stakeholder satisfaction, value delivery, and continuous improvement. Their view is that Project Success is not just about meeting the original project goals, but about delivering value to the organization and meeting the needs of all stakeholders. They also believe that Project Success is a continuous process, and that project managers should always be looking for ways to improve their projects. This view of Project Success is more aligned with the current understanding of Project Management as a strategic asset. Project Management is no longer just about managing individual projects, but about helping organizations to achieve their strategic goals. Project managers who take a holistic approach to Project Success are better positioned to help their organizations achieve their strategic objectives.

Project Success is a multifaceted concept that involves the realization of predefined objectives and the satisfaction of various stakeholders. It is commonly assessed along several dimensions, including scope achievement, adherence to schedule and budget, quality of deliverables, stakeholder satisfaction, Risk Management, and long-term impact.

Project Success can be defined in various ways, and it often depends on the specific goals and objectives of the project, as well as the perspective of the stakeholders involved. Its definition can vary based on the project's nature, goals, and stakeholders involved.

According to the literature review of the most common articles and books related to Project Management and Project Success, there are different principles, processes, tools and techniques to ensure Project Success. Success

factors has been classified as shown in Figure 5 to three groups, these groups will be used as relevant and basic elements until the end of this master thesis.



Figure 5. Success Factor for Projects

2.2 Project Management Fundamental Principles

As shown in Figure 5, success factors have been classified into three groups, the fundamental principle is the first group which contains several factors, such as clear objective, project constraints, stakeholder involvement, Risk Management, change management and continuous improvement. The fundamental principles can be the guidelines and values that underlie Project Management. Below we will outline the key fundamental principles of Project Management.

2.2.1 Clear Objectives

Projects must have well-defined objectives and goals that are specific, measurable, achievable, relevant, and time-bound (SMART). These objectives provide a clear direction for the project team and should be documented and understood by all stakeholders to provide a clear sense of purpose (Wysocki,

2014). This principle ensures that all stakeholders understand what the project aims to achieve, helping to maintain focus throughout the project's lifecycle (PMBOK® Guide). Project Success hinges on defining clear and achievable objectives. PMBOK® Guide emphasizes the importance of defining project objectives to guide the project team effectively.

2.2.2 Project Constraints

Projects are often limited by constraints such as time, cost, scope, and quality. As shown in Figure 6, project managers need to balance these constraints to ensure successful outcomes. Three elements have been constrained (time (schedule), resources (people and budget) and scope (functionality to be delivered)) (B. Tayntor, 2010).

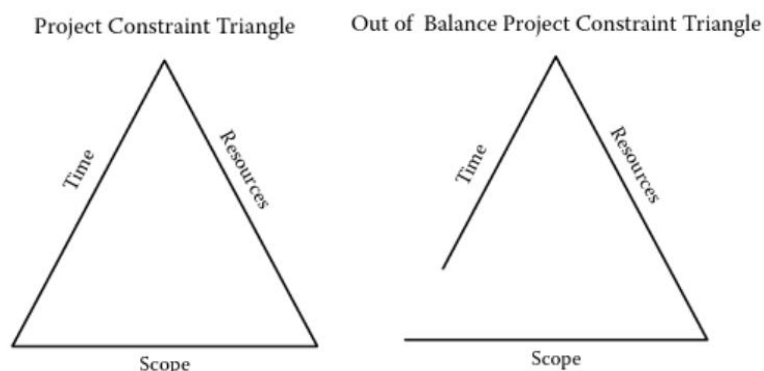


Figure 6. Project Constraints Triangle (B. Tayntor, 2010)

The Scope Triangle, also known as the Project Management Triangle or Iron Triangle, is a graphical representation of the three primary constraints that project managers must balance in any project: scope, time, and cost. The key concept of the Scope Triangle is that if you want to change one constraint (e.g., increase the scope), it will likely impact the other two constraints (e.g., time and cost). Balancing these constraints is crucial for Project Success. Wysocki (2014) mentioned that Iron Triangle and these three variables beside the triangle are good, but we should consider as well following constraints (scope, quality, cost, time, resources and risk) as shown in Figure 7.

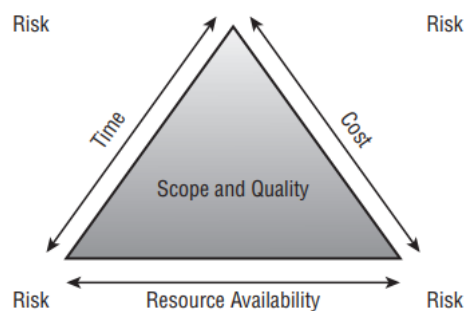


Figure 7. The Scope Triangle (Wysocki, 2014)

A constraint is a limiting factor that affects the execution of a project, program, portfolio, or process (PMBOK® Guide). Project constraints refer to a broader set of limitations, conditions, and factors that can affect a project's success. The PRINCE2 recognizes several constraints that can affect Project Success. These constraints are essential to consider in order to effectively manage a project such as (time, cost, quality, scope, risk and benefits). While the Scope Triangle focuses on the three primary constraints, project constraints encompass a wider range of variables that may influence the project. Project constraints can include, but are not limited to (scope, time, cost, quality, risk, resources, stakeholders, and technology).

The Scope Triangle is a subset of project constraints that emphasizes the interrelationship between scope, time, and cost, project constraints cover a more extensive range of factors that project managers need to consider when planning and executing a project. Kerzner (2022) discusses project constraints, such as (time, cost, and scope) and secondary factors like (resource availability, Risk Management, and stakeholder expectations) as they relate to Project Management. He emphasizes the importance of understanding and managing project constraints effectively to ensure a successful project. Secondary factors are additional considerations that can impact a project but are not as critical as the primary constraints. He also emphasizes that both primary constraints and secondary factors are carefully considered to achieve Project Success.

2.2.3 Stakeholder Involvement

Pinto and Slevin (1988) discuss the importance of considering the perspectives of different stakeholders when measuring Project Success. Different stakeholders may have different expectations for a project, and it is important to consider these different expectations when determining whether a project has been successful. Lim and Mohamed (1999) suggest that we should focus on the needs of stakeholders and not just on meeting the project's budget, schedule, and scope. Cooke-Davies (2002) emphasizes the importance of aligning projects with corporate strategy and ensuring that they are delivering value to stakeholders.

Engaging stakeholders is fundamental in Project Management. Involving stakeholders ensures their interests, expectations, and concerns are considered throughout the project's life cycle (PMBOK® Guide).

Stakeholder management is critical to Project Success. Effective communication and stakeholder engagement are core principles and are key to managing expectations and resolving issues (Kerzner, 2022). Wysocki (2014) mentioned that identifying and engaging with all relevant stakeholders is crucial. Identifying stakeholders will be during the first part of the Project Management processes which it is in initiation phase, later we will discuss that on (2.3.1 initiation).

2.2.4 Risk Management

Risk Management is a fundamental part of Project Management principles. It involves identifying, assessing, and mitigating potential risks that could impact a project's success. As shown in Figure 7, Wysocki (2014) mentioned that risk is not an integral part of the scope triangle, but it is always present and spans all parts of the project both external as well as internal, and therefore it does affect the management of the other five constraints. In section (3 Risk Management), we will delve further into a detailed discussion on the subject of Risk Management.

2.2.5 Change Management

Change is one of the factors that affect Project Success (Lim & Mohamed, 1999). Changes can be an opportunity to improve the project (Cooke-Davies, 2002). He emphasizes that organizations need to be prepared to manage changes effectively in order to achieve Project Success. Chapman and Ward (2003) mentioned that change is inevitable on any project, and it is important to have a process in place to manage it effectively. They identify two types of change (planned and unplanned changes) both can pose risks to the project, and the authors recommend that project managers use a change management process to identify, assess, and manage these risks. In PMBOK® Guide change management is not a primary focus, but it is an important aspect that is addressed within the context of Project Management. PMBOK® Guide describes change management in the context of Project Management as the process of controlling changes to the project scope, schedule, and costs. It emphasizes the importance of change control to ensure that project changes are properly identified, evaluated, and approved, and that they are managed in a way that minimizes negative impacts on the project's objectives. Change may be positive, it may be negative, but it always has an impact (B. Tayntor, 2010). She argues that it is much easier and more cost effective to make changes in the planning phases of a project rather than later on. She also states that project managers need to be prepared to manage change throughout the project lifecycle.

2.2.6 Continuous Improvement

Lessons learned from past projects should be used to improve future projects. This iterative approach contributes to better Project Management practices. PMBOK® Guide emphasizes the importance of Continuous Improvement throughout the project lifecycle. It is strongly supporting the use of continuous improvement on projects. It recognizes that continuous improvement is essential for Project Success in today's dynamic and competitive environment. Wyszocki

(2014) discuss that continuous improvement is necessary because the world is constantly changing and project teams need to be able to adapt quickly in order to be successful. According to his view, continuous improvement is an essential element of effective Project Management that can help teams to deliver better results, improve efficiency and productivity, reduce risk, and create a more positive and engaged work environment.

2.3 Project Management Processes

Project Management processes provide a structured approach to managing and handling projects. The PMBOK® Guide is a widely accepted source for these processes shown in Figure 8. The PMBOK® Guide acknowledges and integrates the principles of the Plan-Do-Check-Act (PDCA) model (Shewhart cycle) into its framework for Project Management. The relationship between the PMBOK® Guide and the PDCA model is one of alignment and integration.

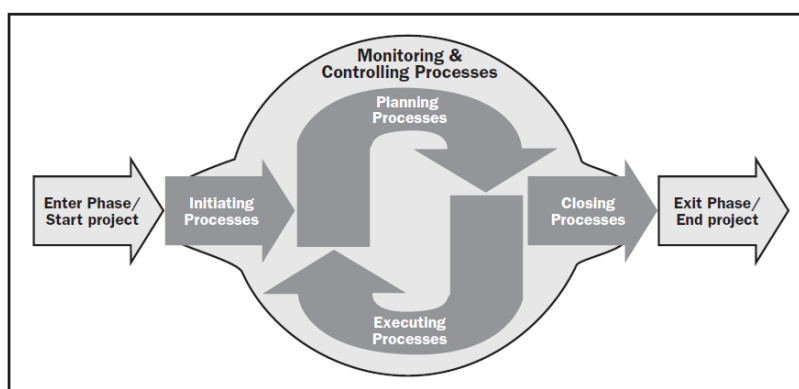


Figure 8. Process Groups (PMBOK® Guide)

2.3.1 Initiation

This phase involves defining the project's scope, and establishing project objectives. A project charter is typically created, outlining the project's purpose, scope, stakeholders, initial budget, and overall feasibility to formally authorize the project's initiation. This is in alignment with the PMI's initiation processes in PMBOK® Guide.

Wysocki (2014) named this phase as scoping, and he finds scoping instead of initiating is clearer. Identifying stakeholders is important in the phase. In the initiation phase these following answers need to be answered who, what, where, when and why (B. Tayntor, 2010). She mentioned that the main objective of this phase is to reduce unrealistic expectations. Kerzner (2022) and Wysocki (2014) based on PMBOK® Guide, they confirmed that assigning project manager, documents preparation and project approval are important in this phase.

We confirmed that clear objective presented in 2.2.1. and stakeholder involvement presented in 2.2.3 are two of the main elements of Project Management fundamental principles, and here in this part we discussed how to make clear objective and identifying the stakeholders.

2.3.2 Planning

This phase involves creating a detailed project plan. This includes defining tasks, assigning responsibilities, resource allocation, defining scope, creating a schedule, setting budget, quality, estimating resources, Risk Management plan, change management, and communication strategies. (Wysocki, 2014)

Planning encompasses creating comprehensive plans for scope, schedule, cost, quality, communication, risk, and resources (PMBOK® Guide). Kerzner (2022) mentioned that work requirements, quality, resources, scheduling the activities and risk evaluation should be defined in this phase. Because expectations were controlled during initiation, it is less likely that this phase will become one of disillusionment (B. Tayntor, 2010).

All plans presented in (2.2.2 project constraints; 2.2.4 Risk Management and 2.2.5 change management) are belong to this phase.

2.3.3 Execution

The PMI emphasizes this phase as the implementation of the project plan (PMBOK® Guide). In this phase, the project plan is put into action. Tasks are assigned, resources are mobilized, teams are organized, and tasks are carried out and work is performed according to the plan. In this phase, plans run in to reality (B. Tayntor, 2010).

Wysocki (2014) called this phase is lunching, because the execution phase as the point at which the project is finally launched and begins to produce tangible results. He argues that the execution phase is the most important phase of a project, as it is when the project team actually delivers the product or service that was promised to the client. He also notes that the execution phase is the phase where most projects tend to go wrong, so it is important to carefully plan and manage this phase.

Wysocki (2014) and Kerzner (2022) mentioned that effective communication, change management processes, and team management are key during this phase. 2.4.1effective communication presented in 2.4.1 and change management presented in 2.2.5 are very important in this phase.

2.3.4 Monitoring and Controlling

Progress is tracked against the project plan. Any deviations are identified, and corrective actions are taken to bring the project back on track. This phase involves performance measurement, quality assurance, and change control (PMBOK® Guide). Continuous monitoring is essential to track progress, compare it to the plan, and take corrective actions when necessary. KPIs are used to measure project health. This phase is to monitor processes and resolve problems before they become effective (B. Tayntor, 2010). Kerzner (2022) and Wysocki (2014) see that discovering and solving problems, reporting project status, monitoring both performance and risks, and change requests are key for this

phase. In this phase it is very important to monitor and control project constraints presented in 2.2.2, Risk Management presented in 2.2.4 and change management 2.2.5.

2.3.5 Closing

Project closure involves finalizing all activities, delivering the project's outputs, obtaining formal acceptance from stakeholders, and closing contracts (PMBOK® Guide). Post project review, post implementation audit or lessons learned session is conducted to capture insights for future projects (Wysocki, 2014). Writing the final report, ensuring all deliverables are accepted, release resources, and documenting lessons learned are key of this phase (B. Tayntor, 2010; Wysocki, 2014; Kerzner, 2022).

2.4 Project Management Practices

Project Management practices are Various practices and methodologies support Project Management. They often aligned with well-established Project Management methodologies and standards, such as PMBOK® Guide and PRINCE2. Project managers and teams select and adapt these practices based on the specific needs and characteristics of their projects to increase the likelihood of successful project outcomes.

2.4.1 Effective Communication

Open and clear communication among team members, stakeholders, and project managers is vital for understanding project requirements, progress, and issues. PMBOK® Guide Establishing clear communication channels and practices is essential for stakeholder engagement. Any project manager must manage communication process as much as the technical process or risk failure (Wysocki, 2014). Communication not only within the team but also to various stakeholders outside of the team (Wysocki, 2014). One of the reasons of the project failure is a lack of communication between project team and customers (B. Tayntor, 2010).

Projects will always involve communications. Effective communication is core principles to resolving issues (Kerzner, 2022).

2.4.2 Resource Allocation

Resource allocation is a fundamental part of Project Management practices. Resource allocation refers to the process of assigning and distributing resources, such as people, time, money, equipment, and materials, to various tasks and activities within a project to ensure its successful completion (PMBOK® Guide). Efficiently allocating and managing resources, including people, time, and budgets, is crucial for Project Success (Kerzner, 2022). Resource allocation practices ensure efficient management of project resources (Wysocki, 2014). There is a significant connection between project constraints presented in 2.2.2 and resource allocation in the context of Project Management. The relationship between them is intertwined, so project managers need to navigate and manage both to ensure successful project outcomes.

2.4.3 Documentation and Reporting

Documentation and reporting are very important part in Project Management practices, it can be used in all Project Management phases and processes (Wysocki, 2014). Ensure the both documentation and reporting are important to use in Risk Management and Change Management by recording potential problems, their mitigation strategies and ensuring that changes are properly authorized (B. Tayntor, 2010; Kerzner, 2022; Wysocki; 2014; PMBOK® Guide). Documentation and reporting facilitate communication among team members and stakeholders (PMBOK® Guide). It ensures that everyone is on the same page, reducing misunderstandings and conflicts.

2.4.4 Work Breakdown Structure (WBS)

WBS is a widely-used practice to decompose project work into smaller, manageable tasks (PMBOK® Guide). The most useful tools used in planning phase are like WBS and Gantt charts are often used (Wysocki, 2014).

2.5 Relationship between Project Management Fundamental Principles, Processes and Practices

Table 3 shows the differences between Project Management Fundamental Principles, Processes and Practices. Figure 9 shows the relationships that the researcher got from literature review so far.

Table 3. Differences between Project Management Fundamental Principles, Processes and Practices

Aspect	Project Management Principles	Project Management Processes	Project Management Practices
Definition	Guidelines and values that underlie Project Management.	A set of steps and activities to manage a project from initiation to closure.	Specific methods, techniques, and tools used in Project Management.
Purpose	Provide a foundation for decision-making and professional conduct in Project Management.	Provide a structured approach to achieve project objectives.	Implement and execute Project Management in real-world scenarios.
Examples	<ul style="list-style-type: none"> • Clear Objective • Project Constraints • Stakeholder Involvement • Risk Management • Change Management • Continuous Improvement 	<ul style="list-style-type: none"> • Initiation • Planning • Execution • monitoring and controlling • Closing 	<ul style="list-style-type: none"> • Effective Communication • Resource Allocation • Documentation and Reporting • WBS

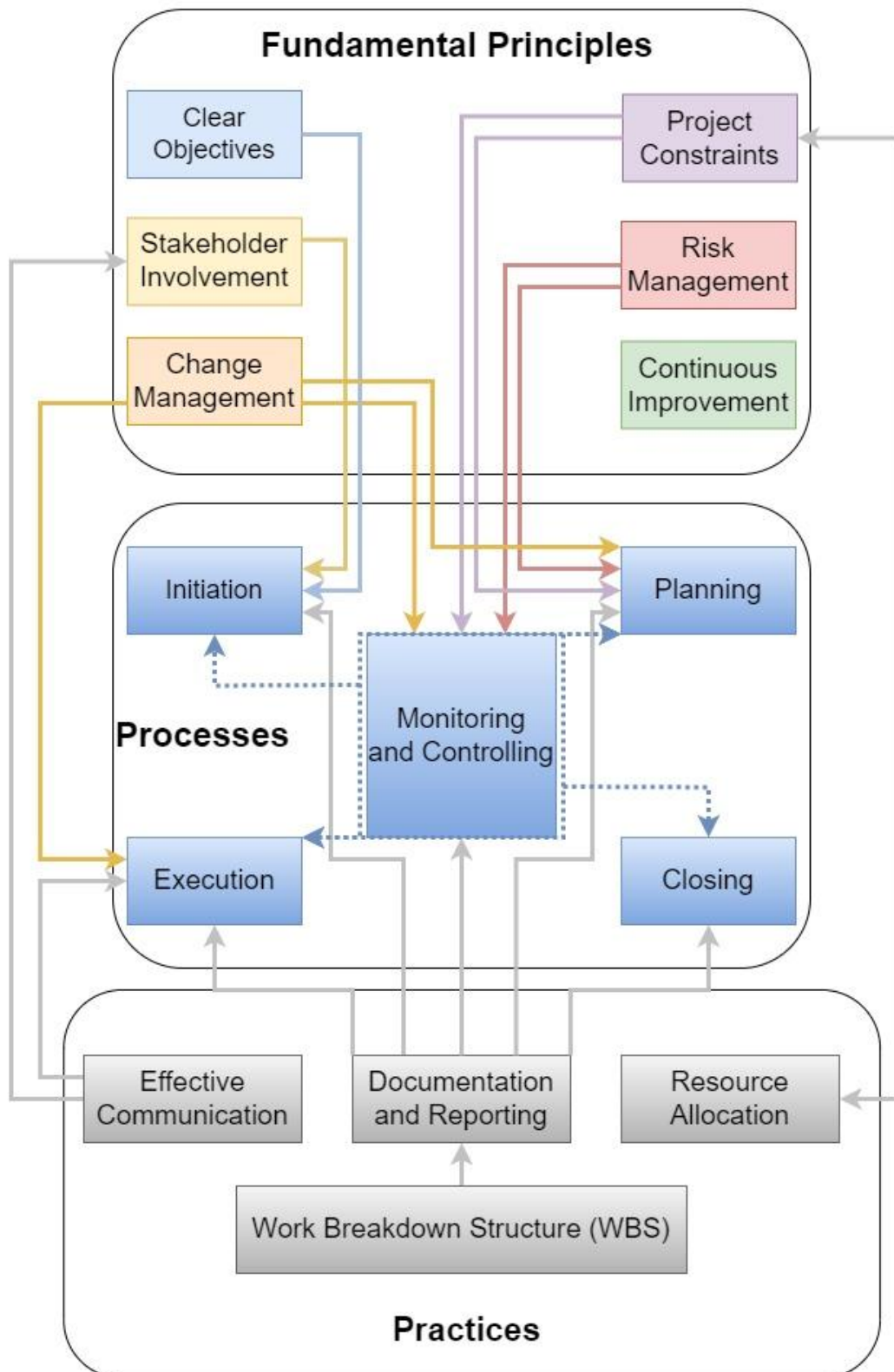


Figure 9. Relationship Between Project Management Fundamental Principles, Processes and Practices

3 RISK MANAGEMENT

In the scholarly work of Pinto and Slevin (1988), a significant emphasis is placed on elucidating the pivotal role of Risk Management in the achievement of Project Success. The authors assert that projects characterized by meticulous management practices tend to exhibit a higher likelihood of success owing to their enhanced capacity to both forewarn and proactively address potential risks and uncertainties.

