Universitetet i Stavanger

FACULTY OF SCIENCE AND TECHNOLOGY

MASTER'S THESIS

Study programme/specialisation: **Risk Management & Societal Safety**	Spring semester, 2019 Open/~~Confidential~~
Author: **Javeed Sael**	Javeed sael (signature of author)
Programme coordinator: **Frederic Emmanuel Bouder** Supervisor(s): Internal: **Frederic Emmanuel Bouder** External: **Morten Olsen Rygh**	
Title of master's thesis: **English:** A risk-based study of safety barriers in multicultural work environments. **Norwegian:** En risikobasert studie av sikkerhetsbarrierer i multikulturelle arbeidsmiljøer.	
Credits: **30**	
Keywords: Safety, risk-based management, multicultural Organizations, safety barriers, communication, Risk communication and language difficulties.	Number of pages: 81 + supplemental material/other: 98 Stavanger, **14. June .2019** date/year

14.06.2019

A risk-based study of safety barriers in multicultural work environments

HOW COULD A RISK-BASED APPROACH BE USED TO OVERCOME SAFETY BARRIERS IN MULTICULTURAL ORGANIZATIONS?

JAVEED SAEL

UNIVERSITY OF STAVANGER | Norway

PREFACE

Completing my education in completely different conditions than what I had imagined has been my greatest achievement so far. It was not an easy task for an immigrant young boy, who had to leave everything behind and pursue his dreams in a completely unknown country. About 11 years ago after I moved to Norway for the first time, everything I had with me in the *"backpack"* seemed worthless. Thus, I had to adapt to a completely different environment with different culture, tradition, language and living conditions. My journey began with learning the language and integrating into the society as this is where home is now.
With a journey full of challenges, ups and downs and lots of positive and negative memories, I finally managed to get where I am today, but to come this far would not have been possible without the unconditional love and support of my family, my parents, my brothers and my dear sister. I personally dedicate this thesis to my family and friends who have encouraged and motivated me and stood by my side whenever I needed them.

It was not an easy job to find a suitable study entity to conduct this research on because most of the companies that were requested for cooperation, denied the request without even giving a chance to understand the purpose of the paper, while others did not even reply. At this stage things looked a little challenging, but fortunately after lots of back and forth efforts, I managed to sign an official contract with a major industrial operation, for which I am forever grateful. Without their support and cooperation, it would not have been possible to complete this study.

Unfortunately, due to our agreement, I cannot mention any names, but I express my gratitude to my external supervisor for his time, support and advice, and all the other respondents for their time and attention they have given towards this project.

I would also like to thank all my professors, lecturers and the University of Stavanger as whole, especially my supervisor, Professor Frederic Emmanuel Bouder, whose work as a scientist has been an inspiration that firmed this study, who has continuously encouraged, supported and regularly provided me with guidance and valuable advice. I believe requesting Mr Bouder as my supervisor has been one of the most important choices I have made in relation to this paper.

Once again, I am thankful to everyone who has been a part of this journey. Everyone equally share credit for this project, and so, I hope it makes everyone as proud as I am.

ABSTRACT

11 of 13 studies show that foreign employees are about 1,6 to 13 times more often injured in occupational accidents compared to Norwegian employees. Even though, both national and non-national employees are involved in occupational accidents, the risk for the foreign employees is 46 % higher compared to Norwegian employees. Thus, the main purpose of this case study is to investigate safety barriers in multicultural/multilingual (MCML) land-based oil and gas organizations, and *"How could a risk-based approach be used to overcome safety barriers in multicultural organizations?"* Furthermore, this study will describe how to reduce the disparities between Norwegian and foreign employees by utilizing a risk-based model.

This is a field-based qualitative case study including 7 weeks of participatory field observations within the organization, 17 face-to-face interviews with employees on every level and different backgrounds, as well as with 5 representatives from 5 different companies, and 4 open-ended interviews with experts (authoritativeemployees) within the field of occupational safety. Although, there were not many relevant documents in the field to study, this dissertation has systematically looked and analysed what was gathered from the relevant documents and previous studies throughout the paper.