The pivotal role of proficient Risk Management in Project Success cannot be overstated, regardless of project size (Chapman & Ward, 2003). They underscore the significance of seamlessly incorporating Risk Management across all phases of the project life cycle, encompassing planning, execution, monitoring, and closure. Furthermore, they underscore the necessity for a proactive Risk Management approach, which entails the early identification and mitigation of risks to prevent their adverse influence on the project.

The success of a project is contingent not on the inherent risks, but rather on the efficacy of their management. Risks are an inherent and anticipated facet of Project Management (Cooke-Davies, 2002). However, he maintains that a proactive approach to Risk Management, involving early risk identification and the formulation of contingency plans for deviations from the project plan, is instrumental in their successful mitigation. Moreover, he underscores the pivotal role of transparent communication of risks to stakeholders and the empowerment of project team members in the process of Risk Management.

As shown in Figure 7, risk is not an inherent component within the scope triangle, yet it invariably pervades all facets of a project, encompassing both external and internal dimensions, thus exerting an influence on the management of the other five constraints (Wysocki, 2014).

Effective Risk Management exerts a favorable influence on Project Success, with this connection being subject to moderation by managerial competence. Their investigation revealed that projects featuring superior Risk Management are associated with an increased likelihood of achieving success (Sabir, et al., 2020).

It is imperative for organizations to allocate resources towards enhancing the competencies of their project managers through investments in comprehensive Risk Management training programs. Furthermore, organizations should proactively cultivate a conducive operational environment that empowers project managers to proficiently apply Risk Management methodologies (Sabir, et al., 2020).

The investigation carried out by Junior and Carvalho (2013) has yielded substantial evidence indicating a robust and affirmative association between the adoption of project Risk Management practices and the performance of projects. To elucidate, the findings underscore that organizations which diligently implement a holistic approach to Risk Management are considerably more inclined to realize successful project outcomes. Furthermore, the study's results highlight that the appointment of a dedicated risk manager exerts a favorable influence on project performance. Consequently, these findings advocate for organizations to prioritize investments in the professional training and advancement of risk managers as a strategic means to enhance their overall Project Success rates.

The scholarly contribution by Kishk and Ukaga (2008) furnishes compelling empirical substantiation to underscore the criticality of proficient Risk Management in achieving Project Success. Their work unequivocally advocates for the adoption of rigorous Risk Management protocols by project managers across the spectrum of their projects.

As shown below in Figure 10, all project management processes presented in 2.3 are related with Risk Management.



Figure 10. PMI PMBOK® Links Among Process Groups (Kendrick, 2009)

Effective Risk Management must be considering as a dynamic part of all project. Below is the important part should be planned:

3.1 Risk Identification

One of the fundamental steps in Risk Management is identifying potential risks that could affect Project Success (PMBOK® Guide). Developing a Risk Management plan is a significant part of the project planning process. Risk identification generally occurs as part of project planning activities (Wysocki, 2014). The first step in Risk Management is to understand what risks or problems may occur (B. Tayntor, 2010). The purpose of identification is to enable the risk events to a project to be identified as comprehensively as is possible, practical and cost effective (Bartlett, 2004). Risk identification is one of the nine portrayals of SHAMPU which it is created by Chapman and Ward (2003) to show the purpose of risk identification risk is to identify sources of uncertainty at a strategic level in terms of opportunities and threats. Kendrick (2009) explored in the linkages between project planning and risk identification, and risk identification is essential for Project Success, because it is increasing chances of completing any project on time, within budget, and to the required quality standards. The risk list can be developed in parallel with other project planning

activities as shown in Figure 11. There are four risk categories has been mentioned to be considers in the risk identification template, and these risks are (Technical, Project Management, Organizational and External) (Wysocki, 2014).

RISK CATEGORIES AND RISKS	SCOPE TRIANGLE ELEMENTS				
	Scope	Time	Cost	Quality	Resources
Technical					
Project Management					
Organizational					
External					

Figure 11. Risk Identification Template (Wysocki, 2014)

Identify the risk drivers that may be operative on a given project is the first step of the Risk Management, and ignoring this step effect Project Success. One of the effective methodical processes used to identify the underlying causes of a risk or problem within an organization is RCA (Wysocki, 2014).

3.2 Risk Assessment

Once the risk has been identified, they need to be analyzed to understand their potential impact and likelihood, we can call this process is risk analysis as a first part of this phase. Wysocki (2014) emphasizes the importance of risk assessment and project managers need to manage the risks that might actually occur. Tayntor (2010) underscores the continuous nature of risk assessment, highlighting the importance for project managers to consistently reassess and revise their risk evaluations throughout the course of the project. The main aim of risk assessment is to increase the understanding of each identified risks to be able to take the effective decision (Bartlett, 2004). For effective assessment,

each risk events should be described all relevant characteristics including positive and negative potential impacts on Project Success (Bartlett, 2004).

The assessment of an effective risks in any projects can be undertaken using qualitative and quantitative approach (PMBOK® Guide; Bartlett, 2004; Chapman & Ward, 2003; Kendrick, 2009). Qualitative and quantitative are techniques for doing this effectively may provide either qualitative information for prioritizing risks or quantitative risk measures (Kendrick, 2009). We decided here to focused more on qualitative risk assessment to know how we can prioritize the risks.

3.2.1 Qualitative Risk Assessment

Probability and loss (impact) are the two major factors in risk assessment (Wysocki, 2014). Risk assessment should be made of risk probability and potential impact (Bartlett, 2004; Kendrick, 2009). The risk might be ignored if the probability is high and the impact is low or the probability is low and the impact is high. Risk matrix is one approach of risk assessment as shown in Figure 12 (Wysocki, 2014; Kendrick, 2009).

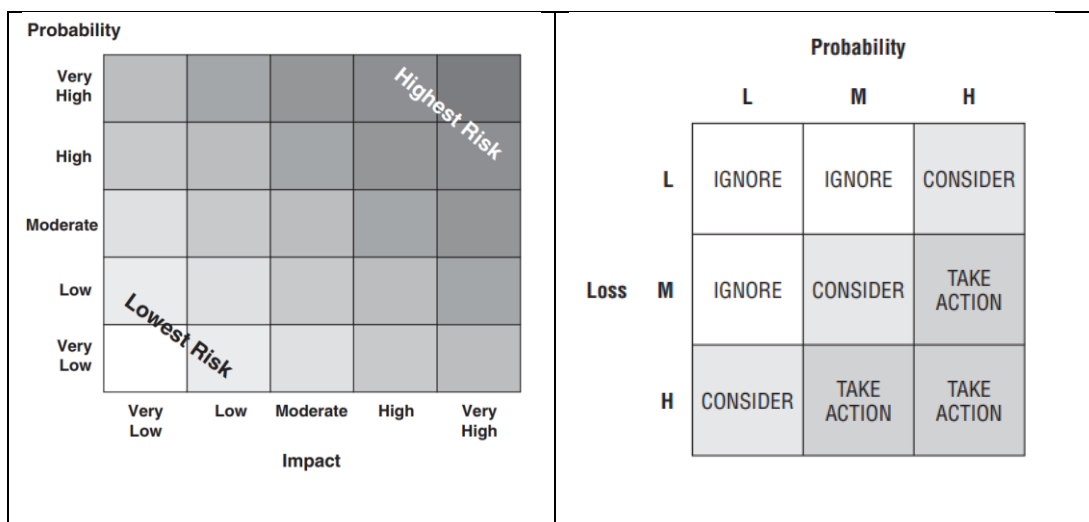


Figure 12. Risk Matrix (Kendrick, 2009) and (Wysocki, 2014)

No probability, no risk (Wysocki, 2014). Probability is number between (0-1) and the decision is based on probability and impact as shown in Figure 12.

Qualitative risk assessment based on both probability and impact, another approach for this is risk assessment table or spreadsheet where risks are listed with category assignments for both probability and impact as shown in Figure 13 (Kendrick, 2009).

Risks	Probability (H/M/L)	Impact (H/M/L)	Overall Risk
Software Guru Is Not Available	M	H	HM
Consultant Is Incompetent	M	M	M
Purchased Component Comes Late	L	H	M
Software Development Is Too Slow	L	M	ML
Needed Test Gear Is Not Available	L	L	L

Figure 13. Example of Risk Assessment Table (Kendrick, 2009)

In general, although different methods for risk assessment exist, they all agree that the decision is based on two main factors which they are probability and impact, regardless of the name difference in some resources.

3.2.2 Quantitative Risk Assessment

Kendrick (2009) quantitative risk assessment involves more effort than qualitative techniques, so qualitative methods are generally used for initial risk sorting and selection. He mentioned that for some risks it may be difficult to develop precise consensus for both the impact and probability. Qualitative tables have their categories for probability and impact replaced by absolute numerical estimates. The cells in risk matrices are transformed into continuous two-dimensional graphs for plotting the estimates.

3.3 Risk Prioritization

Not all risks are equal (B. Tayntor, 2010; Kendrick, 2009). Some are more critical than others. It is necessary to know which risks are most likely to occur and which would have the greatest negative effect (B. Tayntor, 2010). Analysis and prioritization of identified risks comes after risk assessment (Kendrick, 2009).

According to qualitative risk assessment presented in 3.2.1 we discussed the qualitative risk assessment to know how to be able to prioritize risks.

3.4 Risk Mitigation

As much as possible, plan the responses that will be used if the defined risks occur (Wysocki, 2014). He also mentioned that for all the risks listed in the risk identification, we should have some type of action in mind. After risk identification and prioritization, now it is the time to consider certain actions to minimize the likelihood for the risks becoming reality (B. Tayntor, 2010). Mitigate risks is key to prevent any panic (B. Tayntor, 2010). The plan response is to determine appropriate responses for the identified risk (Bartlett, 2004). Risk response is one of the main major processes in PMBOK® Guide. Risk responses involve searching for and classifying primary responses for each primary source identified earlier (Chapman & Ward, 2003).

Risk response is very important to be prepared for the identified risk becoming real to the project, below briefly classified risk responses mostly recommended (PMBOK® Guide; B. Tayntor, 2010; Bartlett, 2004; Chapman & Ward, 2003; Kendrick, 2009; Wysocki, 2014).

Accept/ Evasion: No action required; the organization acknowledges the existence of the risk but chooses not to take any proactive action to mitigate it.

Avoid: The project plan can be modified to avoid any risk created. Avoidance involves taking proactive measures to eliminate the risk entirely.

Contingency Planning / containment: What we will do if the risk event occurs? contingency planning focuses on preparing for the potential occurrence of a risk.

Mitigate: An action required to minimize the impact of risk event occur, is an active approach to Risk Management that aims to enhance the project's ability to achieve success by addressing potential challenges.

Transfer: Pass the impact should the risk event occur, involves shifting the responsibility, impact, or financial consequences of a risk to another party (insurance policy).

3.5 Risk Monitoring and Controlling

Once risk has identified, assessed the probability and impact of the risks, and planned what to do if the risk event occurs, now it is the time to monitor and control the project risks (Wysocki, 2014). Monitor and control make decisions to refine or redefine project plans as required (Chapman & Ward, 2003). The key idea of risk monitoring and control is respond to issues and problems promptly and communicate clearly and often (Kendrick, 2009).

(Wysocki, 2014) emphasizes that Register Log is a powerful document to use in this phase because it is listing all risks need to be managed, to whom has been assigned, and what should be done to manage the risk.

This register log contain: -

- ID Number
- Risk Description
- Risk Owner
- Action to be taken
- Outcome

3.6 Risk Management Standards and Frameworks

Risk Management framework is often described as the risk architecture, strategy and protocols of the organization (IRM, 2018 a). Kumar (2021) and Edirimanna (2019) discuss the COSO and ISO 31000 standards to integrate Risk Management with all organizational processes and that it should be dynamic and responsive to change. It is good know some of these popular standard because these standards help to reach long-term success and sustainability of an organization.

3.6.1 PMI

Developed by Project Management Institute (PMI), 1996 - 2023, Its provides a comprehensive framework for managing risks in projects as shown in Figure 10 (PMBOK® Guide).

Key Processes:

- Risk Management Planning
- Risk Identification
- Qualitative Risk Analysis
- Quantitative Risk Analysis
- Risk Response Planning
- Risk Monitoring and Control

3.6.2 ISO 31000

Developed by ISO to provide principles and guidelines for effective Risk Management. ISO-31000 (2018) is applicable to all organizations, regardless of type, size, activities and location, and covers all types of risk. It is intended for use by anyone who manages risks, not just professional risk managers.

Key Components:

- Establishing the context for Risk Management.

- Risk identification, assessment, and prioritization.
- Risk treatment and monitoring.
- Communication and consultation.

In many organizations, these related components are more closely aligned with the framework (IRM, 2018 a). as per the previous sections we can see that these four components are the main parts of Risk Management as well.

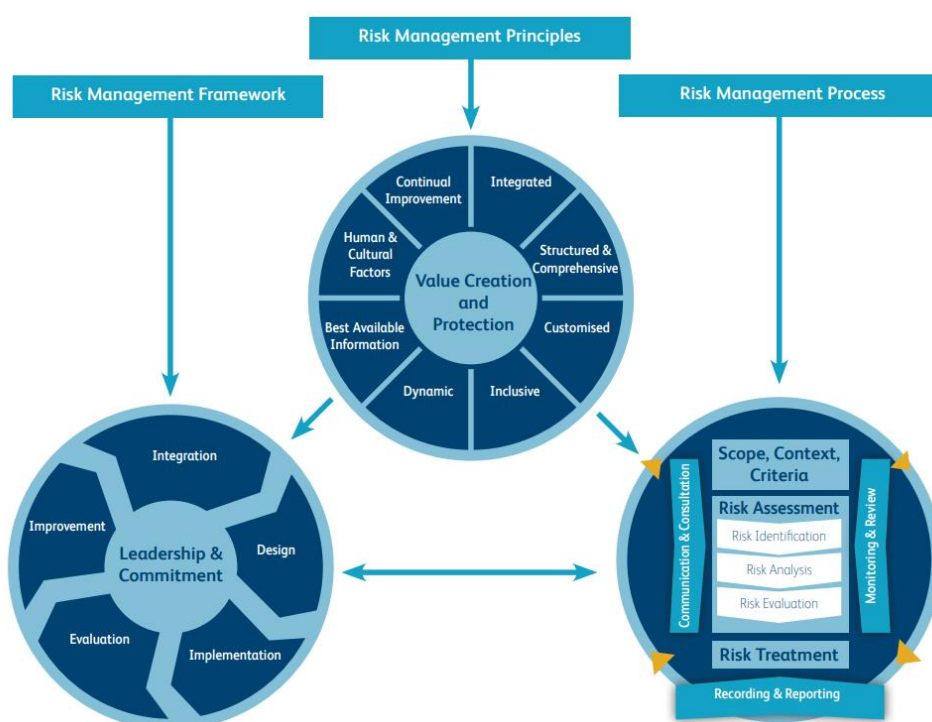


Figure 14. Principles, framework and Risk Management process from ISO 31000

The section of ISO 31000 concerned with the Risk Management process describes risk assessment and risk treatment as being at the center of the Risk Management process (IRM, 2018 a).

This section also includes guidance on:

- scope, context and criteria.
- communication and consultation.
- monitoring and review.
- recording and reporting.

3.6.3 COSO

COSO provides a widely adopted ERM framework. COSO ERM integrates Risk Management into an organization's governance structure. COSO is a recognized body that has published guidance on Risk Management and internal control for some time (IRM, 2018 b).

Key Components:

- Governance and Culture.
- Strategy and Objective-Setting.
- Performance.
- Review and Revision.
- Information, Communication, and Reporting.

The COSO ERM cube remains important and influential because it provides a framework against which Risk Management and internal control systems can be assessed and improved as shown in Figure 15 (IRM, 2018 b).

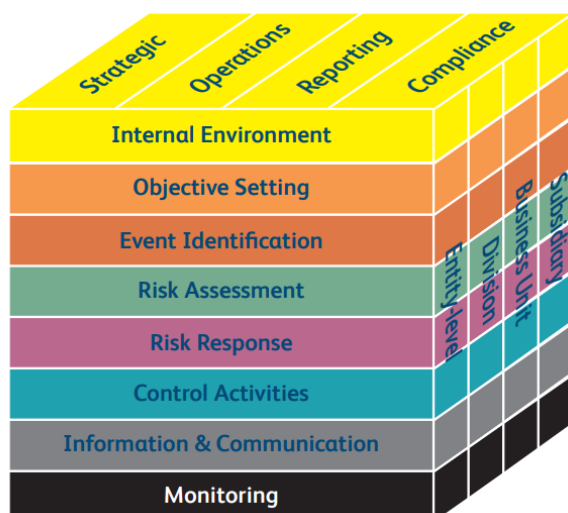


Figure 15. COSO ERM Cube 2004 (IRM, 2018 b)

COSO use the cube to illustrate the links between business objectives on the top of the cube and the eight components shown on the front (IRM, 2018 b).

COSO decided to publish an updated version of their guidance on ERM in 2015 and published an exposure draft in 2016 (IRM, 2018 b). This consultation led to the publication of revised guidance in 2017 entitled ERM – Integrating Strategy and Performance as shown in Figure 16.



Figure 16. Components and Principles of ERM 2017 (IRM, 2018 b)

The 2017 COSO ERM framework clearly differentiates between ERM and internal control and enhances the references to risk appetite and risk tolerance (IRM, 2018 b).

In general, all frameworks and standards have the same aim, IRM (2002) summaries Risk Management process as shown in Figure 17 that gave clear vision about the standards. Every framework has been developed based on future and current innovations for ensuring compliance, making decisions, and building stakeholder confidence.



Figure 17. The Risk Management Process (IRM, 2002)

4 HSE MANAGEMENT

What is HSE? HSE is a stand for Health, Safety, and Environment. It is referred to the practices, policies, and regulations aimed at ensuring the well-being and protection of people, property, and the environment within various workplaces and industries. The aim of HSE Management to reduce the probability of accidents and hazards that have direct impact on humans and environment (Kozhovska, 2018). Companies aren't considering only on achieving the main goals such as efficiency and profitability, but strongly they added HSE as an important element in their considerations (Hajipour, Amouzegar , Gharaei, Abarghoei, & Ghajari, 2021).

HSE involves managing risks, preventing accidents, promoting employee health, and minimizing the impact of business operations on the environment (NEBOSH, 2022; HSE, 2013).

The topic of HSE makes us to use key words and phrases, and they are:

Health: The absence of disease or ill health. This includes preventing occupational illnesses and injuries, promoting healthy work practices, and providing adequate training and PPE (NEBOSH, 2022; HSE, 2013).

Safety: The absence of risk of serious personal injury. This involves identifying and assessing risks, implementing control measures, and maintaining safe work environments (NEBOSH, 2022; HSE, 2013).

Environment: Managing and mitigating the impact of an organization's activities on the environment. This includes efforts to reduce pollution, conserve resources, and comply with environmental regulations (ISO-14001, 2015).

4.1 HSE History

18th-19th Centuries: Workplace accidents and health hazards became more prevalent because of Industrial Revolution, so this era laid the foundation for recognizing the importance of ensuring the safety and well-being of workers (Koradecka, 2010, p. 4). In 1833 The Factory Inspectorate is established in the United Kingdom to investigate accidents in factories and mines (HSE, 1974 - 2023).

1970 – 1974: In 1970 in the United States, OSHA was established to enforce safety and health standards in workplaces. In 1974 HSE is created in UK by government agency. This marked a pivotal moment in the formalization of regulatory frameworks to protect workers. (OSHA, 1970; HSE, 1974 - 2023)

1996: ISO 14001 standard for environmental management systems had been deployed for the first time and it created by ISO (ISO-14001, 2015).

2018: ISO 45001 standard for occupational health and safety management systems has been developed by IOS (ISO-45001, 2018).

4.2 Why HSE?

4.2.1 The Moral Reason for Managing HSE

Following the global statistics have been published by ILO (1919 - 2023):

- There are over 350,000 work related fatal accidents reported each year.
- Over 2.72 million people die every year from occupational accidents and occupational diseases.
- There are over 270 million occupational accidents and 160 million occupational diseases recorded each year.
- 4% of the world's gross domestic product is lost each year through the cost injury, death, absence, etc.

4.2.2 The Financial Reason for Managing HSE

Personal injury accidents, worker ill health and property damage cost money. Accidents and ill health can significantly affect the financial resource of any organization, and in some cases can put the organization out of business.(NEBOSH, 2022)

4.3 HSE Standards

HSE Management must be considered systematically in any organization, in the same way of any other types of managements. HSE systematic program referred to OHSMS (NEBOSH, 2022). To reduce the risk of accidents and injuries can be achieved by implementing a strong SMS (Khalid, Sagoo, & Benachir, 2021).

Widely recognized HSE systems exist for systematic management are ILO-OSH 2001, ISO 45001 and ISO 14001 (NEBOSH, 2022). All based on PDCA management lifecycle, same as project management processes presented in 2.3.

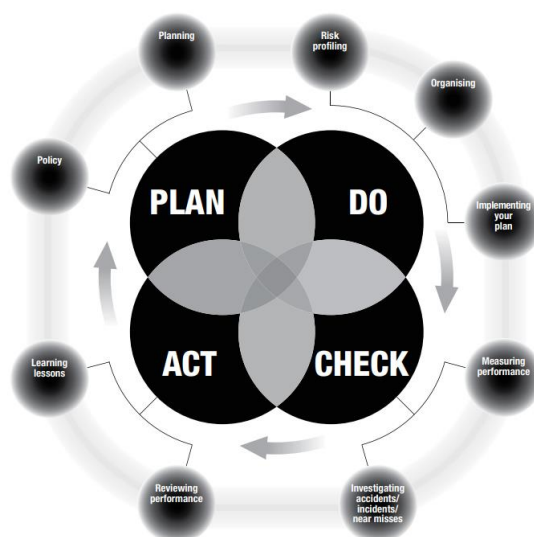


Figure 18. PDCA Cycle (HSE, 2013)

The movement from POPMA model of managing health and safety to a PDCA approach to achieves a balance between the systems and behavioral aspects of management as shown in Figure 18 (HSE, 2013).

4.3.1 ILO-OSH 2001

Can be summarized as Policy, Organizing, Planning and Implementing, Evaluation, Action for Improvement, and Audit as shown in Figure 19 (NEBOSH, 2022; ILO, 1919 – 2023; ILO-OSH 2001, 2009).

Policy (Plan): A clear statement has to be made to establish health as a prime commitment management at all levels.

Organizing (Plan): A framework of roles and responsibilities for health and safety must be created within organization for all staff members.

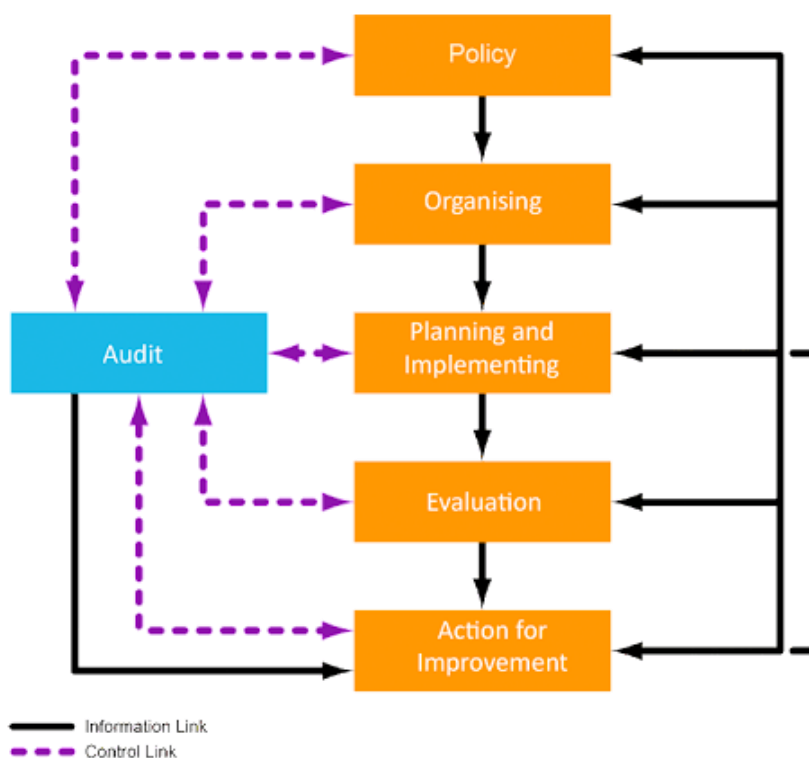


Figure 19. ILO-OSH 2001 Safety Management System (NEBOSH, 2022)

Planning and Implementing (Do): Detailed arguments must be made for the management of health and safety. Genital to this idea is the concept of risk assessment, identification and implementation of safe systems of work and protective measures.

Evaluation (Check): Methods must be devised to monitor and review the effectiveness of the arrangements put in to place. This might be reactively by reviewing accident and ill-health statistic, or actively by reviewing inspection reports.

Audit (Check): Arrangements must be made for the independent, systematic and critical examination of Safety Management System to ensure that all parts are working acceptably well.

Action for Improvement (Act): Any shortcomings identified by review process must be corrected as soon as possible by making whatever adjustments are necessary to the policy, organization and arrangements for the implementation.

Continual improvement: As shown in Figure 20 the intention is that safety management system will not remain static but will develop over time to become increasingly appropriate and useful to the organization the it exists to serve.

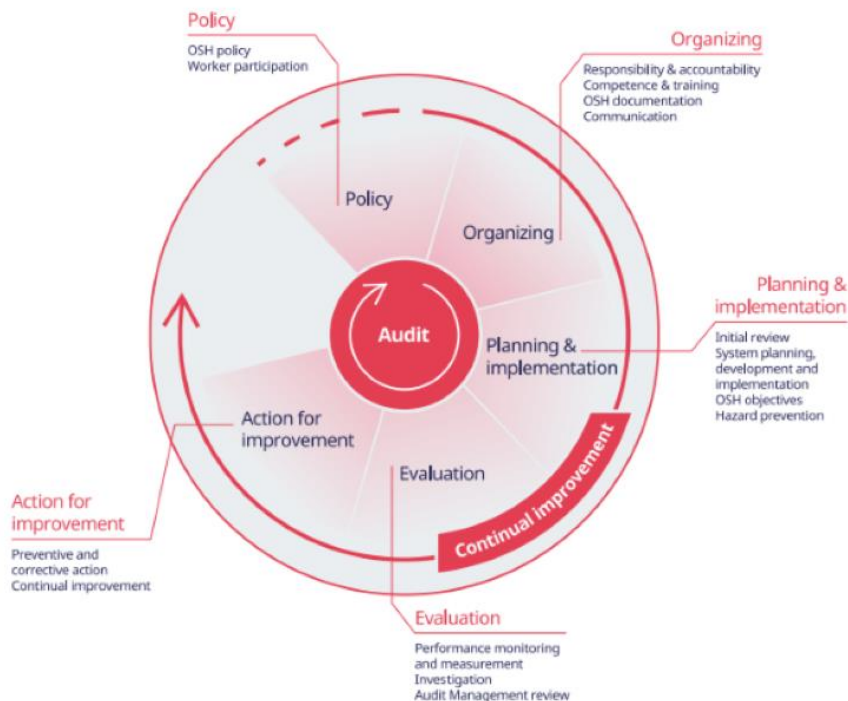


Figure 20. OSH Management Cycle (ILO-OSH 2001, 2009)

4.3.2 ISO 45001

It can be summarized as content of the organization, leadership and worker participation, planning support, operation, performance evaluation, and improvement as shown in Figure 21 (NEBOSH, 2022; ISO-45001, 2018).

ISO 45001 provides a management standard that an organization can be externally audited against (NEBOSH, 2022). Successful certification to the management standard means that the organization can demonstrate to other interested parties (such as stakeholders) that it has a robust safety management system that can stand up to close scrutiny (NEBOSH, 2022). It is based on the PDCA management cycle and it is fully compatible with other ISO management standards such as ISO 14001 (ISO-45001, 2018; ISO-14001, 2015).

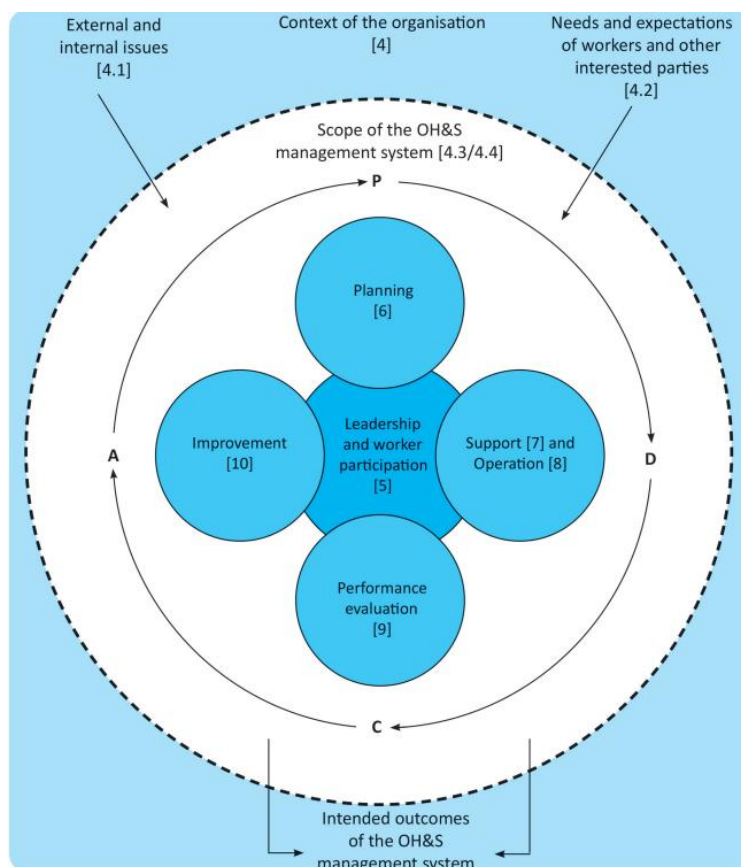


Figure 21. ISO 45001 Safety Management System (NEBOSH, 2022)

Based on NEBOSH (2022) and ISO-45001 (2018) key components of ISO 45001 include:

Context of the Organization (management system framework): Understanding the internal and external factors that can affect the organization's OHSMS.

Leadership and worker participation (management system framework): Demonstrating leadership commitment to OHSMS, and involving workers in the development and implementation of the system.

Planning (Plan): Identifying hazards, assessing risks, and defining objectives and processes necessary to deliver results in accordance with OHSMS policy.

Support (Do): Providing resources, competence, awareness, communication, and documented information to support the operation of the OHSMS.

Operation (Do): Planning and controlling processes related to identifying hazards, assessing risks, and opportunities, and implementing the necessary controls.

Performance evaluation (Check): Monitoring, measuring, analyzing, and evaluating OHS performance and the effectiveness of the management system.

Improvement (Act): Continual improvement of the OHSMS to enhance overall performance.

4.3.3 ISO 14001

The standard provides a framework for organizations to establish and implement an effective EMS, helping them identify, manage, monitor, and continuously improve their environmental performance (ISO-14001, 2015).

Base on ISO-14001 (2015) Key components of ISO 14001 include:

Scope (Clause 4): This clause defines the scope of the EMS in terms of the organization's activities, products, and services.

Normative References (Clause 2): This clause lists the international standards and other normative documents referred to in.

Terms and Definitions (Clause 3): This clause provides the definitions of terms used throughout the standard to ensure a common understanding.

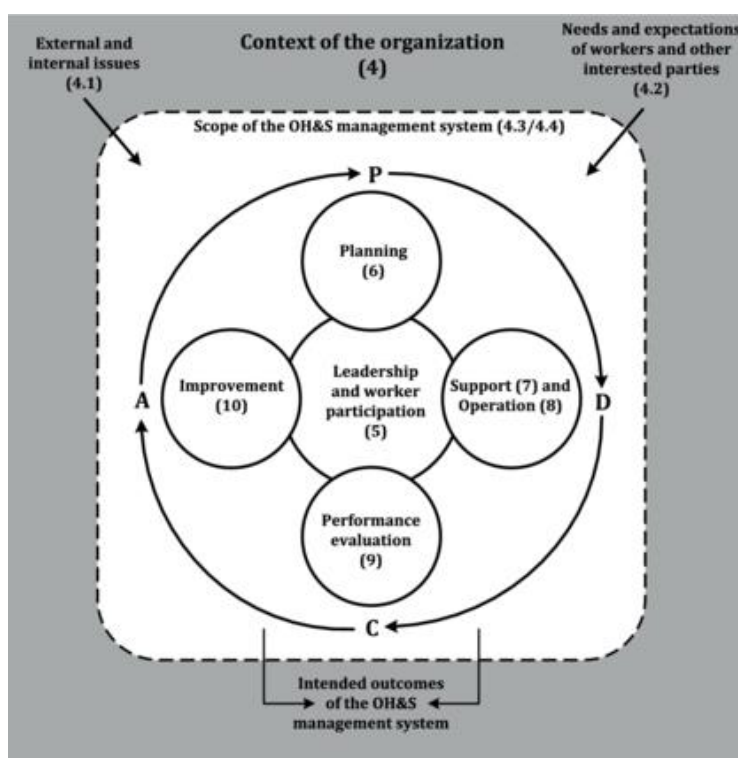


Figure 22. ISO 14001 Environmental Management System (ISO-14001, 2015)

Context of the Organization (Clause 4): This clause requires the organization to determine the internal and external issues that are relevant to its purpose and its strategic direction.

Leadership (Clause 5): This clause outlines the requirements for top management to demonstrate leadership and commitment to the EMS.

Planning (Clause 6) (Plan): This clause covers the planning requirements for the EMS, including identifying environmental aspects, compliance obligations, and setting environmental objectives and targets.

Support (Clause 7) (Do): This clause addresses the resources, competence, awareness, communication, and documented information necessary for the EMS.

Operation (Clause 8) (Do): This clause details the implementation of the EMS, including the planning and control of processes, as well as emergency preparedness and response.

Performance Evaluation (Clause 9) (Check): This clause covers monitoring, measurement, analysis, and evaluation of the EMS performance, including internal audit and management review.

Improvement (Clause 10) (Act): This final clause focuses on nonconformity and corrective action, as well as continual improvement of the EMS.

4.4 HSE and Risk Management

HSE is an integral part of Risk Management (Koradecka, 2010; Ershadi, Edrisabadi, & Shakouri, 2019; Hillson, 2009). In the context of Risk Management, HSE is concerned with identifying, assessing, and mitigating risks associated with health, safety, and environmental factors (NEBOSH, 2022). Effective Risk Management involves not only financial and operational considerations but also the well-being of individuals and the preservation of the environment (Ershadi, Edrisabadi, & Shakouri, 2019).

Below the key elements explaining how HSE and Risk Management collaborate:

4.4.1 Risk Assessment

For evaluating potential hazards, identifying the associated risks, and determining appropriate measures to control or mitigate those risks (NEBOSH, 2022). Risk assessment is a fundamental element of a proactive and preventive approach to health, safety, and environmental management (NEBOSH, 2022; HSE, 1974 - 2023).

4.4.2 Hazards Identification

For identifying and recognizing potential hazards in the work environment. Hazards can be physical, chemical, biological, ergonomic, or psychosocial factors that have the potential to cause harm. (NEBOSH, 2022)

4.4.3 Determination of Risk Factors

Once hazards are identified, the next step is to assess the risk factors associated with each hazard. This includes evaluating the likelihood of an event occurring and the potential severity of its consequences. (NEBOSH, 2022)

4.4.4 Risk Evaluation

Involves combining the information gathered about the hazards, likelihood of occurrence, and potential consequences to assess the overall level of risk. This is often done using a risk matrix or similar tools to categorize risks into different levels of severity as shown in Figure 11, Figure 12 and Figure 13. (NEBOSH, 2022)

4.4.5 Risk Control Measures

Based on the evaluation, the next step is to determine and implement appropriate risk control measures. These measures aim to reduce or eliminate the risk and may include engineering controls, administrative controls, or PPE.(NEBOSH, 2022)

4.4.6 Monitoring and Review

The risk assessment process is not static, it requires ongoing monitoring and review. This involves regularly reassessing the effectiveness of control measures, considering changes in the work environment, and updating the risk assessment as needed. (NEBOSH, 2022)

4.5 HSE and Project Management

Identify key Project Management principles and processes that are pertinent to HSE Management, such as risk assessment, planning, monitoring, and control.

It is good time to move away from the traditional three constraints and embrace a more holistic view of Project Success (Atkinson, 1999).

The integration of HSE principles into Project Management is essential for preventing any negative consequences such as poor HSE and quality outcomes, schedule delays, reduced productivity, and cost increases (Kozhovska, 2018). Integrated process-based HSE Management systems with company's main achievements are an effective way to success and improve HSE performance (Hajipour, Amouzegar , Gharaei, Abarghoei, & Ghajari, 2021). Organizations can achieve perfect project outcomes not only focusing on cost, quality, and time, but also the potential HSE impacts of projects should be considered (Ershadi, Edrisabadi, & Shakouri, 2019). As well as integrate HSE Management considerations into project planning and execution is should be considered. HSE should be considered more extensively in facility planning (Kazerouni, Chinniah, & Agard, 2013).

Below the key element to know how HSE works based on Project Management:

4.5.1 SMART Objectives

HSE objectives should be SMART, to promote and ensure the well-being of individuals, protect the environment, and prevent accidents and injuries in the organization (NEBOSH, 2022; Ershadi, Edrisabadi, & Shakouri, 2019).

4.5.2 Stakeholder Involvement

Stakeholder involvement in HSE is essential for the success of HSE initiatives and overall organizational performance. Involving stakeholders ensures that diverse perspectives are considered, leading to more comprehensive and effective HSE strategies. (ILO-OSH 2001, 2009; ISO-45001, 2018; ISO-14001, 2015)

4.5.3 Effective Communication and Training

To ensure that all relevant stakeholders are promptly informed for any potential hazards. Recognition reinforces positive safety behavior, contributing to a motivated workforce that is committed to maintaining high safety standards (NEBOSH, 2022; HSE, 1974 - 2023). HSE performance is affected by a variety of factors including learning and training, political-economic variables, and workforce qualifications and skills (Ahmadvand, Arjmandi, Mohammadi, Mazloumi, & Mirzahosseini, 2020). HSE Management can support Project Management by providing project managers and staff with the necessary knowledge and tools to identify and manage HSE risks (Ershadi, Edrisabadi, & Shakouri, 2019).

4.5.4 Resource Allocation

It ensures that organizations have the necessary tools, personnel, and infrastructure to proactively address safety challenges, comply with regulations, and foster a culture of safety and well-being among employees (NEBOSH, 2022; HSE, 1974 - 2023). Resource allocation is one of the affective factors for HSE

performance (Ahmadvand, Arjmandi, Mohammadi, Mazloumi, & Mirzahosseini, 2020).