Despite the focus on safety and *"The Zero Vision"* in organizations, respondents agree that the current approach to achieve safety in MCML context is not good enough to prevent accidents. It is because the current approach does not account for MCML aspects of production. Through this exploratory case study some of the most important barriers in MCML context have been highlighted, that are often not visible or overlooked by the organizations, but they do exist at all times and have a significant influence on safety and increase disparities between different groups, for example, language and communication barriers, fear of job loss, discrimination and cultural disparities and etc.

The purpose of results and recommendations in this paper is to raise awareness and understanding among key stakeholders about the importance of the MCML aspects of the society and its advantages to integrate and maintain safety in diverse industrial operations and to strive to strengthen standards for better future development. Language is the key to all the challenges related to MCML societies and must be studied in different contexts to highlight other challenges in MCML societies such as, poverty among foreigners, class distinctions, increasing crime and labour crime rate, racism, discrimination, social dumping and insufficient integration.

TABLE OF CONTENTS

Figures

Tables

Abbreviations

MCML:	Multicultural/Multilingual
AKU:	Workforce Survey
SSB:	Statistic Central Agency
EU:	European Union
EEA:	European Economic Area
EFTA:	European Free Trade Association
NOA:	National Monitoring of Work Environment
QRA:	Qatar Regulatory Agency
ALARP:	As Low As Reasonably Practicable
HTO:	Human, Technology and Organization
HSE:	Health, Safety and Environment
IRGC:	International Risk Governance Council
TQM:	Total Quality Management
PPE:	Personal Protection Equipment
SJA:	Safe Job Analysis
LKU:	Living Condition Survey
CRM:	Communication Risk Management

1. INTRODUCTION

Some key sectors of the economy including the oil and gas industry, increasingly need to use very diverse workforce that comes from different countries with different safety, culture, training and experience and language knowledge. Such diversity increases safety challenges in multicultural/multilingual (MCML) organizations and in the society in general. According to Workforce Survey (AKU) (AKU, in SSB, 2019; STAMI-report, 2018, p. 27, 33) about 70,1 % (2,8 million) of all citizens in Norway between the age of 15-74 years are rewardingly employed. The report also states that about 66,6 % (480.000) of all the immigrants (884.000) living in Norway are employed in different sectors, which is 14,1 % of all population and about 15 % of all workforce.

After the European Economic Area agreement (EEA) in 1994, enlargement of the European Union (EU) in 2004 and European Free Trade Association (EFTA), Norway has become a good mix of citizens with different nationalities, cultures and religious beliefs (SSB, 2019; Marsdal, 2018). Beside the advantages it provides in the form of multicultural society, it also increases the complexity in human interactions and expose us to different type of known and unknown threats, risks and vulnerabilities.

Accidents happen all the time on every level of a system, but the complexity in procedures, standards and guidelines and human interactions can increase safety barriers in working environment and may raise dangerous situations and make the safety of work difficult in MCML organizations (Turner & Pigeon, 1997, p. 102; Wogalter et al., 1999; Lungren & McMakin, 2009; Marsdal, 2018, p. 14). The working environment in oil and gas industry is very diverse, people come from everywhere, yet we do not have a safety approach that accounts for barriers in MCML context. If we are increasingly using diverse workforces, then we are supposed to be able to implement safety requirements in an uniformed way, because safety is a critical thing in MCML communities. Thus, the big question is, how do we do it, and how does it work?

The table below illustrates an overview of reported occupational accidents per 1000 employees in different sectors from 2014 to 2017. As observed in 2017, despite the focus on safety over the last 20-30 years, the amount of reported accidents in all industries is 8 per 1000 employees, which is lower than the years before. Nevertheless, it is worrying that the number of accidents has over the years been significantly similar. The table on the other hand

indicates only the numbers that are officially registered. According to Gravseth et al. (2003), about 90 % of all accidents never get reported, which means that in 2017 the real number of accidents could possibly be about 200000 or more. Such under reporting creates implications for the safety work in organizations and makes it difficult to develop appropriate safety procedures to predict and prevent accidents in MCML context.