4.5.5 Documentation

Proper documentation of the risk assessment process is essential. This includes recording the identified hazards, the assessed risks, the chosen control measures, and any additional relevant information. Documentation serves as a reference for future assessments and as a means of communication within the organization. (NEBOSH, 2022; HSE, 1974 - 2023)

4.5.6 Change Management

Structured process of planning, implementing, and managing changes to policies, procedures, processes, or systems within an organization to ensure that they align with HSE goals and regulations. Effective change management in HSE is crucial for minimizing risks, maintaining compliance, and promoting a safe and healthy work environment. (NEBOSH, 2022; HSE, 1974 - 2023)

4.5.7 Continuous Improvement

ILO-OSH 2001 (2009), ISO-45001 (2018) and ISO-14001 (2015) emphasize establish mechanisms for project team members to provide feedback on HSE practices and suggest improvements. Ensure the capture of lessons learned from HSE incidents and apply them to future projects to enhance overall safety performance.

4.6 HSE Culture and Performance

HSE culture as per NEBOSH (2022) definition is the shared attitudes, values, beliefs and behaviors relation to HSE. Organizational culture is one of the factors that influence HSE performance (Ahmadvand, Arjmandi, Mohammadi, Mazloumi, & Mirzahosseini, 2020). Improving HSE performance by implementing a strong SMS in projects to mitigate the critical safety factors that contribute to accidents and injuries (Khalid, Sagoo, & Benachir, 2021). To improve project outcomes and protect the environment, organizations should create a positive HSE culture (Ershadi, Edrisabadi, & Shakouri, 2019).

There is a strong relationship between HSE culture and performance, and there are two types of cultures (NEBOSH, 2022):

Positive HSE Culture: is characterized by a proactive, open, and continuous improvement approach, with strong leadership commitment and employee involvement.

Negative HSE Culture: is reactive, may involve fear or reluctance to report safety concerns, and lacks the commitment and engagement needed for a robust safety environment.

Organizations strive to cultivate a positive safety culture to ensure the well-being of their employees and the sustainability of their operations. Poor safety culture has contributed to many major incidents and personal injuries. (HSE, 1974 – 2023; NEBOSH, 2022; Khalid, Sagoo, & Benachir, 2021)

4.7 Project Management, Risk Management and HSE

According to the literature review and all studies, the researcher found a strong relationship between Project Management, Risk Management and HSE.

Figure 9 have been developed to add both Risk Management and HSE in it as shown in Figure 23. In the next sections we will delve into the empirical evidence surrounding this intersection and compare it with theoretical part.

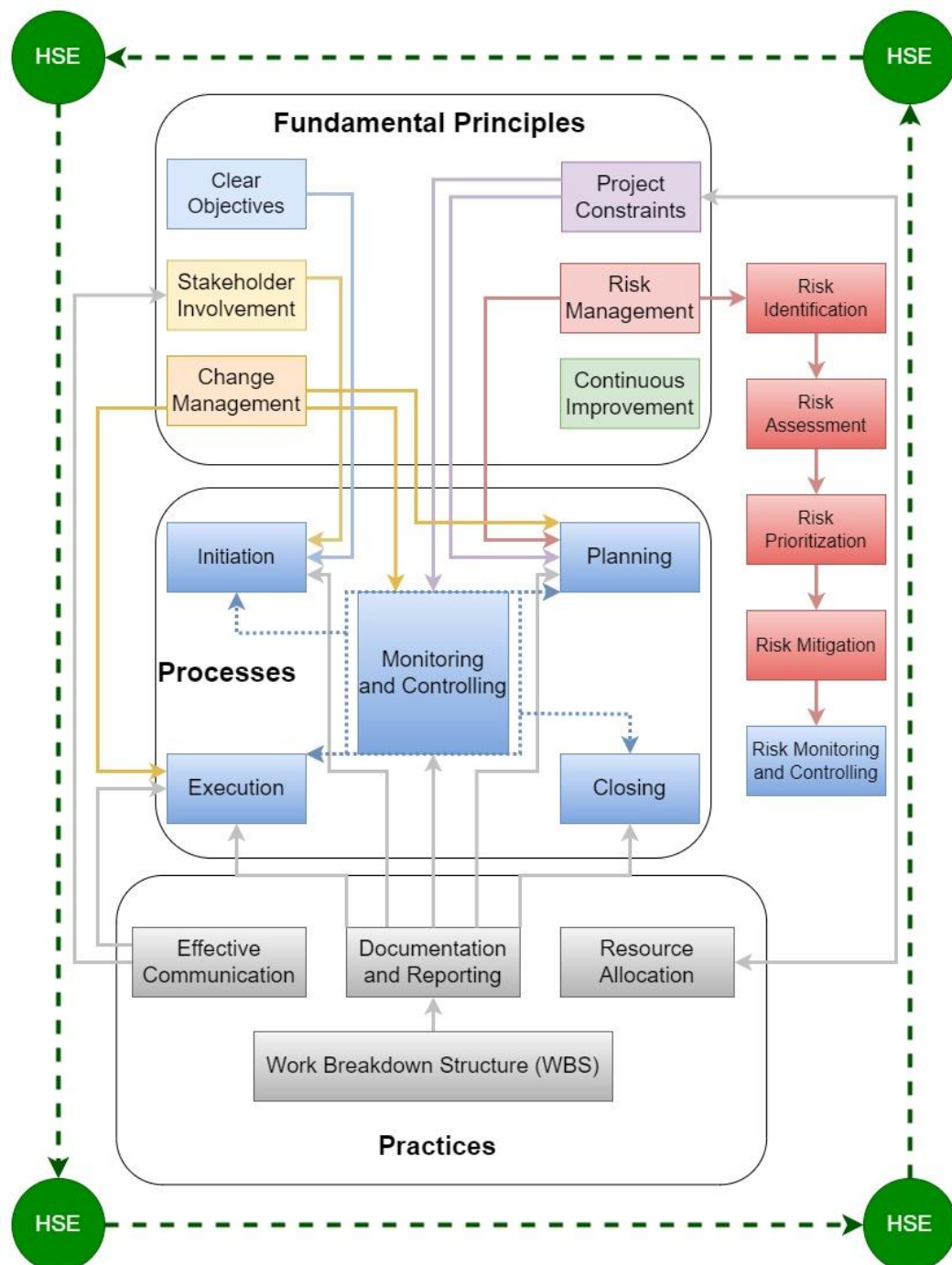


Figure 23. Relationship Between Project Management, Risk Management and HSE

5 RESEARCH METHODOLOGY

Research Methodology is one of the most important chapters in the thesis, it plays an important role in ensuring the quality and credibility of findings. The choices made in research design, research methods, and the approach to collecting and analyzing data significantly impact the reliability and validity of the study's findings.

Figure 24 shows three important steps to obtain information and results. These steps will provide big support to help us to find answer to the main research question “What is the relationship between Risk Management practices and Project Success in the context of HSE?”



Figure 24. Research Methodology Processes

As shown in Table 4, the main research objectives are research method and the data collection methods to be able to find the right answer for the main research question mentioned above.

Table 4. Research Methodology

Research Objective	Research Methods	Data Collecting Methods
To find the relationship between the Project Management, Risk Management and HSE.	Qualitative Research	Primary Data: Semi-structured interviews
To understand Project Management principles, process and practices relation to and integration with HSE Management.		
To understand the effect of the implementation of Risk Management processes, practices and procedures to the HSE performance of a project.		

In this chapter we will go step by step through research method, case study, collecting data via interviews, analyzing data, and evaluating criteria of reliability and validity to see which research method has been chosen and why.

5.1 Research Method

Common research methods as shown in Table 5 are quantitative, qualitative and mixed research methods. Quantitative research involves the collection and analysis of numerical data to establish patterns, relationships, or causal connections. Qualitative research focuses on understanding and interpreting non-numerical data, often using methods such as interviews, focus groups, or content analysis. Mixed methods research combines both quantitative and qualitative approaches to provide a comprehensive understanding of a research problem.

Table 5. Overview of Research Paradigms (Bloomberg & Volpe, 2019)

	<i>Quantitative Research</i>	<i>Qualitative Research</i>	<i>Mixed Methods</i>
Research paradigm	Postpositivist	Constructivist, Critical Theory/Advocacy	Pragmatic
Strategy/tradition/ genre of inquiry	Descriptive, correlational, causal/comparative, and experimental research	Case study, Grounded Theory, Ethnography, Hermeneutics, Narrative Inquiry, Phenomenology	*Sequential design can be exploratory or explanatory *Concurrent design triangulates methods
Research purpose	*Seek consensus (the norm) *Examine topic in order to quantify results *Investigate relationships and cause—effect phenomena	*Seek variation in findings *Delves into the “essence” of the topic	*Combination of quantitative and qualitative methods are needed to fully understand a problem
Researcher role	*Adopts an <i>etic</i> (outsider) point of view *Seeks to test or verify theory *Identifies variables, makes predictions, and seeks specific evidence that will support or disconfirm hypothesis *Believes that research can be value-free *Attempts to remain unbiased, objective, and impartial	*Adopts an <i>emic</i> (insider) point of view *Seeks to discover and understand meaning of experience *Adopts a flexible stance and is open to change *Is reflective about own voice and perspective *Acknowledges personal values, and brings own experience to bear on the study *Is active and involved	*Appreciates how quantitative and qualitative data might complement each other *Develops a rationale for integrating aspects of qualitative and quantitative research *Decides whether to prioritize one or other type of approach or to consider them equally important
Research design	*Hypothetic-deductive: Research is about “idea testing” *Design is determined up front and follows systematic procedures *Large samples are selected randomly *Study is conducted under controlled conditions	*Inductive: Research is about “idea generation” *Design is proposed up front, but is open and emergent, rather than rigid and fixed to permit exploration *Small samples are selected purposefully	*Design combines quantitative structure and qualitative flexibility *Borrows distinct elements from both quantitative and qualitative approaches *Purposeful or random sample selection *Researcher-designed framework allows for innovation or creativity

This thesis is qualitative because this study dealing with complex topic and difficult to quantify, for exploring complex phenomena in-depth. As well as the main reason to make this study is qualitative is the research question is exploratory and the study aims to explore and discover new insights. Qualitative research is a valuable tool for understanding complex social phenomena and gaining insights into human experiences (Bloomberg & Volpe, 2019; Bairagi & Munot, 2019; Bryman, 2012; Abuhamda, Ismail, & Bsharat, 2021).

Qualitative research delves into the experiences, perceptions, and understandings of individuals or groups, seeking to discover the latent meanings and interpretations shaped by their experiences (Bloomberg & Volpe, 2019; Bairagi & Munot, 2019; Bryman, 2012; Abuhamda, Ismail, & Bsharat, 2021).

Inductive way has been applied in this research, which it is one of the qualitative research aspects. Qualitative research unlike quantitative research, which typically begins with hypotheses or predetermined variables, qualitative research follows an inductive path (Bloomberg & Volpe, 2019; Bairagi & Munot, 2019;

Bryman, 2012; Abuhamda, Ismail, & Bsharat, 2021). Data collection and analysis guide the development of themes, concepts, and theories, allowing the researcher to uncover new insights and perspectives.

Qualitative research provides rich data resource, because qualitative researchers use a diversity of data collection methods, including interviews, observations, document analysis, and focus groups to gain a more holistic understanding of the research question, then to enhances the validity and credibility of the findings (Bloomberg & Volpe, 2019; Bairagi & Munot, 2019; Bryman, 2012; Abuhamda, Ismail, & Bsharat, 2021).

5.2 Case Study

In research field, a case study is an in-depth exploration of a particular subject, offering a comprehensive analysis within its real-life context. It involves detailed examination of multiple facets to gain a holistic understanding. (Yin, 2018)

Case studies involve the collective examination of several cases or subjects, providing a broader perspective. Researchers often use multiple case studies to identify patterns, trends, or commonalities across different cases. (Yin, 2018)

On the other hand, a single case study focuses exclusively on one individual or case. This design allows for a detailed investigation into a specific scenario, providing nuanced insights into that particular case. (Yin, 2018)

The choice of a single case study should be carefully considered based on its uniqueness, representativeness, relevance to the research question, accessibility, complexity, theoretical contribution, and practical significance (Yin, 2018).

Given the specific nature of the research topic, focusing on a single case study might be suitable for this master thesis. A single case study allows for a detailed and comprehensive analysis of a specific context, providing a deep

understanding of the impact of Risk Management on Project Success in the context of HSE.

Yin (2018) mentioned that one of the biggest considerations in single case study is the findings may not be easily generalizable to other contexts or projects due to the specificity of the single case. To address this consideration, the researcher will collect rich, detailed data through interviews with three project managers from different companies, countries, cultures and fields. That will be allowing me to explore nuances and specific details of the case.

5.3 Collecting Data via Interviews

Effective data collection is crucial for generating meaningful insights and drawing valid conclusions. Collecting data via interviews is a qualitative research method where the researcher (interviewer) engages in direct, face to face or one-on-one conversations with participants (interviewees) to gather information and insights on this thesis research topic mentioned above to answer the research question. Interviews allow interviewers to explore interviewees perspectives, experiences, and opinions in-depth, providing rich and detailed data (Bryman, 2012).

The importance of interviews as a crucial tool for collecting rich and insightful data in case study research should be observed. Interviews allow researchers to gain access to the perspectives, experiences, and knowledge of interviewee to answer the research question. By engaging in direct conversations with interviewee, researchers can gather required data that may not be readily apparent from other sources of data. (Yin, 2018) (Bryman, 2012)

Researchers must be good listeners in the interviews to minimize biases their impact on the data collection and analysis. Being a good listener means being able to assimilate large amounts of new information without bias (Yin, 2018).

There are common and popular types of interviews can be used as data collection for research or master thesis (Bryman, 2012):

Structured Interview: a highly organized and standardized interview where the interviewer follows a predetermined set of questions in a fixed order.

Unstructured Interview: an informal and open-ended interview where the conversation flows freely, allowing the interviewer to explore various topics without a strict script.

Semi-Structured Interview: combines elements of both structured and unstructured interviews. While there is a predefined list of questions, the interviewer has flexibility to explore additional areas or follow-up on responses.

In this thesis, semi structured interviews in English have been used as primary data collection because it is a suitable process of gathering information, facts, and observations for analysis then to answer the main research question. Three professionals and experts in the field of Project Management have been interviewed using unique interview questions shown in (Appendix 1).

5.4 Sampling Strategy

Samples selections is extremely important, and it is necessary to set criteria for selecting these samples. The most important of these criteria are:

- Individuals holding key role such as project managers.
- Minimum 10 years of experience in Project Management, with a focus on HSE.
- Representation from various industries such as (IT, Construction, Oil and Gas, Energy, etc.) to capture industry-specific nuances.
- Ability to articulate thoughts and experiences effectively to ensure the richness of interview data.

Based on the above-mentioned criteria, three project managers have been selected as shown in Table 6. These selected project managers are professionals with significant experience in Project Management within the context of HSE.

Representation diversity from different industries and regions gave me a chance to capture a wide range of perspectives.

Table 6. Interviewees List

Interviewee	Role	Industry	Year of Experience	Worked Countries	Interview Date
(α)	Project Manager	IT, Oil and Gas, Energy	10-15	US, UK, UAE, Iraq, ME, EU	28.12.23
(β)	Project Manager	IT, Oil and Gas, Energy	10-15	US, KSA, UAE, Iraq, ME	02.01.24
(γ)	Project Manager	Construction, Manufacturing	10-15	UAE, Iraq, ME	29.01.24

The interviews were carried out at the end of December 2023 and the beginning-end of January 2024. Based on ethical considerations and confidential reasons, the interviewees names have been replaced with symbols like (α), (β) and (γ). Interviewees may have memory issues incomplete recall of events and experiences, leading to potential inaccuracies in the data (Bryman, 2012; Yin, 2018). So, the best strategy to mitigate any memory issues is by sending all interview questions to the interviewees a couple of days before the interview date to get them prepared. Finally, for in-depth discussions in English, online meeting about 45 – 90 minutes were arranged for each interviewee.

5.5 Data Analysis

Data analysis is the process of inspecting, clearing, transforming, and modeling data to discover useful information, draw conclusions, and answer the main research question. In the context of semi-structured interviews, data analysis involves systematically examining the collected data to identify patterns, themes, and insights. The importance of qualitative data analysis as a crucial step in the research process (Bryman, 2012). He also mentioned that qualitative data analysis is not simply a technical procedure but rather a creative and interpretive endeavor that requires careful attention to the collected data.

To make the data more manageable for analysis, the first step is often to transcribe the audio into text (Bryman, 2012). So, all interviews have been recorded then transcribed the audio to text. For that purpose, the researcher used AI tools to convert the audio to text. To gain deeper understanding of the context, identify key themes, and develop a sense of the overall structure of the data, reviewing the transcripts is the next step to become familiar with the content.

Being aware of potential biases helps maintain rigor and transparency in the research. During the analysis process the researcher should reflect on the researcher's own biases and assumptions throughout the analysis process. (Bryman, 2012)

In this thesis, we are dealing with qualitative data analysis, so the researcher has to make sure the data analysis process should always be situated within the context of the research project, taking into account the research questions, theoretical framework, and data collection methods.

It is important to understand the meanings that interviewees connected to their experiences and actions. So, the data has been carefully analyzed, paying attention to the language, symbols, and metaphors used by interviewees.

5.6 Evaluating Criteria of Reliability and Validity

Reliability is concerned with the question of whether the results of a study are repeatable. It is the ability of a measuring instrument to produce the same results over time and across different conditions. Validity is concerned with the integrity of the conclusions that are generated from a piece of research. On the other hand, refers to the accuracy or correctness of a measurement or observation. (Bryman, 2012)

Both Reliability and Validity used for quantitative studies (Bryman, 2012). In this thesis we are using qualitative study, and for that purpose, we will emphasize Trustworthiness and Authenticity.

Trustworthiness: It is made up for four criteria (Bryman, 2012): -

- **Credibility:** which parallels internal validity: it is about establishing the truth and accuracy of findings within the study.
- **Transferability:** which parallels external validity: it is the extent to which the findings of a study can be applied or generalized to other settings or contexts.
- **Dependability:** which parallels reliability: it is the stability and consistency of the data and results over time and in various conditions.
- **Confirmability:** which parallels objectivity: it is about the objectivity of the research findings and the extent to which they are shaped by the participants and not the biases, values, or perspectives of the researcher.

Authenticity is related to the overall quality and trustworthiness of research, especially in qualitative research. It is refer to genuineness of the researcher in understanding the participant's experiences or viewpoints. (Bryman, 2012)

6 EMPIRICAL FINDINGS

This chapter is a critical component of this thesis, as it provides the basis for the researcher's conclusions and contribute to the overall knowledge in the impact of Risk Management on Project Success in the context of HSE. Empirical findings in this master thesis refer to the results of the research that the researcher has conducted as part of the researcher's thesis work. These findings are based on empirical evidence, which is data that has been gathered through semi-structured interviews. To get accurate results, the methods of selecting the interviewees and the interview questions was within well-thought-out criteria as the researcher mentioned before in (5.3 collecting data via interviews, and sampling strategy presented in 5.4).

6.1 Findings from Interviews

In the below sections for this chapter presents the findings derived from in-depth interviews conducted with three experienced project managers, each bringing a unique perspective and wealth of expertise to the table. Through candid discussions and reflective narratives, the interviewees provide nuanced insights into the thesis topic.

In December 2023 and January 2024, three project managers with 10 – 15 years of experience were interviewed in English, as shown in Table 6. All selected project managers have very good experience managing many projects in different fields such as Information Technology, Oil and Gas, Energy, Constructions, and Manufacturing. Their wealth of experience was acquired through working with various companies situated in different countries and regions such as the United State of America, United Kingdom, Europe, and Middle East.

All of these mentioned interviews are introduced one by one as per the interview's due dates.

6.1.1 Interview (α) Findings

Based on the responses from Interviewee (α), the key factors for Project Success include ensuring sufficient financial support for all aspects of the project, having a robust Risk Management plan to anticipate and address potential challenges, clearly stating project goals and guidelines to provide a framework for the project's direction, acknowledging the need for flexibility in project execution to adapt to unforeseen circumstances and changes, and emphasizing the significance of a proactive and skilled project team with each member possessing the necessary skills for their role. *“Mainly success factors may vary depending on the type of the project itself but it can start with project fund that will make sure all project parts is covered, a very well defined project Risk Management, then project goals and guidelines as well, flexibility during the execution and delivery, a proactive project manpower (team) and the skills for each member.”*

In response to the question about critical success factors for achieving a balance between Project Success and HSE compliance, Interviewee (α) highlighted that the project manager is tasked with ensuring strict adherence to HSE rules and instructions from the project's inception, overseeing the implementation of HSE guidelines throughout the project phases. Successful completion of project parts (phases) within the planned timeline and with high-quality standards is crucial, emphasizing the need for efficient project execution alongside HSE compliance. *“Actually, this is one of the sensitive topics that always adds extra efforts and obstacles for the project manager from day one of project supervision, he needs to make sure all project HSE rules and instructions is applied and followed and from the other side the project parts (phases already implemented within the plan without delays and with a good quality as well).”*

Moreover, continuous improvement in work tasks related to HSE is deemed essential to avoid delays and misunderstandings within the team, establishing a culture of continuous improvement to ensure that the team stays on track with

HSE requirements. Regular monitoring of team skills and performance is deemed vital, encompassing tracking tasks, measuring HSE performance, and assessing overall project progress, underscoring the importance of a competent and well-performing project team. *“Normally I would say those factors are CI (Continuous Improvement) for the work tasks within HSE to make sure no delays and misunderstanding for the team and their duties, also Team Skills and Performance as you need to make sure continuous tracking their performance and the completed/pending tasks and measure the HSE Performance including the project progress,”*

Additionally, the adoption of an active Risk Management process or approach is emphasized as a daily cultural practice within the organization. This involves capturing and identifying all HSE matters and proactively preventing mistakes to enhance Project Success. *“....., Active Risk Management Process/approach as a daily culture you will need to make sure this kind of culture is applied and inherited within your organization to capture and identify all HSE matters and prevent any mistakes as much as you can.”*

In response to the question about the integration of Project Management fundamental principles with HSE Management in projects, Interviewee (α) emphasize that open communication channel is crucial, facilitating clear and transparent interactions between the project manager and HSE officers, professionals, and employees. This channel covers safety meetings, drills, incident reports, awareness sessions, KPIs, and performance reports. Safety meetings and drills are identified as essential components, contributing to the creation of a safety-conscious environment and preparing the team for potential incidents. The integration process involves the sharing and analysis of common incident reports, ensuring a comprehensive understanding for both the project manager and HSE professionals to collectively work towards preventing future occurrences. *“Its important to have an open channel between project manager*

and the HSE Officers/professionals/ employees to obtain a clear safety meeting, drills, common incident reports,”

Conducting awareness sessions is recognized as a key element in integrating HSE Management with Project Management, aiming to keep the project team informed about HSE protocols and best practices. The use of Key Performance Indicators (KPIs) and reports is mentioned to measure team and project performance concerning HSE tasks, allowing for a systematic evaluation of HSE compliance and issue resolution. *“....., awareness sessions, KPI’s and Reports that show how are your team and project performing against any HSE tasks and how they resolve issues,*”

Integrating Project Management and HSE also encompasses aligning project planning and task scheduling with each phase within the Work Breakdown Structure (WBS) and registers. This alignment ensures success, aims to prevent HSE violations, and ultimately contributes to meeting project deadlines and deliverables. *“....., Project Planning and Tasks scheduling according to each phase within WBS and registers to make your success and make sure no HSE violations in order to meet the deadlines and deliverables as well.”*

Interviewee (α) findings regarding specific instances where Project Management principles, processes, and practices are directly related to and integrated with HSE Management reveal several key points: *“In term of Project Management principles, process and practices for integration with HSE process on daily basis you will need to make sure the below is in place:”*

Utilization of existing Risk Management registers is consistently applied to record and capture risks, including their financial impacts on the project cost. This proactive approach underscores the importance of identifying and managing risks that could impact both Project Success and HSE compliance. *“Existing Risk Management registers always available to record and capture the risk also the financial impacts that could cause the project cost to change.”*

Effective communication channels are established among management, project leads, HSE professionals, and laborers to address HSE incidents promptly during the project period. This highlights the significance of real-time communication for ensuring swift responses to HSE issues. *“Communication channels between management and leads and the HSE professional along with labors for any HSE incidents, during the project period.”*

The monitoring of Key Performance Indicators (KPIs) produced within project reports is emphasized to avoid delays and ensure a high level of integration within the work. This suggests that KPIs play a crucial role in gauging project performance, particularly concerning HSE considerations. *“Monitoring each KPI produced within project reports to avoid delays and make sure best level of integration within work.”*

A well-defined project plan, encompassing processes, tasks, and the project scope, integrates HSE risk assessments into each part of the plan. This demonstration showcases the incorporation of HSE considerations throughout the entire project life cycle. *“A very well project plans for project process, tasks and the scope itself to be clear and HSE risk assessments included in each part.”*

In addressing the significance of Risk Management practices in ensuring Project Success, particularly in relation to HSE, Interviewee (α) mentioned reveal several key considerations: *“As the Risk Management within any project is going to be critical issue and need to be addressed very well then we will need to make sure we have points available:”*

Maintaining stakeholder’s confidence involves providing full support and commitment to HSE professionals within the project team, fostering trust, and establishing clear communication channels between stakeholders and HSE professionals. *“Stakeholders confidence by maintaining full support and commitment to the HSE professionals in the project team and building strong trust and clear communications channels between them.”*

Emphasizing a good resilience level is crucial to supporting and encouraging planning and preparations at each step within project phases. This resilience is designed to minimize future delays and disruptions, underscoring the importance of proactive Risk Management. *“An existing good resilience level to support and encourage the planning and preparations ahead of each step within project phases to minimize any future delays and disturbances.”*

The establishment of solid and agreed decision-making processes at different levels is deemed significant. This supports a project culture that ensures decisions are well-grounded and collectively agreed upon, contributing to effective Risk Management. *“Solid and agreed decision making for different levels that support the culture within the projects phases.”*

Active and proactive HSE safety actions are highlighted as crucial elements of Risk Management. These actions aim to identify and control potential hazards that may harm people or any project members, emphasizing a preventive approach to HSE. *“Active/proactive HSE safety actions the identify and control any potential hazards that may harm people or any of the project members.”*

In response to the question about specific examples where effective Risk Management practices contributed to Project Success in terms of HSE outcomes, Interviewee (α) shared a detailed example from their work experience in the oil and gas industry. The example pertained to the installation of a 35-meter metal tower for internet services in a challenging environment, and several key findings emerged from this experience. *“One example was part of my work back to June 2010 while I was part of Oil and gas industry within Baker Hughes Iraq Operations, most of the work environments are in oil fields in remote areas like deserts and requires different services. The main challenge to install 35meter metal tower for internet services for the company services, many HSE hazards that need to be addressed, steps to be planned and risks to be captured.”*

Ensuring the structural stability of the 35-meter metal tower involved considerations such as solid land, a concrete foundation, and strategically placed steel wires. Additionally, a lightning system was installed to enhance safety. *“High metal 35meter tower needs solid and strong land with concrete foundation and steel wires different level and directions to keep it standing, stable along with lightning system all the way to the ground.”*

Careful planning for cabling from the tower to the building, where the IT Room/Servers block was located, included the use of conduits and appropriate signage for safety. *“Cabling from the tower all the way to the building where the IT Room/Servers block located with its conduits and signs.”*

Managing costs that could affect different phases of the project was identified as a critical factor, highlighting the financial aspect of Risk Management and its impact on Project Success. *“Cost that will affect the project phases.”*

Conducting meetings with all relevant stakeholders, including management, ensured alignment and agreement on the project's goals and safety measures. *“Meetings is done with all related stakeholders including the management to make sure all on same page and agreed.”*

The utilization of a risk register played a crucial role in systematically capturing each potential risk. This proactive approach aimed to identify and address risks to prevent harm to people's lives and contribute to the overall success of the project. *“Risk register was there to capture each possible risk that may happen to avoid to save people lives.”*

In response to the question about assessing the effectiveness of Risk Management practices in relation to Project Success and HSE performance, Interviewee (α) emphasize that the evaluation involves multiple facets: *“Key Performance Indicators may vary from project to another depending on the*

Project Management and the organization culture as well. But mainly they can be:

The highest number of incidents is considered a key indicator, prompting the conduct of risk assessments. Plans with validated results are developed to prevent similar incidents in the future. *“Numbers like the highest number of incidents that was captured and will need to do risk assessments to reduce it with a studied plans and validated results to prevent them in the future.”*

Incident rates, percentages, roles, locations, timing, and main causes are assessed, involving a root cause analysis. This process aids in understanding the reasons for incidents and leads to the development of risk mitigation plans for more proactive reactions in the future. *“Incident rates / percentages / roles / location / timing and the main causes that lead to happen in order to make risk mitigation plan to understand reasons with a proven root cause analysis to react more proactively in the future.”*

Metrics are employed to evaluate risk mitigation plans and actions, including assessing the return on investment for management. This provides insights into the effectiveness of implemented Risk Management strategies. *“Metrics of risk mitigation plans and actions to implement/control and evaluate the return on investment for the management.”*

Monitoring project delays caused by HSE risks serves as a gauge for successful Risk Management practices. Fewer delays indicate effective identification and mitigation of HSE-related risks. *“Project delays caused by the HSE risks means less HSE risks is good will indicate successful Risk Management.”*

The level of skills, training, and awareness among project employees is considered a key indicator. Higher levels of skills and awareness contribute to a higher level of implementation and, consequently, fewer HSE risks. *“Level of skills*

/ trainings / awareness of the project employees that will lead into project high level of implementation and less HSE risks.”

External audits are highlighted as an important component of KPIs. These audits provide an additional perspective on the project, offering insights that may not be immediately apparent, and can help identify areas for improvement. *“External audits always good within KPIs to show the other side of opinion within project that we might not see and give attention to it.”*

In response to the question about the interviewee's experience and background in Risk Management within the context of HSE, Interviewee (α) provided several key findings: *“As HSE matter within any project this lets me reach a point that always learned to:”*

The experience encompasses the ability to identify common and usual risk scenarios within HSE matters in projects, indicating a level of familiarity with potential risks and challenges that may arise in HSE contexts. *“Identify common usual risk scenarios and the challenges that may happen and how to deal with.”*

The interviewee emphasized the importance of conducting Root Cause Analysis (RCA), involving checking and assessing root causes with related teams. This process aims to understand the effectiveness of actions taken and to apply the lessons learned in future Risk Management. *“Doing the RCA root cause analysis is important to be checked and assessed with related teams together and see how effective was the action and the results in future.”*

The experience also includes the generation of helpful reports and useful recommendations for professionals within HSE teams. This suggests that Risk Management practices involve not only identifying and addressing risks but also providing valuable insights and guidance for continuous improvement. *“Generates for us helpful reports and useful recommendations for professionals within HSE teams as part of Risk Management.”*

In response to the question about the role of Risk Management in the interviewee (α) organization's projects, particularly in terms of HSE considerations, Interviewee (α) underscored that Risk Management is described as playing a critical and important role within any project, emphasizing its fundamental significance to the overall success of projects. The role of Risk Management is linked to contributing to Project Success by identifying and mitigating risks, thereby creating a safe environment and ensuring the well-being of individuals involved in the project. Risk Management is given high priority, with mitigation plans in place, reflecting a proactive approach to addressing potential HSE hazards and indicating a commitment to prevention rather than reaction. *“Risk Management acts as critical and important role within any project, it can lean to Project Success, safe environment and human, having high priority and mitigation plans to avoid the HSE hazards that about to happen or even likely to happen.”*

Interviewee (α) highlighted the importance of continuous improvement for all plans and processes, demonstrating a commitment to refining and optimizing Risk Management strategies and ensuring the seamless functioning of all aspects of the project. *“Add to that continuous improvement for all plans and process to make sure seamlessly all working without issues that could lead to project disturbance or delays.”*

In response to the question about prioritizing risks in projects within the context of HSE and the criteria or guidelines used for these decisions, Interviewee (α) presented that risks are prioritized based on two critical factors, severity and likelihood, guiding the assessment of urgency and significance for each risk. *“Normally we do prioritize by two factors first severity and second one is likelihood.”*

High priority is accorded to risks with higher severity, especially those posing potential threats of incidents leading to fatalities or injuries. The primary goal is

to eliminate such risks as much as possible, prioritizing the safety of individuals involved in the project. *“By severity is about the incident fatalities and anything that affect life or injuries as a high priority and try to eliminate the risks as much as we can to make sure no harm happen.”*

Likewise, risks are prioritized based on their likelihood of occurrence. Immediate action is taken for risks with a high likelihood, aiming to prevent incidents and mitigate potential harm. Moderately likely risks are carefully considered, striking a balance between severity and the implementation of strong control measures. Unlikely risks are diligently monitored and reported as part of routine tasks. This comprehensive approach ensures a nuanced and strategic prioritization of risks within the HSE framework. *“By likelihood simply any risk that about to happen to be prioritized and requires direct immediate action to prevent the incident and its risk, also the moderately likely risks that need to be taken in consideration to balance with severity and in order to have strong control for the risk, then the last one is unlikely to happen risks to keep monitoring and reporting on daily basis the routine tasks by the labors.”*

In response to the question about ensuring that project teams are adequately trained and informed about HSE-related risks and Risk Management procedures, Interviewee (α) provided the following findings: *“There is several ways to make sure that your project team have high level or awareness and proper trainings with skills:”*

Comprehensive Training Approach

- Conducting induction training that covers general HSE awareness, specific project risks, and emergency procedures. *“Conduct induction training covering general HSE awareness, specific project risks, and emergency procedures.”*
- Providing role-specific training on tasks with higher risk exposure, equipment operation, and safe work practices. *“Provide role-specific*

training on tasks with higher risk exposure, equipment operation, and safe work practices.”

- Offering regular refresher training to reinforce learning and address new or evolving risks. *“Offer regular refresher training to reinforce learning and address new or evolving risks.”*

Project Information Accessibility:

- Developing risk registers that are readily accessible to all team members, detailing identified risks, mitigation plans, and responsibilities. *“Develop risk registers readily accessible to all team members, detailing identified risks, mitigation plans, and responsibilities.”*
- Creating job hazard analyses (JHAs) for high-risk tasks, outlining specific hazards, controls, and safe work procedures. *“Create job hazard analyses (JHAs) for high-risk tasks, outlining specific hazards, controls, and safe work procedures.”*
- Utilizing visual aids such as posters, infographics, and safety videos to communicate key risks and procedures clearly. *“Utilize visual aids like posters, infographics, and safety videos to communicate key risks and procedures clearly.”*

Communication Strategies:

- Fostering a culture of open communication where team members feel comfortable reporting concerns and near misses. *“Foster a culture of open communication where team members feel comfortable reporting concerns and near misses.”*
- Conducting regular safety briefings and toolbox talks to discuss ongoing risks, mitigation strategies, and lessons learned. *“Conduct regular safety briefings and toolbox talks to discuss ongoing risks, mitigation strategies, and lessons learned.”*

In response to the question about prioritizing HSE considerations when developing and implementing Risk Management strategies for projects, and the role of leadership in this process, Interviewee (α) highlighted several key considerations: *“In my opinion for Prioritizing HSE in Risk Management we will need to have in place the below parts:”*

Firstly, there is an emphasis on the early integration of HSE considerations in the project, underscoring the importance of treating HSE as an integral part of the project from its conception rather than as an afterthought. *“Integrate early by considering HSE from project conception and not just as an afterthought.”*

The prioritization of risks based on their potential for severe consequences for both individuals and the project as a whole reflects a concentration on high-impact risks, ensuring that critical areas are addressed with priority. *“Concentrate on high-impact risks by Prioritizing risks for any severe consequences for people and project.”*

A crucial aspect involves balancing HSE measures with project feasibility and financial viability through the use of cost-benefit analysis, ensuring that safety measures are aligned with the overall project goals. *“Cost-benefit analysis to balance HSE measures with project feasibility and financial viability.”*

While the response does not explicitly mention leadership, the emphasis on integrating HSE early and balancing measures suggests that leadership plays a crucial role in setting the tone and priorities for HSE within the organization. The proactive integration of HSE considerations and the careful balancing of measures align with the leadership's responsibility to guide and prioritize safety within the project framework.

In response to the question about the impact of implementing Risk Management processes and procedures on the HSE performance of a project, Interviewee (α) presented that the implementation of Risk Management processes and

procedures is viewed positively, with several notable outcomes. The implementation of Risk Management processes and procedures is seen as having a positive impact on HSE performance. The processes and procedures are highlighted as effective tools for identifying and mitigating hazards in the project environment. *"For sure positive Impact, implementing Risk Management processes and procedures in a good way this will identify and mitigate all the hazards, and less HSE accidents, environmental damage."*

Implementation leads to fewer incidents and accidents, as early risk assessment and control measures are applied to prevent harm. *"Early risk assessment and control measures prevent harm."*

A positive safety culture is fostered, characterized by a proactive approach that engages employees and increases awareness of risks. *"Proactive approach fosters employee engagement and risk awareness."*

There is a reduction in operational costs, as the avoidance of accidents saves money by preventing downtime, damages, and legal repercussions. *"Avoiding accidents saves money from downtime, damages, and legal repercussions."*

The positive impact extends to Project Success, with fewer disruptions leading to better schedule and budget adherence. *"Fewer disruptions lead to better schedule and budget adherence."*

In response to the question about common challenges or obstacles organizations face when implementing Risk Management processes and procedures for HSE, and the impact of these challenges on Project Success and HSE performance, Interviewee (α) highlighted several key findings such as Lack of commitment, resistance to change, risk assessment, and communication issues. *"Normally the common project daily challenges would be Lack of commitment, Resistance to any change, Risk assessment, and Communication between employees in different levels. Those can lead into more risks, legal, cultural issues that will*

affect the project progress and team spirit as well too.” These challenges, if not effectively addressed, can impact both Project Success and HSE performance, underscoring the importance of overcoming obstacles to ensure the successful implementation of robust Risk Management practices.

6.1.2 Interview (α) Analysis

Manager (α) responses provide a comprehensive understanding of the intricate relationship between Risk Management, Project Success, and HSE compliance. The insights shared reflect a nuanced approach to addressing challenges and ensuring a proactive and integrated approach to HSE within the Project Management framework. As shown in Table 7, several key themes and insights has been listed and all of these key elements had been confirmed by connecting them with the relevant literature and chapters for this thesis.

Table 7. Interview (α) Analysis

Theme/Area of Discussion	
	Key Insights from Manager (α) Responses
	Relevant Literature and Chapters
Factors of Project Success Manager (α) emphasizes the importance of project funding, well-defined project Risk Management, project goals, flexibility during execution and delivery, proactive project manpower, and skills as key factors for Project Success.	
	Funding
	(2.1 Project Success) (2.4.2 Resource Allocation)
	Well-Defined Risk Management
	(2.1 Project Success) (2.2.4 Risk Management) (3 Risk Management) (2.3.2 Planning) (Figure 10)

Clear Project Goals
(2.1 Project Success) (2.2.1 Clear Objectives)
Flexibility During Execution and Delivery
(2.1 Project Success) (2.3 Project Management Processes) (Figure 8)
Skilled and Proactive Project Team
(2.1 Project Success)
<p>Critical Success Factors for Balancing Project Success and HSE Compliance</p> <p>Manager (α) recognizes the challenges of balancing Project Success with HSE compliance. Continuous improvement, team skills and performance, active Risk Management, and communication channels are highlighted as critical success factors in achieving this balance.</p>
Continuous Improvement
(4.5 HSE and Project Management) (4.5.7 Continuous Improvement) (4.3 HSE Standards)
Team Skills and Performance
(4.3 HSE Standards) (4.5 HSE and Project Management) (4.5.3 Effective Communication and Training) (4.6 HSE Culture and Performance)
Active Risk Management
(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)
Strong Communication
(4.5.3 Effective Communication and Training)
<p>Integration of Project Management and HSE</p> <p>Manager (α) emphasizes the importance of an open channel between project managers and HSE professionals, including safety meetings, drills, incident reports, awareness sessions, and KPI monitoring. Clear project planning, task scheduling, and risk assessments are considered crucial for success.</p>

Open Communication Channels
(2.4.1 Effective Communication) (2.4.3 Documentation and Reporting) (3.6 Risk Management Standards and Frameworks) (4.3 HSE Standards) (4.5.3 Effective Communication and Training) (4.5.5 Documentation)
Monitoring and Reports
(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review)
Project Planning and Tasks Scheduling
2.3.2 Planning) (2.4.4 Work Breakdown Structure (WBS))
Risk Assessment
(3.2 Risk Assessment) (4.4.1 Risk Assessment) (3.6 Risk Management Standards and Frameworks)
Significance of Risk Management in HSE
Manager (α) recognizes Risk Management as a critical issue, emphasizing stakeholder confidence, resilience, decision-making, and proactive safety actions as essential elements for ensuring Project Success, particularly in terms of HSE.
Stakeholder Confidence
(4.5.2 Stakeholder Involvement)
Resilience in Planning
(2.3.2 Planning) (Figure 10)
Solid Decision-Making
(2.2 Project Management Fundamental Principles) (3.2 Risk Assessment) (Table 3)
Proactive Safety Actions
(4 HSE Management)

Examples of Integration

Manager (α) provides a specific example from the oil and gas industry, highlighting the challenges of installing a 35-meter metal tower in a hazardous environment. This example underscores the importance of risk assessment, stakeholder communication, and proactive Risk Management.