	Reported accidents at work				Reported accidents at work (per 1 000 employees)			
	2014	2015	2016	2017	2014	2015	2016	2017
All industries	23 892.0	23 942.0	22 459.0	21 937.0	9.8	8.9	8.3	8.0
Agriculture, forestry and fishing	280.0	361.0	351.0	367.0	12.0	12.0	11.0	11.0
Mining and quarrying	439.0	419.0	332.0	349.0	6.5	6.3	5.7	5.9
Manufacture	3 249.0	3 145.0	2 667.0	2 501.0	14.0	13.0	11.0	11.0
Electricity, water supply, sewerage, waste management	443.0	482.0	484.0	469.0	15.0	15.0	15.0	14.0
Construction	2 791.0	2 716.0	2 712.0	2 574.0	13.0	12.0	11.0	10.0
Wholesale and retail trade: repair of motor vehicles and motorcycles	1 473.0	1 415.0	1 395.0	1 381.0	4.4	3.9	3.8	3.7
Transportation and storage	1 443.0	1 738.0	1 697.0	1 785.0	11.0	12.0	12.0	12.0
Accommodation and food service activities	392.0	352.0	344.0	400.0	4.7	3.4	3.2	3.6
Information, financial and professional activities	399.0	449.0	461.0	441.0	1.5	1.5	1.6	1.5
Administrative and support service activities	1 093.0	1 083.0	1 133.0	1 135.0	7.7	7.3	7.3	6.9
Public adm., defence, soc. security	1 160.0	2 218.0	2 562.0	2 323.0	7.9	14.0	16.0	14.0
Education	2 334.0	2 251.0	2 128.0	2 118.0	12.0	10.0	9.6	9.4
Human health and social work activities	6 381.0	5 924.0	5 312.0	5 264.0	13.0	11.0	9.5	9.3
Other service activities	311.0	337.0	323.0	317.0	4.1	3.7	3.4	3.3
Ukjent Unknown	1 704.0	1 052.0	558.0	513.0	.	.	.	.

Table 1 Reported accidents at work (Per 1 000 employees) in the period of 2014-2017 (ssb.no, 2019)

However, based on research related to the working environment amongst foreign employees in Norway (STAMI-report, 2018, p. 184), the risk for serious accidents is 46% higher compared to national employees. Analysis also shows that the risk for life threatening and occupational death amongst non-national employees is about 26% higher than Norwegian employees (Arbeidstilsynet, 2012, p. 4). In total about 7,9% of immigrants compared to 1,5%

of national employees report that they have during the last 12 months been victim of injuries during work (STAMI-report, 2018, p. 183).

Even though, science and scientists state that 80 to 90% of all accidents are caused by active human failures (Helmreich, 2000; Reason, 1997; Wagenaar & Groenweg in Flin et al, 2008, p. 1), yet we do not have appropriate risk models that account for the human factors in MCML industrial operations. It appears that there is higher focus on the remaining 10 to 20% technological factors associated with accidents rather than 80 to 90% of human factors. Thus, this paper investigates that what are the main factors for the ever-increasing accident rates amongst foreign employees compared to Norwegians.
Is it because foreign employees work in high risk activities or are there other underlying factors that can explain such disparities? To avoid any confusions, we have not studied different activities level, but employees on the operating level. Front-line activities are carried out both by national (42%) and foreign employees (58%) at the same level performing similar tasks based on similar procedures and standards. The project seeks to explain about what are the safety barriers in the MCML working environment and how can we use a risk-based model and its elements to overcome barriers in the appropriate manners.

1.1. Research Question

Based on the introduction above this paper addresses the following research question:

How could a risk-based approach be used to overcome safety barriers in multicultural organizations?

This is a subject area we know very little about, and therefore makes a good point of departure to carry out this investigation. Furthermore, the secondary research questions listed below; clarify the choice of our main research question and extrapolate the purpose of this project.

- What do we mean by safety in MCML organizations?
- How is language and communication related to occupational safety?
- How to integrate and maintain safety in multicultural sharp end activities?