Risk Assessment, Stakeholder Involvement, Effective Communication, Risk Management, Monitoring and Controlling.

(3.2 Risk Assessment) (4.4.1 Risk Assessment) (2.2.3 Stakeholder Involvement) (4.5.2 Stakeholder Involvement) (4.5.3 Effective Communication and Training) (3 Risk Management) (4.4 HSE and Risk Management) (2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review)

Assessment of Risk Management Effectiveness

Key performance indicators (KPIs) such as incident rates, metrics of risk mitigation plans, project delays, employee skills, and external audits are mentioned by Manager (α) for assessing the effectiveness of Risk Management.

KPIs

(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review) (3.2.1 Qualitative Risk Assessment)

Personal Experience and Background in Risk Management

Manager (α) Experience includes identifying common risk scenarios, conducting root cause analysis, and generating reports and recommendations for HSE teams.

Risk Identification, Root Cause Analysis

(3.1 Risk Identification) (4.4.2 Hazards Identification)

Reports and Recommendations

(2.4.3 Documentation and Reporting) (4.5.5 Documentation)

Role of Risk Management in Manager (α) Organization Projects

Manager (α) sees Risk Management as playing a critical role in achieving Project Success, maintaining a safe environment, and prioritizing mitigation plans to avoid HSE hazards and potential disruptions.

Effective Risk Management, Continues Improvements

(3.6 Risk Management Standards and Frameworks)

Risk Prioritization

Manager (α) explains the prioritization of risks based on severity and likelihood, with a focus on eliminating high-priority risks that could cause harm. Continuous monitoring is highlighted for routine tasks.

Likelihood, Severity, and Continuous Monitoring

(3 Risk Management) (3.2 Risk Assessment) (3.3 Risk Prioritization) (3.4 Risk Mitigation) (4.4.3 Determination of Risk Factors) (4.4.4 Risk Evaluation) (2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review)

Training and Communication on HSE Risks

Manager (α) outlines comprehensive training, accessibility of project information, and effective communication as key strategies to ensure that project teams are well-informed and trained on HSE-related risks and procedures.

Trainings and Effective Communications

(2.4.1 Effective Communication) (4.5.3 Effective Communication and Training)

Leadership's Role in Prioritizing HSE Considerations

Manager (α) suggests integrating HSE considerations from the project's

conception, concentrating on high-impact risks, and balancing HSE measures with project feasibility. Leadership is highlighted as crucial in this integration.

Integrating HSE Considerations with Project Tasks

(4.3 HSE Standards) (4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and HSE)

Qualitative Risk Assessment

(3.3 Risk Prioritization) (3.2.1 Qualitative Risk Assessment)

Monitoring and Controlling

(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.5 Risk Control Measures) (4.4.6 Monitoring and Review)

Recommendations for Integrating Risk Management

Manager (α) recommends early integration, focusing on high-impact risks, and conducting cost-benefit analysis to balance HSE measures with project feasibility.

Balance HSE Measures with Project Feasibility

(4.3 HSE Standards) (4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and HSE)

Impact of Risk Management on HSE Performance

Manager (α) strongly asserts that the implementation of Risk Management processes has a positive impact on HSE performance, leading to fewer incidents, enhanced safety culture, reduced operational costs, and improved Project Success.

Positive Impact of Risk Management Implementation

(4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and

HSE)
<p>Challenges in Implementing Risk Management</p> <p>Common challenges highlighted include lack of commitment, resistance to change, issues with risk assessment, and communication gaps between employees at different levels. These challenges can negatively impact project progress and team dynamics.</p>
<p>Commitment Lack, Change Management, Risk Assessment, Communication Gaps</p>
<p>(4.3 HSE Standards) (4.6 HSE Culture and Performance)</p>

6.1.3 Interview (β) Findings

In response to the question about the real factors of Project Success, Manager (β) sees that Project Success is defined as enabling stakeholders to achieve their core goal within the required budget and timeline. *“For me, Project Success is enabling the stakeholder to achieve their core goal within the required budget and timeline.”*

In response to the question about critical success factors for achieving the balance between Project Success and HSE compliance, Interviewee (β) highlighted that there is an emphasis on the non-negotiable stance regarding HSE, emphasizing that there should be no compromise for HSE, whether in projects or operations. *“There is no compromise for HSE, be it for projects or operations. The safety of our human resources should always be our number one priority, above and beyond any financial targets that are set to be achieved.”*

Safety is underscored as the top priority, with a clear stance that the safety of human resources should always surpass any financial targets. The biggest measure of Project Success, according to Interviewee (β), is stakeholders going

home safe to their families. *“Having our stakeholders go home safe to their families should be the biggest measure of Project Success.”*

In response to the question about the integration of Project Management fundamental principles with HSE Management, Interviewee (β) conveyed several key findings. There is an emphasis on integrating HSE requirements in the initial plan, influencing project planning and execution from the outset. *“We need to keep in mind that HSE requirements are considered in the initial plan and drives the project planning and execution.”*

This approach is seen as crucial for preventing surprises, as integrating HSE from the beginning allows the project to run with lower risks, minimizing unexpected issues. *“This will allow the project to run with lower risks and hence allow for minimal surprises.”*

Conversely, Interviewee (β) warns that if HSE is addressed as an afterthought, it can lead to fires to put off, higher costs to fix gaps, and inevitably delayed timelines, underscoring the importance of considering HSE from the project's inception. *“On the flip side, if HSE is included as a band aid after project initiation, there will be lots of fires to put off, resulting in higher costs to fix gaps and inevitably delayed timelines.”*

In response to the question about specific instances where Project Management principles, processes, and practices are directly related to and integrated with HSE Management, Interviewee (β) highlighted that project scheduling is underscored as directly related to HSE Management, with the project manager tasked with ensuring that resources are not engaged beyond normal expectations, considering factors such as working hours, time off, and planned engagements. *“Project scheduling directly relates to HSE Management. A project manager needs to consider that a resource is not engaged beyond what is normally expected from them.”*

Wellness considerations are emphasized, encompassing accounting for periods of being unwell, and for tasks involving travel, there should be an allowance for ample rest before/after engagement to ensure the resource is fully prepared. *“In addition to working hours, this will include scheduled time off, accounting for periods of being unwell or any other planned engagements that allow the resource to be fully available and productive.”*

Safety measures for tasks involving travel include tracking or a buddy system, ensuring that the resource travels and returns to their base location without incident. *“In case travel is involved, there should be allowance for ample rest before/after engaging the resource with a project task, as well as a tracking or buddy system that allows to ensure that the resource travels and gets back to their base location without incident.”*

In response to the question about the significance of Risk Management practices in ensuring Project Success, particularly in relation to HSE, Interviewee (β) offered crucial insights. Risk Management is defined as the practice of managing any deviation, whether positive or negative, that takes the project away from the intended goal, cost, or schedule. *“Risk Management to me, is managing any deviation (good or bad) to a project that takes us away from the intended goal, cost, or schedule.”*

Emphasizing the importance of constant monitoring, Interviewee (β) underscores a proactive approach to flagging and reviewing risks for timely resolution. *“There should be constant monitoring for any risks, and these should be flagged for review and resolution as soon it is identified.”*

This comprehensive approach to Risk Management is seen as instrumental in steering the project towards its objectives while addressing potential deviations effectively.

In response to the question about specific examples where effective Risk Management practices have directly contributed to Project Success in terms of HSE outcomes, Interviewee (β) shared insightful findings through a real-world scenario:

In a project where a stakeholder introduced scope creep by requesting modifications to approved implementation methods, effective Risk Management practices came into play. *“I recently had a project where, one of the stakeholders kept introducing scope creep by requesting modification to the implementation methods that were already approved.”*

The team utilized an escalation matrix to flag the scope creep, ensuring that any changes to scope required sign-off from executive management. *“We flagged this up using the escalation matrix and this helped ensure any changes to scope needed to be signed off by executive management.”*

This proactive use of Risk Management, particularly the escalation matrix, not only mitigated scope creep but also contributed to reducing the constant load and mental pressure on the Technical Architect overseeing design and implementation. The reduction in pressure allowed the Technical Architect to be involved in more productive tasks, indicating a positive impact on overall project productivity. *“In terms of HSE, this helped reduce the constant load and mental pressure on the Technical Architect that was overlooking the design and implementation, which allowed him to be involved in more productive tasks.”*

This example illustrates how effective Risk Management practices can directly influence Project Success by addressing challenges and enhancing productivity.

In response to the question about assessing the effectiveness of Risk Management practices in relation to Project Success and HSE performance, Interviewee (β) shared valuable insights:

The team maintains a comprehensive risk register, regularly sharing it with key stakeholders to assess and address potential risks proactively. *"A risk register is maintained and shared with key stake holders regularly to assess the risks."*

Key metrics are utilized for assessment, involving a combination of probability/likelihood versus the impact of identified risks. This data-driven approach ensures a nuanced evaluation of risks, contributing to a more effective Risk Management strategy within the project. *"The key metrics that we utilize are a combination of probability/likelihood versus the impact."*

In response to the question about providing an overview of experience and background in Risk Management within the context of HSE, Interviewee Beta () emphasizing the importance of considering human resources in all projects within the context of Risk Management. *"A project manager needs to keep in mind that there is an element of human resources involved in all his projects."*

Suggesting the use of a contingency buffer of 10-15% to mitigate risks associated with resource availability. *"This would mean keeping a contingency buffer of 10-15% to mitigate any risks associated with resource availability."*

These aspects reflect a proactive approach to integrating Risk Management considerations, particularly in relation to human resources, to ensure the successful execution of projects within the HSE framework.

In response to the question about describing the role of Risk Management in the organization's projects, particularly in terms of HSE considerations, Interviewee (β) describing Risk Management and HSE as integrated into the project life cycle, suggesting an ingrained and systematic approach. *"As a habit, Risk Management, like HSE are integrated into the Project Life cycle."* This underscores the organization's commitment to incorporating Risk Management practices seamlessly throughout the project life cycle, with a specific focus on Health, Safety, and Environment considerations.

In response to the question about prioritizing risks in projects within the context of HSE, Interviewee (β) confirmed that prioritization is based on factors that affect human life, safety, and productivity, strictly in that order. *"The prioritization in terms of HSE is with regards to anything that affects human life, safety, and productivity, strictly in that order."*

This prioritization approach underscores a commitment to placing the utmost importance on human well-being and safety within the project framework.

In response to the question about ensuring that project teams are adequately trained and informed about HSE-related risks and Risk Management procedures, Interviewee (β) shared important practices:

All resources are mandated to undergo compulsory HSE training, with consequences, including termination, for non-compliance. *"It is compulsory for all resources to complete all mandated HSE training, failing which they are held liable and will face consequences including and up to termination."*

Risks for projects are brainstormed at project initiation, and the risk register is regularly updated to keep the team informed about the status. These measures reflect a proactive approach to ensuring that project teams are well-equipped with the necessary knowledge and awareness regarding HSE-related risks and the corresponding Risk Management procedures. *"Risks for projects are brainstormed at project initiation and the risk register is updated regularly to keep the team abreast of the status."*

In response to the question about how organizations should prioritize HSE considerations when developing and implementing Risk Management strategies for projects, and the role of leadership in this process, Interviewee (β) presented holistic insights:

HSE should be seamlessly integrated into all tasks within the project, emphasizing its pervasive importance across all project activities. HSE

performance should be meticulously measured using scorecards and dashboards, providing a data-driven approach to assess and improve safety outcomes. *"HSE should be integrated in all tasks and measured via scorecards/dashboards."*

Leadership plays a pivotal role by actively reviewing HSE performance and ensuring that corrective efforts are propagated throughout the organizational hierarchy. *"This will allow for leadership to review and propagate corrective efforts down the command chain."*

Regular display and propagation of messages emphasizing adherence to HSE protocols are essential. This ongoing communication strategy aims to keep teams consistently informed and gain buy-in from all stakeholders, reinforcing a shared commitment to HSE considerations within the organization. *"Messages of adhering to HSE protocols need to be displayed/propagated regularly to keep the teams informed and get buy in from all stakeholders."*

In response to the question about strategies or best practices for effectively integrating Risk Management processes and procedures into project planning and execution to enhance Project Success and HSE performance, Interviewee (β) recommended to keep track of risks in existing projects suggests a proactive approach to ongoing Risk Management. And conducting mandatory after-action reviews with specific reference to elements of HSE is suggested as a good practice to determine lessons learned. These strategies underscore a commitment to continuous improvement and the integration of Risk Management practices to enhance both Project Success and HSE performance. *"Keeping track of risks in existing projects and having mandatory after action reviews with specific reference to elements of HSE to determine lessons learned would be a good practice to follow."*

In response to the question about the impact of the implementation of Risk Management processes and procedures on the HSE performance of a project, Interviewee (β) emphasizing that the implementation of Risk Management

processes has an overall positive impact on the HSE performance of a project. *"Overall, the implementation of Risk Management processes has a positive impact on the HSE performance of a project. "*

Acknowledging that the implementation may temporarily increase project costs, Beta highlights the long-term benefits, suggesting that savings are realized by avoiding negative impacts in the future. *"This may temporarily increase project costs. However, the savings in seen in the long term by avoiding any negative impacts in the future."*

This perspective underscores a strategic approach to Risk Management, emphasizing its positive influence on HSE outcomes and the overall success of the project.

In response to the question about common challenges or obstacles organizations face when implementing Risk Management processes and procedures for HSE, Interviewee (β) mentioned that the most common challenge identified is organizations having short-term objectives for quick implementation and minimal spending to achieve the main project goal. *"The most common challenge in organizations that are trying to implement Risk Management or HSE processes are short terms objectives of quick implementation and/or minimal spending to achieve the main project goal. "*

Interviewee (β) highlights that this approach can have consequences in the long term. The resolution of this challenge is suggested to require proactive intervention from the Project Manager and Leadership teams. *"However, this will have consequences in the long term and will need to be nipped in the bud by the Project Manager and Leadership teams."* This emphasizes the importance of strategic, long-term thinking and the proactive involvement of key stakeholders in addressing challenges associated with implementing Risk Management processes for HSE.

6.1.4 Interview (β) Analysis

Manager (β) responses provide also a comprehensive understanding of the intricate relationship between Risk Management, Project Success, and HSE compliance. Same as Manager (α), the insights shared reflect a nuanced approach to addressing challenges and ensuring a proactive and integrated approach to HSE within the Project Management framework. As shown in Table 8, several key themes and insights has been listed and all of these key elements had been confirmed by connecting them with the relevant literature and chapters for this thesis.

Table 8. Interview (β) Analysis

Theme/Area of Discussion
Key Insights from Manager (β) Responses
Relevant Literature and Chapters
<p>Factors of Project Success</p> <p>Manager (β) defines Project Success in terms of enabling stakeholders to achieve their core goals within the required budget and timeline.</p>
Focus on Stakeholder Goals
(2.1 Project Success) (2.2.3 Stakeholder Involvement)
Goal Achievement within Budget and Timeline
(2.1 Project Success) (2.2.2 Project Constraints)
<p>Critical Success Factors for Balancing Project Success and HSE Compliance</p> <p>Manager (β) emphasizes the non-negotiable nature of HSE, prioritizing the safety of human resources over financial targets. The measure of Project Success is tied to the safety of stakeholders going home unharmed (below some important points to achieve the safety of stakeholders).</p>
SMART Objectives

(4.5.1 SMART Objectives)
Stakeholder Involvement
(4.5.2 Stakeholder Involvement)
Resource Allocation
(4.5.4 Resource Allocation)
Effective Risk Management
(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)
Effective Communication
(4.5.3 Effective Communication and Training)
<p>Integration of Project Management and HSE</p> <p>Manager (β) emphasizes the importance of including HSE requirements in the initial project plan, driving project planning and execution. Early integration is seen as essential to minimize risks and avoid surprises. Project scheduling is highlighted as directly related to HSE Management, with considerations for resource engagement, rest after travel, and tracking systems to ensure safe returns.</p>
Stakeholder Involvement
(2.2.3 Stakeholder Involvement) (4.5.2 Stakeholder Involvement)
Effective Communication
(2.4.1 Effective Communication) (3.6 Risk Management Standards and Frameworks) (4.5.3 Effective Communication and Training)
Project Initiation, Planning and Tasks Scheduling
(2.3.2 Planning) (2.4.4 Work Breakdown Structure (WBS))
Risk Mitigation
(3.4 Risk Mitigation) (4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)

Significance of Risk Management in HSE

Manager (β) recognizes Risk Management is viewed as essential for managing any deviation from project goals, costs, or schedules. Constant monitoring and early identification of risks are considered crucial.

Constant Monitoring

(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling)
(4.4.6 Monitoring and Review)

Risk Identification

(3.1 Risk Identification) (3.6 Risk Management Standards and Frameworks)
(4.4.2 Hazards Identification)

Examples of Integration

Manager (β) provides a specific example where effective Risk Management practices helped control scope creep, reducing the load on a team member and positively impacting HSE by alleviating mental pressure.

Change Management, Stakeholder Involvement, Effective Communication, Risk Management, Monitoring and Controlling.

(2.2.5 Change Management) (4.5.6 Change Management) (2.2.3 Stakeholder Involvement) (4.5.2 Stakeholder Involvement) (4.5.3 Effective Communication and Training) (3 Risk Management) (4.4 HSE and Risk Management) (2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review)

Assessment of Risk Management Effectiveness

Manager (β) uses a risk register shared with key stakeholders, focusing on probability/likelihood versus impact metrics as key indicators.

KPIs

(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling)
(4.4.6 Monitoring and Review) (3.2.1 Qualitative Risk Assessment)

Personal Experience and Background in Risk Management

Manager (β) emphasizes the importance of keeping a contingency buffer to mitigate risks associated with resource availability, showcasing a practical approach to Risk Management.

Risk Mitigation

(3.4 Risk Mitigation) (4.4.5 Risk Control Measures)

Effective Risk Management

(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)

Role of Risk Management in Manager (β) Organization Projects

Manager (β) mentioned that Risk Management is described as integrated into the project life cycle, highlighting its habitual inclusion in project processes.

Effective Risk Management

(3.6 Risk Management Standards and Frameworks)

Risk Prioritization

Manager (β) explains the prioritization of risks based on factors affecting human life, safety, and productivity, aligning with a strict hierarchy.

Qualitative Risk Assessment

(3.3 Risk Prioritization) (3.2.1 Qualitative Risk Assessment)

Training and Communication on HSE Risks

Manager (β) mentioned that mandated HSE training is compulsory for all resources, and regular updates to the risk register keep the team informed about project-related risks.

Trainings and Effective Communications

(2.4.1 Effective Communication) (4.5.3 Effective Communication and

Training)
<p>Leadership's Role in Prioritizing HSE Considerations</p> <p>Manager (β) suggests integrating HSE considerations into all project tasks and measuring through scorecards and dashboards, emphasizing leadership's role in propagating adherence to HSE protocols.</p>
<p>Integrating HSE Considerations with Project Tasks</p>
<p>(4.3 HSE Standards) (4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and HSE)</p>
<p>Monitoring and Controlling</p>
<p>(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.5 Risk Control Measures) (4.4.6 Monitoring and Review)</p>
<p>Recommendations for Integrating Risk Management</p> <p>Manager (β) recommends keeping track of risks in existing projects, after-action reviews with a focus on HSE elements in existing projects to enhance Risk Management integration.</p>
<p>Monitoring and Reviews</p>
<p>(4.3 HSE Standards) (4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.7 Project Management, Risk Management and HSE) (2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.5 Risk Control Measures) (4.4.6 Monitoring and Review)</p>
<p>Impact of Risk Management on HSE Performance</p> <p>Overall, according to Manager (β) answers, the implementation of Risk Management processes is seen as having a positive impact on HSE performance, with potential temporary cost increases offset by long-term savings.</p>

Positive Impact of Risk Management Implementation
(4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and HSE)
Challenges in Implementing Risk Management
Common challenges include short-term objectives and minimal spending, potentially impacting long-term Project Success and HSE performance.
Short-Term Objectives, Quick Implementation, Minimal Spending, Reactive Management
(4.3 HSE Standards) (4.6 HSE Culture and Performance)

6.1.5 Interview (γ) Findings

In response to the question about the real factors of Project Success, Interviewee (γ) highlights that very good planning and initiation with effective communication are identified as genuine and essential factors for achieving successful project outcomes. Good team collaboration within the project team is highlighted as critical factors, emphasizing the importance of cohesive teamwork. As well as Project Success is associated with a focus on meeting stakeholder expectations, underscoring the significance of aligning project outcomes with the expectations of stakeholders. *“The genuine factors contributing to Project Success includes very good planning and initiation, effective communication, good team collaboration, and focus on meeting stakeholder expectations.”*

In response to the question about critical success factors for achieving the balance between Project Success and HSE compliance, Interviewee (γ) mentioned that risk assessment, consistent safety training, proactive hazard mitigation, clear communication of safety protocols, and fostering a culture of

continuous improvement in HSE are identified as a critical success factor, emphasizing the importance of evaluating and understanding potential risks to ensure proactive management. *“Achieving a harmonious balance between Project Success and HSE compliance demands a comprehensive approach. Key success factors include risk assessment, consistent safety training, proactive hazard mitigation, clear communication of safety protocols, and fostering a culture of continuous improvement in HSE practices.”* Integration of these elements ensures Project Success while prioritizing HSE considerations, highlighting the interconnected nature of success and HSE compliance within the project framework. *“As per my experience, integrating these elements ensures a project's success while prioritizing HSE considerations.”*

In response to the question about the integration of Project Management principles with HSE Management, Interviewee (γ) point of views that the integration of Project Management principles with HSE Management as essential for seamless project execution, emphasizing the interdependence of these two domains. *“I view the integration of Project Management principles with HSE Management as essential for seamless project execution.”*

Interviewee (γ) Highlights the importance of aligning project goals with HSE objectives. Emphasizes the need to embed safety protocols into project plans, indicating that safety measures should be an integral part of the project's foundational structure to ensure ongoing adherence. Emphasizes the importance of conducting regular risk assessments. *“Aligning project goals with HSE objectives involves embedding safety protocols into project plans, conducting regular risk assessments,”*

Interviewee (γ) supports for fostering a safety-conscious culture among the project team, and highlights the necessity of ensuring compliance with relevant regulations, emphasizing the legal and regulatory aspects of HSE Management within projects. These points collectively highlight the importance of a holistic

and integrated approach to Project Management that incorporates HSE principles at every stage. *“....., fostering a safety-conscious culture among the team, and ensuring compliance with relevant regulations.”*

In response to the question about specific instances where Project Management principles are integrated with HSE Management, Interviewee (γ) highlights the implementation of a comprehensive Risk Management plan as a specific instance. *“Certainly, one notable instance is the implementation of a comprehensive Risk Management plan within the project framework.”*

This involves:

- Identifying potential hazards.
- Assessing the impact of these hazards on project timelines and HSE considerations.
- Devising mitigation strategies.
- The integration of HSE requirements into project schedules and resource allocation is mentioned. This ensures that safety measures are not overlooked and are an integral part of project planning.

“This involves identifying potential hazards, assessing their impact on both project timelines and HSE considerations, and devising mitigation strategies. Additionally, incorporating HSE requirements into project schedules and resource allocation ensures that safety measures are not overlooked.”

Interviewee (γ) mentions the integration of regular safety audits and performance assessments into the project's quality management system. This suggests a systematic approach to monitoring and improving safety performance. *“Regular safety audits and performance assessments are also integrated into the project's quality management system.”*

These instances illustrate a practical and integrated approach where HSE considerations are woven into the fabric of Project Management processes and practices.

In response to the question about the significance of Risk Management practices in ensuring Project Success, especially in relation to HSE, Interviewee (γ) emphasizes that Risk Management plays a crucial role by proactively identifying, assessing, and mitigating risks. This indicates a forward-looking approach to addressing potential challenges that could impact both project outcomes and safety standards. *“Risk Management plays an important role in ensuring Project Success, especially concerning HSE considerations. By identifying, assessing, and mitigating risks, we proactively address potential challenges that could impact both project outcomes and safety standards.”*

The strong Risk Management practices are stated to contribute to preventing incidents, safeguarding the well-being of project stakeholders. This highlights the protective aspect of Risk Management, focusing on creating a safe environment for all involved in the project. *“strong Risk Management practices help to prevent the incidents to safeguards the well-being of project stakeholders,.....”*

Interviewee (γ) suggests that effective Risk Management practices support the project's overall flexibility. This implies that by addressing risks, the project becomes more adaptable to changes and uncertainties, enhancing the likelihood of successful delivery. *“....., and also support the project's overall flexibility, enhancing the likelihood of successful delivery while maintaining a strong focus on HSE compliance.”*

The response underscores the commitment to maintaining a strong focus on HSE compliance throughout the Risk Management process. This aligns Risk Management with safety standards, ensuring that HSE considerations are an integral part of the Risk Management framework. These points collectively

emphasize the proactive, protective, adaptable, and compliance-focused nature of effective Risk Management within project scenarios.

In response to the question about specific example where effective Risk Management practices directly contributed to both Project Success and favorable HSE outcomes, Interviewee (γ) shared an example from a previous project, during the construction phase of the project, a potential hazard related to working at heights was identified. This indicates a proactive approach to identifying potential risks within the project environment. *“In a previous project, the implementation of comprehensive Risk Management practices played a crucial role in ensuring both Project Success and favorable HSE outcomes. During the construction phase, a potential hazard was identified related to working at heights.”*

Proactive risk assessment was conducted in response to the identified hazard. This proactive stance suggests a commitment to addressing risks before they escalate, aligning with best practices in Risk Management. In response to the risk assessment, enhanced safety measures were introduced. This involved the mandatory use of fall protection equipment and additional training for the team, showcasing a comprehensive strategy for risk mitigation. *“Through proactive risk assessment, we introduced enhanced safety measures, including the mandatory use of fall protection equipment and additional training for the team.”* The preemptive approach and implementation of risk mitigation strategies contributed to preventing potential accidents. This emphasizes the positive impact of Risk Management on safety outcomes, aligning with the overarching theme of HSE considerations.

The incorporation of risk mitigation strategies not only prevented accidents but also contributed to a smoother project timeline. This suggests that effective Risk Management practices can positively influence project efficiency and success.

“This preemptive approach not only prevented potential accidents but also contributed to a smoother project timeline.”

The risk mitigation strategies directly aligned with HSE goals, fostering a safer working environment. This demonstrates the integration of Risk Management with HSE considerations and highlights the role of Risk Management in promoting safety within the project. *“The incorporation of these risk mitigation strategies directly aligned with HSE goals, fostering a safer working environment.”*

The project was completed without any major incidents, indicating that the proactive Risk Management practices were successful in maintaining a safe project environment throughout its duration. These findings collectively showcase a real-world example where Risk Management practices had tangible positive effects on both Project Success and HSE outcomes. *“The project was completed without any major incidents, and the proactive Risk Management practices significantly enhanced both safety performance and overall Project Success.”*

In response to the question about assessing the effectiveness of Risk Management practices in relation to both Project Success and HSE performance, Interviewee (γ) emphasized the importance of tracking the number and severity of incidents as a direct measure of how well Risk Management practices are mitigating potential issues. *“Tracking the number and severity of incidents provides a direct measure of how well Risk Management practices are mitigating potential issues.”* This suggests a quantitative approach to evaluating the impact of Risk Management on project and HSE outcomes.

Monitoring adherence to established HSE standards and regulations is identified as a key indicator for assessing the effectiveness of Risk Management. This implies that compliance with regulatory requirements is considered a crucial aspect of evaluating Risk Management practices. *“Monitoring help to established*

HSE standards and regulations helps assess the effectiveness of Risk Management in maintaining a safe working environment.”

The efficiency of Risk Management processes is assessed by evaluating how quickly identified risks are addressed and mitigated. This criterion reflects the effectiveness of Risk Management in responding promptly to potential threats. *“Assessing how quickly identified risks are addressed and mitigated can gauge the efficiency of Risk Management processes.”* These findings collectively provide a comprehensive perspective on the evaluation criteria for assessing the effectiveness of Risk Management practices in the context of both Project Success and HSE performance.

In response to the question about overview of their experience and background in Risk Management within the context of HSE, Interviewee (γ) has experience leading the development and implementation of comprehensive Risk Management plans. This suggests a proactive approach to identifying and addressing potential risks throughout the project lifecycle. *“In my previous roles, I have led the development and implementation of comprehensive Risk Management plans.”*

The focus on identifying potential hazards indicates a thorough risk assessment process. Understanding the specific risks associated with the project is crucial for effective Risk Management. Interviewee (γ) considers the impact of identified hazards not only on project objectives but also on HSE goals. This holistic approach aligns with the thesis topic, emphasizing the integration of Risk Management with HSE considerations. The experience includes formulating effective mitigation strategies. This implies a hands-on involvement in devising plans to address and reduce the impact of identified risks, contributing to overall Project Success and HSE performance. *“This involved identifying potential hazards, assessing their impact on both project objectives and HSE goals, and formulating effective mitigation strategies.”*

In response to the question about the role of Risk Management in organization's projects, particularly focusing on HSE considerations, Interviewee (γ) confirms that Risk Management in his organization is described as integral to the success of projects in Gamma's organization. This emphasizes the strategic importance of effectively managing risks to achieve overall Project Success. Risk Management is framed not only as a project necessity but as a fundamental commitment to maintaining a safe and sustainable work environment. This indicates a broader organizational philosophy that values safety and sustainability. *“In our organization, the role of Risk Management is integral to the success of projects, with a dedicated focus on HSE considerations. We recognize that effective Risk Management is not only a project necessity but also a fundamental component of our commitment to maintaining a safe and sustainable work environment.”*

Interviewee (γ) provided specific examples of Risk Management roles within the organization:

Emphasis on early identification of potential risks related to both project objectives and HSE goals. *“We emphasize the early identification of potential risks related to both project objectives and HSE goals. This involves thorough risk assessments during project planning and continuous monitoring throughout the project lifecycle.”*

Strong integration of Risk Management into project planning processes, ensuring HSE considerations are embedded in schedules and resource allocation. *“Risk Management is strongly integrated into project planning processes. This ensures that HSE considerations are embedded in project schedules, and resource allocation.”*

Fostering a culture of continuous improvement in both Project Management and HSE practices by incorporating lessons learned from previous projects, incidents, or near-misses. *“We foster a culture of continuous improvement in both Project Management and HSE practices. Lessons learned from previous projects,*

incidents, or near-misses are analyzed and integrated into our Risk Management framework for ongoing enhancement.”

In response to the question about how risks are prioritized in projects within the context of HSE, Interviewee (γ) mentions that prioritizing risks is based on a combination of severity and likelihood, considering both project objectives and HSE goals. *“Prioritizing risks in projects, especially within the context of HSE is typically based on a combination of severity and likelihood on both project objectives and HSE goals.”*

The severity of a risk is evaluated by assessing the potential consequences if the risk were to occur. Risks with severe consequences to HSE or Project Success are given higher priority. *“The severity of a risk is evaluated based on the potential consequences if it were to occur. Risks with severe consequences to HSE or Project Success are given higher priority.”*

The likelihood of a risk materializing is assessed. Risks with a higher probability of occurrence are prioritized, especially if they pose significant threats to HSE considerations. *“The likelihood of a risk materializing is assessed. Risks with a higher probability of occurrence are often prioritized, especially if they pose significant threats to HSE considerations.”*

In response to the question about how project teams are ensured to be adequately trained and informed about HSE-related risks and Risk Management procedures, Interviewee (γ) mentions that the organization designs and implements comprehensive training programs specific to the project and industry. *“Ensuring that project teams are well-equipped to handle HSE-related risks and following Risk Management procedures is a crucial aspect of Project Management.”*

Training sessions cover HSE-related risks, including awareness of potential hazards, safety protocols, and familiarity with the organization's Risk Management framework. *"We design and implement comprehensive training programs that cover HSE-related risks specific to the project and industry. This includes awareness sessions on potential hazards, safety protocols, and the organization's Risk Management framework."*

Regular workshops and drills are conducted to simulate potential HSE scenarios, providing practical experience and reinforcing theoretical knowledge. *"Regular workshops and drills simulating potential HSE scenarios helps reinforce theoretical knowledge."*

In response to the question about how organizations should prioritize HSE considerations when developing and implementing Risk Management strategies for projects, interviewee (γ) emphasizes that HSE considerations should be integral to project decision-making processes, emphasizing the need for a seamless integration of HSE into all aspects of project planning and execution. *"In my opinion, prioritizing HSE considerations in the development and implementation of Risk Management strategies is important for the overall success of projects."*

Leadership plays a crucial role in shaping the organizational culture and ensuring that HSE receives the necessary attention. Leaders are instrumental in fostering a culture where HSE is a priority. *"Leadership plays a crucial role in shaping the organizational culture and ensuring that HSE is given the attention it deserves."*

Leaders should ensure that risk assessments and mitigation strategies explicitly account for HSE considerations. This involves incorporating HSE elements into the Risk Management framework from the early stages of project development. *"HSE considerations should be integral to project decision-making processes and tasks. Leaders should ensure that risk assessments and mitigation strategies explicitly account."*

Clear communication channels are essential for conveying updates on risk assessments, safety protocols, and lessons learned from previous projects. Effective communication ensures that relevant HSE information reaches all stakeholders. *"Deploy updates on risk assessments, safety protocols, and lessons learned from previous projects by using clear communication channels."*

In response to the question about strategies or best practices for effectively integrating Risk Management processes and procedures into project planning and execution to enhance Project Success and HSE performance, Interviewee (γ) provided recommends to schedule regular reviews of the risk register throughout the project lifecycle. *"Schedule regular reviews of the risk register throughout the project lifecycle."* This involves periodic assessments to ensure that the risk register remains up-to-date and relevant as the project progresses. Conduct lessons learned sessions at key project milestones. *"Conduct lessons learned sessions at key project milestones to capture insights and improvements for future projects."* These sessions aim to capture insights and improvements derived from the project experience, contributing to organizational learning and enhancing future project outcomes.

In response to the question about the impact of the implementation of Risk Management processes and procedures on the HSE performance of a project, Interviewee (γ) emphasizing that the implementation of Risk Management processes and procedures generally has a positive impact on the HSE performance of a project. *"The implementation of Risk Management processes and procedures generally has a positive impact on the HSE performance of a project."*

In construction projects, Interviewee (γ) provided a specific example related to working at heights. Risk identification and assessment were conducted to identify potential hazards. Proactive safety measures, including the use of fall protection equipment and specialized training, were implemented. *"In*

construction projects for examples, a risk identification and assessment potential hazards related to working at heights."

The proactive safety measures implemented as part of the Risk Management processes resulted in a significant reduction in the likelihood of incidents. Specifically, in the example provided, the measures aimed at working at heights helped prevent injuries and contributed to improved overall HSE performance. *"Implementing proactive safety measures, such as requiring the use of fall protection equipment and providing specialized training, significantly reduced the likelihood of incidents. This helped prevent injuries and improve overall HSE performance."*

In response to the question about common challenges or obstacles that organizations face when implementing Risk Management processes and procedures for HSE, Interviewee (γ) identified several common challenges including (Lack of Integration with Project Planning, Lack of Training and Awareness, Poor Communication, and Unarranged Documentation and Reporting) *"Some common challenges are: Lack of Integration with Project Planning, Lack of Training and Awareness, Poor Communication, and Unarranged Documentation and Reporting"*

6.1.6 Interview (γ) Analysis

Manager (γ) responses provide also a comprehensive understanding of the intricate relationship between Risk Management, Project Success, and HSE compliance. Same as Manager (α) and Manager (β), the insights shared reflect a nuanced approach to addressing challenges and ensuring a proactive and integrated approach to HSE within the Project Management framework. As shown in Table 9, several key themes and insights has been listed and all of these key elements had been confirmed by connecting them with the relevant literature and chapters for this thesis.

Table 9. Interview (γ) Analysis

Theme/Area of Discussion
Key Insights from Manager (γ) Responses
Relevant Literature and Chapters
Factors of Project Success
<p>Manager (γ) identifies planning, initiation, effective communication, team collaboration, and meeting stakeholder expectations as genuine factors contributing to Project Success.</p>
Planning and Initiation
(2.1 Project Success) (2.3.2 Planning) (2.3.1 Initiation)
Effective Communication
(2.1 Project Success) (2.4.1 Effective Communication)
Team Collaboration
(2.1 Project Success)
Meet Stakeholder Expectations
(2.1 Project Success) (2.2.3 Stakeholder Involvement)
Critical Success Factors for Balancing Project Success and HSE Compliance
<p>Manager (γ) highlights risk assessment, safety training, proactive hazard mitigation, clear communication, and a culture of continuous improvement as critical success factors. Emphasize the importance of integrating these factors to ensure Project Success while prioritizing HSE considerations.</p>
Risk Assessment
(3.2 Risk Assessment) (4.4.1 Risk Assessment) (3.6 Risk Management Standards and Frameworks)
Safety Trainings
(4.5.3 Effective Communication and Training)

Proactive Hazard Mitigation
(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)
Clear Communication
(4.5.3 Effective Communication and Training)
Continuous Improvement
(4.5 HSE and Project Management) (4.5.7 Continuous Improvement) (4.3 HSE Standards)
Integration of Project Management and HSE
<p>Manager (y) emphasizes the essential nature of integrating HSE requirements into project plans from the beginning, regular risk assessments, fostering a safety-conscious culture, and ensuring compliance with regulations. Describes instances such as the implementation of a comprehensive Risk Management plan, embedding HSE requirements into project schedules, and integrating safety audits into the project's quality management system.</p>
Project Planning and Schedule
(2.3.2 Planning) (2.4.4 Work Breakdown Structure (WBS))
Risk Assessment
(3.2 Risk Assessment) (4.4.1 Risk Assessment) (3.6 Risk Management Standards and Frameworks)
Effective Risk Management
(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)
Resource Allocation
(2.4.2 Resource Allocation) (4.5.4 Resource Allocation)
Effective Communication and Training
(4.3 HSE Standards) (4.5.3 Effective Communication and Training) (4.5.5 Documentation)

Significance of Risk Management in HSE

Manager (γ) emphasizes the importance of Risk Management in proactively addressing challenges, preventing incidents, safeguarding stakeholders' well-being, supporting project flexibility, and ensuring successful project delivery with a focus on HSE compliance.

Effective Risk Management (Identification, Assessment, and Mitigation)

(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)

Examples of Integration

Manager (γ) provides an example where comprehensive Risk Management practices contributed to both Project Success and favorable HSE outcomes, particularly in addressing hazards related to working at heights. Proactive risk assessment led to enhanced safety measures, preventing accidents, and contributing to a smoother project timeline.

Risk Assessment, Resource Allocation, Effective Communication and Training, Risk Management, Monitoring and Controlling.

(3.2 Risk Assessment) (4.4.1 Risk Assessment) (2.4.2 Resource Allocation) (4.5.4 Resource Allocation) (4.5.3 Effective Communication and Training) (3 Risk Management) (4.4 HSE and Risk Management) (2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review)

Assessment of Risk Management Effectiveness

Manager (γ) suggests assessing the effectiveness of Risk Management practices by tracking incident numbers and severity, monitoring HSE standards, evaluating how quickly identified risks are addressed, and utilizing key performance indicators (KPIs) for efficiency evaluation.

KPIs
(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.6 Monitoring and Review) (3.2.1 Qualitative Risk Assessment)
<p>Personal Experience and Background in Risk Management</p> <p>Manager (γ) highlights experience in developing and implementing comprehensive Risk Management plans, focusing on risk identification, assessment, and mitigation strategies. Highlights the importance of working with multifunctional teams to instill a culture of risk awareness.</p>
Effective Risk Management (Identification, Assessment, and Mitigation)
(4.4 HSE and Risk Management) (3.6 Risk Management Standards and Frameworks)
Hazard Identification
(4.4.2 Hazards Identification)
<p>Role of Risk Management in Manager (α) Organization Projects</p> <p>Manager (γ) describes Risk Management as integral to Project Success with a dedicated focus on HSE considerations. Outlines roles such as risk identification, integrated planning, and continuous improvement.</p>
Effective Risk Management, Continues Improvements
(3.6 Risk Management Standards and Frameworks)
<p>Risk Prioritization</p> <p>Manager (γ) prioritizes risks based on severity and likelihood, aligning with a strict hierarchy. Emphasizes the importance of assessing the potential consequences and probability of occurrence.</p>
Likelihood, Severity, and Continuous Monitoring
(3 Risk Management) (3.2 Risk Assessment) (3.3 Risk Prioritization) (3.4 Risk Mitigation) (4.4.3 Determination of Risk Factors) (4.4.4 Risk Evaluation)

Training and Communication on HSE Risks

Manager (γ) outlines ensures comprehensive training programs covering project-specific HSE-related risks. Reinforces theoretical knowledge through regular workshops and drills simulating potential HSE scenarios.

Trainings and Effective Communications

(2.4.1 Effective Communication) (4.5.3 Effective Communication and Training)

Leadership's Role in Prioritizing HSE Considerations

Manager (γ) emphasize for integrating HSE into decision-making processes and tasks. Emphasizes the integration of HSE considerations into decision-making processes, clear communication channels, and leadership's role in shaping the organizational culture towards HSE.

Integrating HSE Considerations with Project Tasks

(4.3 HSE Standards) (4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and HSE)

Qualitative Risk Assessment

(3.3 Risk Prioritization) (3.2.1 Qualitative Risk Assessment)

Monitoring and Controlling

(2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.5 Risk Control Measures) (4.4.6 Monitoring and Review)

Recommendations for Integrating Risk Management

Manager (γ) recommends regular reviews of the risk register and lessons learned sessions to enhance integration. Encourages capturing insights and improvements for future projects.

Monitoring and Reviews

<p>(4.3 HSE Standards) (4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.7 Project Management, Risk Management and HSE) (2.3.4 Monitoring and Controlling) (3.5 Risk Monitoring and Controlling) (4.4.5 Risk Control Measures) (4.4.6 Monitoring and Review)</p>
<p>Impact of Risk Management on HSE Performance</p> <p>Manager (γ) strongly asserts that the implementation of Risk Management processes and procedures generally has a positive impact on HSE performance. Provides an example of reduced incidents through proactive safety measures in a construction project.</p>
<p>Positive Impact of Risk Management Implementation</p> <p>(4.4 HSE and Risk Management) (4.5 HSE and Project Management) (4.6 HSE Culture and Performance) (4.7 Project Management, Risk Management and HSE)</p>
<p>Challenges in Implementing Risk Management</p> <p>Identifies common challenges in Risk Management implementation, including lack of integration with project planning, insufficient training and awareness, poor communication, and unorganized documentation and reporting. Emphasizes the potential impact of these challenges on Project Success and HSE performance.</p>
<p>Lack of Integration with Project Planning, Lack of Training and Awareness, Poor Communication, Unarranged Documentation and Reporting</p> <p>(4.3 HSE Standards) (4.6 HSE Culture and Performance)</p>

6.1.7 Interviews Summary

Although the presentation method and the amount of the information are different between Interviewee (α), Interviewee (β) and Interviewee (γ), but the

results are same. As shown in Table 10, the researcher summarized all the results based on the interviews analysis.

Table 10. Summary of Interviews Results

Theme	PM (α)	PM (β)	PM (γ)
Factors of Project Success	Resource Allocation	Stakeholder Involvement	Initiation and Planning
	Effective Risk Management		
	Clear Objectives	Project Constraints	Effective Communication
	PM processes		Team Collaboration
	Skilled Team		Stakeholder Involvement
Critical Success Factors for Balancing Project Success and HSE Compliance	Continuous Improvement	SMART Objectives	Continuous Improvement
	Team Skills and Performance	Stakeholder Involvement	Safety Training
		Resource Allocation	
	Effective Risk Management	Effective Risk Management	Effective Risk Management
Effective Communication	Effective Communication	Effective Communication	
Integration of Project Management and HSE	Effective Communication	Effective Communication	Effective Communication
	Monitoring and Controlling	Stakeholder Involvement	Effective Risk Management

	Project Planning and Tasks Scheduling	Project Initiation, Planning and Tasks Scheduling	Project Planning and Tasks Scheduling
	Risk Assessment	Risk Mitigation	Risk Assessment Resource Allocation
Significance of Risk Management in HSE	Stakeholder Involvement	Monitoring and Controlling	Effective Risk Management
	Planning		Risk Identification
	Solid Decision-Making	Risk Identification	Risk Assessment
	Proactive Safety Actions		Risk Mitigation
Examples of Integration	Risk Assessment	Change Management	Risk Assessment
	Stakeholder Involvement	Stakeholder Involvement	Resource Allocation
	Effective Communication	Effective Communication	Effective Communication
	Risk Management	Risk Management	Risk Management
	Monitoring and Controlling	Monitoring and Controlling	Monitoring and Controlling
Assessment of Risk Management Effectiveness	KPIs/ Qualitative Risk Assessment	KPIs / Qualitative Risk Assessment	KPIs / Qualitative Risk Assessment
Personal Experience and	Risk Identification	Risk Mitigation	Hazard Identification

Background in Risk Management	Documentation and Reporting	Effective Risk Management	Effective Risk Management
Role of Risk Management Organization Projects	Effective Risk Management	Effective Risk Management	Effective Risk Management
	Continuous Improvements		Continuous Improvements
Risk Prioritization	Likelihood	Qualitative Risk Assessment	Likelihood
	Severity		Severity
	Continuous Monitoring		Qualitative Risk Assessment
Training and Communication on HSE Risks	Training and Effective Communications	Training and Effective Communications	Training and Effective Communications
Leadership's Role in Prioritizing HSE Considerations	Integrating HSE Considerations with Project Tasks	Integrating HSE Considerations with Project Tasks	Integrating HSE Considerations with Project Tasks
	Qualitative Risk Assessment		Qualitative Risk Assessment
	Monitoring and Controlling	Monitoring and Controlling	Monitoring and Controlling
Recommendations for Integrating Risk Management	Balance HSE Measures with Project Feasibility	Monitoring And Reviews	Monitoring And Reviews
Impact of Risk Management on HSE Performance	Positive Impact of Risk Management Implementation	Positive Impact of Risk Management Implementation	Positive Impact of Risk Management Implementation
Challenges in	Commitment Lack	Short-Term	Lack of Integration

Implementing Risk Management		Objectives	with Project Planning
	Change Management	Quick Implementation	Lack of Training and Awareness
	Risk Assessment	Minimal Spending	Poor Communication
	Communication Gaps	Reactive Management	Unarranged Documentation and Reporting

7 DISCUSSION AND CONCLUSION

7.1 Theoretical Implications

How Project Management principles, process and practices related to and integrated with HSE Management?

Clear project objectives should include HSE goals by setting clear HSE objectives for the project. These objectives should be aligned with the overall project goals. That will lead us to complete any project within a specified timeframe while ensuring zero incidents and compliance with environmental regulations (2.2.1 clear objectives, and SMART objectives presented in 4.5.1).

Both Project Management and HSE Management require engaging with a range of stakeholders (stakeholder involvement presented in 2.2.3 and 4.5.2). It is important to engage with relevant stakeholders, including regulatory bodies, HSE experts, and the local community, to ensure that HSE concerns are addressed and that the project aligns with community and regulatory expectations (4.6 HSE culture and performance).

Risk Management in Project Management involves identifying, assessing, and mitigating risks (Risk Management presented in 2.2.4 and 3). In the context of HSE, risks could include potential health hazards, safety incidents, or environmental impacts. Project managers work with HSE professionals to develop risk assessments and mitigation plans to minimize these risks (HSE and Risk Management 4.4). A thorough risk assessment should be conducted for HSE early in the project planning phase (risk assessment presented in 4.4.1), and potential risks and opportunities identified related to HSE and this will lead for developing risk mitigation plans and safety measures (hazards identification presented in 4.4.2). It is very important to develop and implement strategies to mitigate identified HSE risks. Additionally, contingency plans are in place to

address unforeseen HSE issues that may arise during the project (4.4.4 risk evaluation, and risk control measures presented in 4.4.5).

Projects often encounter changes, and Project Management includes processes for managing these changes. In the HSE context, changes can affect safety and environmental aspects. So, any changes to the project plan or scope should undergo a thorough assessment of their impact on HSE. Project managers must ensure that changes are evaluated for their impact on HSE and that necessary adjustments are made to maintain compliance (change management presented in 2.2.5 and 4.5.6).

Continuous improvement is a shared goal between Project Management and HSE Management. Project managers and HSE professionals work together to learn from past projects and incidents, refining processes and practices to enhance safety and environmental outcomes in future projects (continuous improvement presented in 2.2.6 and 4.5.7, as well as HSE standards presented in 4.3).

Project Management emphasizes detailed planning, which includes defining project scopes, schedules, budgets, and Risk Management plan. It is very important to integrate HSE requirements into the project planning process, by developing a comprehensive project plan that includes HSE elements, such as safety protocols, environmental impact assessments, and regulatory compliance (2.3.2 project planning, as well as HSE standards presented in 4.3).

Project managers continuously monitor and control project progress throughout the project lifecycle. In the field of HSE, this includes monitoring safety metrics, environmental performance, and adherence to HSE regulations. Corrective actions are taken if there are deviations from the established standards (2.3.4 monitoring and controlling, as well as HSE standards presented in 4.3).

Effective communication is a fundamental Project Management principle. In the context of HSE, project managers and HSE professionals need to communicate regularly about safety and environmental concerns (2.4.1 effective communication, also effective communication and training presented in 4.5.3).

Project managers allocate resources, including personnel and equipment, which need to comply with safety and environmental regulations. They ensure that the right safety equipment is available, and that the workforce is adequately trained in HSE procedures (resource allocation presented in 2.4.2 and 4.5.4).

Proper documentation is essential for both Project and HSE Management. This includes maintaining records of safety incidents, environmental assessments, and compliance reports (2.4.3 documentation and reporting , as well as documentation presented in 4.5.5).

How does the implementation of Risk Management processes, practices and procedures affect the HSE performance of a project?

Risk Management process involves identifying potential risks to the project, including those related to HSE. Early identification of HSE risks allows for proactive measures to be taken to prevent incidents or mitigate their impact. Risk Management involves planning for potential emergencies or crises. Effective emergency response planning ensures that the project team is prepared to address HSE incidents promptly, reducing the severity of consequences. (3 Risk Management, as well as HSE and Risk Management presented in 4.4).

Risk assessment helps in evaluating the severity and likelihood of various risks, allowing for prioritization (risk assessment presented in 3.2 and 4.4.1). Prioritizing HSE risks ensures that resources are allocated to address the most critical concerns, enhancing overall HSE performance (3.3 risk prioritization, and risk evaluation presented in 4.4.4).

Developing risk mitigation strategies is a core aspect of Risk Management. Implementation of these strategies directly contributes to minimizing the likelihood and impact of HSE incidents, fostering a safer project environment (3.4 risk mitigation, and risk control and measures represented in 4.4.5).

Risk Management is an ongoing process that requires continuous monitoring and review. Regularly monitoring HSE risks allows for adjustments to Risk Management strategies, ensuring that the project remains aligned with HSE goals (risk monitoring, controlling, and review presented in 3.5 and 4.4.6).

What is the relationship between Risk Management practices and Project Success in the context of HSE?

The relationship between Risk Management practices and Project Success in the context of HSE is critical and interconnected. Effective Risk Management practices significantly contribute to Project Success, particularly in ensuring HSE compliance and positive outcomes.



Figure 25. Relationship between Project Success, Risk Management and HSE Management

As shown in Figure 25, the relationship between Risk Management practices and Project Success in the context of HSE is symbiotic. A solid Risk Management framework supports the overarching goal of Project Success by safeguarding HSE aspects, contributing to the overall well-being of the project and its stakeholders.

Below are key aspects of this relationship:

Prevention of HSE Incidents by Risk Identification and Mitigation: Risk Management involves systematically identifying potential hazards and implementing mitigation measures. This proactive approach minimizes the likelihood of HSE incidents during project execution. (NEBOSH, 2022)

Safety Culture Improvement by Risk Awareness and Communication: Effective Risk Management practices provide a culture of safety awareness. When project teams are well-informed about potential risks and mitigation strategies, they are more likely to adopt safe work practices, leading to an overall improved safety culture. (Ershadi, Edrisabadi, & Shakouri, 2019)

Minimization of Environmental Impact by Environmental Risk Assessment: Risk Management includes assessing potential environmental impacts and implementing measures to minimize harm. This proactive approach helps in preventing adverse effects on the environment, aligning with sustainable and responsible project practices. (ISO-14001, 2015)

Project Continuity and Timely Completion by Contingency Planning: Risk Management involves developing contingency plans for identified risks. This ensures that unexpected events do not disrupt project timelines, contributing to project continuity and successful completion within set schedules. (PMBOK® Guide)

Cost Savings and Operational Efficiency by Financial Risk Mitigation: Effectively managing financial risks related to HSE aspects prevents unexpected costs associated with incidents, accidents, or regulatory non-compliance. This leads to cost savings and ensures efficient resource utilization. (NEBOSH, 2022)

Stakeholder Confidence by Effective Communication: Implementing effective Risk Management practices builds stakeholder confidence. This is particularly important in the context of HSE, where stakeholders, including employees, regulatory bodies, and the community, expect a commitment to safety. (Kerzner, 2022)

Continuous Improvement by Learning from Risks: The Risk Management process involves continuous improvement by learning from past risks and incidents. This iterative learning loop contributes to refining HSE strategies, ensuring that future projects benefit from the lessons learned. (ILO-OSH 2001, 2009)

Legal and Regulatory Compliance by Adherence to HSE Regulations: Risk Management ensures that the project complies with HSE regulations and standards. This not only mitigates legal risks but also enhances the project's reputation as a responsible and compliant entity. (HSE, 1974 - 2023)

7.2 Practical Implications

Highlighting on insights obtained from the interviews with experienced project managers, the practical implications for project practitioners and organizations are real. The findings confirm the critical role of solid Risk Management practices in ensuring Project Success, particularly with respect to HSE outcomes. Based on interview's results and literature review, practical implications for project managers shown in Table 11. All important influences that significantly affect Project Success in context of HSE has been mapped in Figure 23 These practical implications provide a roadmap for all kinds of project to increase Risk

Management strategies, improve HSE outcomes, and ultimately contribute to the overall Project Success.

Table 11. Practical Implications

Practical Recommendations	Description
Early Integration of HSE in Project Planning and Project Life Cycle	Integrate HSE requirements and considerations into the initial phases of project planning to ensure that safety protocols are not treated as an afterthought. Early integration ensures that HSE is embedded in project planning, execution, and decision-making processes. It is help to minimizing surprises and extra costs, as well as ensuring alignment with project timelines and resource allocation.
Effective Risk Management	Develop and implement comprehensive Risk Management plans that identify, assess, mitigate, and monitor potential risks and hazards. Effective Risk Management supports both Project Success and HSE compliance, preventing incidents and ensuring a safer working environment, safety of project stakeholders, reduced operational costs, and improved overall Project Success.
Effective Communication	Create clear communication channels between project managers, HSE professionals, and project teams for sharing updates on risk assessments, safety protocols, and lessons learned. In any project we have to make sure that Risk Management processes and HSE considerations are effectively communicated at all levels.

	Effective communication ensures that HSE information reaches all stakeholders.
Continuous Improvement	Implement a culture of continuous improvement by learning from previous projects or incidents and regular reviews of the risk register. Regularly update risk registers and conduct lessons learned sessions to improve Risk Management practices. Continues improvement help to avoid delays, misunderstandings, and enhance team efficiency.
Training and Awareness Programs	Implement comprehensive training programs for project teams that cover project's HSE-related risks and emergency procedures. Regular workshops and drills simulating potential HSE scenarios reinforce theoretical knowledge and ensure that teams are well-prepared to handle risks, contributing to Project Success and safety.
Leadership Involvement	Leadership should actively prioritize HSE considerations during the development and implementation of Risk Management strategies, decision-making processes, and tasks. This involves integrating HSE into all tasks, deploy updates on risk assessments, measuring performance through scorecards, lessons learned from previous projects, and displaying HSE protocols regularly.
Integration of HSE in Organizational Culture	Integrate HSE considerations into the organizational culture to create a holistic approach where every team member understands the importance of safety and its direct impact on project success. Recognize that the implementation of Risk Management processes

	generally has a positive impact on HSE performance. Proactive risk identification and mitigation contribute to preventing incidents, reducing the likelihood of accidents, and improving overall HSE outcomes.
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7.3 Limitations and Future Research

7.3.1 Limitations

While the semi-structured interview method offers valuable insights into the impact of Risk Management on Project Success in the context of HSE, it is essential to acknowledge certain limitations in the research design.

The study relies on a relatively small sample size of three project managers with 10-15 years of experience. This limited sample size may affect the generalizability of the findings to a broader population of project managers. Additionally, the participants were selected based on their extensive experience, potentially introducing selection bias.

The participants in this study represent diverse geographical backgrounds and industries, including the Middle East, Iraq, United Arab Emirates, United States, and the United Kingdom. However, the findings may not capture the full spectrum of perspectives from other regions and industries, limiting the generalizability of the results.

Semi-structured interviews inherently involve subjective interpretation, both in the formulation of questions and the analysis of responses. The personal perspectives and experiences of the participants may influence the results, potentially leading to biased findings.

7.3.2 Future Research

Future research can build upon the foundation laid by this study, offering a more comprehensive and nuanced perspective on the interplay between Risk Management and Project Success in the context of HSE.

Future studies could benefit from a larger and more diverse sample size, encompassing project managers, employees and HSE professionals from various regions, industries, and experience levels. This would enhance the external validity of the findings and provide a more comprehensive understanding of the impact of Risk Management on Project Success in diverse contexts not just in HSE contexts.

Complementing qualitative insights with quantitative methods, such as surveys or statistical analyses, could offer a more robust assessment of the relationships between Risk Management practices and Project Success in general or specifically in diverse contexts. This would provide a broader empirical basis for drawing conclusions and identifying patterns.

Future research could explore how Risk Management practices practically in HSE context or diverse contexts vary across different industries and sectors. Comparing and contrasting the effectiveness of Risk Management strategies in diverse settings would contribute to a more nuanced understanding of their impact on Project Success.

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APPENDIX 1

Interview Questions

Project Management, Project Success and HSE Management

1. What are the real factors of Project Success?
2. In your experience, what are the critical success factors for achieving the balance between Project Success and HSE compliance?
3. How do you perceive the integration of Project Management fundamental principles with HSE Management in your projects?
4. Can you describe specific instances where Project Management principles, processes and practices are directly related to and integrated with HSE Management?

Project Management, Risk Management and HSE Management

5. In your opinion, what is the significance of Risk Management practices in ensuring Project Success, particularly in relation to HSE?
6. Have you observed any specific examples where effective Risk Management practices have directly contributed to Project Success in terms of HSE outcomes? If so, could you please describe those examples?
7. How do you assess the effectiveness of Risk Management practices in relation to Project Success and HSE performance? Are there any key performance indicators (KPIs), specific metrics or indicators that you utilize?

Risk Management and HSE Management

8. Can you provide an overview of your experience and background in Risk Management within the context of HSE?
9. How would you describe the role of Risk Management in your organization's projects, particularly in terms of HSE considerations?
10. How do you prioritize risks in projects within context of HSE, and what criteria or guidelines are used to make these decisions?
11. How do you ensure that your project teams are adequately trained and informed about HSE-related risks and Risk Management procedures?
12. In your opinion, how should organizations prioritize HSE considerations when developing and implementing Risk Management strategies for projects? What role does leadership play in this process?

Risk Management and Project Success and HSE Performance

13. What strategies or best practices would you recommend for effectively integrating Risk Management processes and procedures into project planning and execution to enhance Project Success and HSE performance?

14. Is the implementation of Risk Management processes and procedures having positive or negative impact to the HSE performance of a project? how? can you share any insights or examples?
15. What are some common challenges or obstacles that organizations face when implementing Risk Management processes and procedures for HSE? How do these challenges impact Project Success and HSE performance?