1.2. Thesis Structure

This paper begins with an introductory chapter focusing on the purpose of this research and creates the foundation and the motivation to perform this project. It also defines the main research question along with the sub-research questions to extrapolate its purpose. Furthermore, it looks into previous studies and reports in the MCML context to study safety barrier in diverse working communities.

Chapter 2 is based on risk science and a discussion of the relevant theories in relation to understanding the phenomena this paper studies. This chapter primarily builds theories about risk-based approach and its central elements in the MCML context. Other literature has also been reviewed along the way as the research required.

In chapter 3, the methodology used to collect and analyse data will be presented. In chapter 4 and 5, the findings from data analyses are presented and discussed in relation to the literature presented in chapter 2. As a conclusion, in chapter 6, the focus will be on lessons learned, recommendations and further research in the MCML context of safety based on the barriers introduced.

1.3. Exploratory Case Study

In spite of the attention to safety during the last 30 years, it is still argued that companies have problems with successfully integrating safety in daily work activities (Arbeidstilsynet, 2017). To study and understand; *"How could a risk-based approach be used to overcome safety barriers in multicultural organizations?"*, a case study in collaboration with a MCML company located in Stavanger, with over 900 employees and about 23 different nationalities has been chosen to complete. To make the arguments clearer, it has been decided to study both Norwegian and foreign employees at the front-line activities.

Sharp-end operations are risky activities with sets of defined safety instructions, procedures and regulations that need to be understood, communicated and followed up accordingly throughout the system to successfully complete an operation, without any harm to employees.

This is a qualitative case study that involves 7 weeks of participatory field observations within the organization, 17 face-to-face interviews with employees on every level of the organization, 4 open ended interviews with experts and a systematic document analyses.

Since this paper studies human-beings, probably the best way to carry out this investigation is from the inside of the organization. To perform this project, presence at the activity area and observation ofemployees' personal relations, their behaviour and their language and communication skills to understand and implement required safety procedures related to their tasks is essential. It has also been sought to observe administrative meetings and their way of working with safety and the strategies they use to communicate the safety information with operators.

The advantage of such case study is that we can through document analysis, interviews and field observations compare different groups, different communication strategies, different risk frameworks, and safety models at the same time. We can also compare similar activities and similar tasks carried by national and non-national employees, which is important to answer why foreign employees are more often involved in occupational accidents and what are the safety barriers in major multicultural industrial operations. Such case studies create the capacity for the transfer and implementation of predictive and preventive measures between sectors and organizations. Besides cultural differences, language and communication barriers, this project provides the opportunity to study other underlying risk factors related to accidents, that may explain the increasing disparities between foreign and native employees. In this paper referring to "front-line employees", means every person who is physically involved in the production area, regardless of their occupation, background and/or whether they are sub-contractors or hired by the company.

1.4. Previous Research

In a report from the Norwegian labour inspectorate, based on 31 studies about labour immigration and occupational accidents, it has been stated that diversity in sharp end activities is linked to reduced safety. The purpose of these studies have been to investigate more about working conditions among foreign workforce and the causes as to why foreign employees are more often involved in occupational accidents compared to Norwegian workers. Other purpose of these studies have been to provide valuable information, so that supervisory authorities, organisations and companies can increase their knowledge about complexities in multicultural settings and the risks that employees are exposed to.

11 of 13 studies show that foreign employees are about 1,6 to 13 times more often injured in occupational accidents compared to native employees. Studies also show that there is a

significant 72% risk of bullying and harassment in multicultural working environment, and 22% foreign employees say that they have during the last 12 months been discriminated based on where they come from. The reports also show that the risk for serious injuries is 46% higher for non-national compared to national employees. It is indicated that the risk for occupational death amongst foreign employees is 26% higher compared to national workers (Arbeidstilsynet, 2012; STAMI-report, 2018, p. 184).

The figure below summarizes and indicates important factors related to occupational accidents in the Norwegian working environment. These factors illustrate a comparison of national and foreign employees based on different analyses during the last 10-15 years.

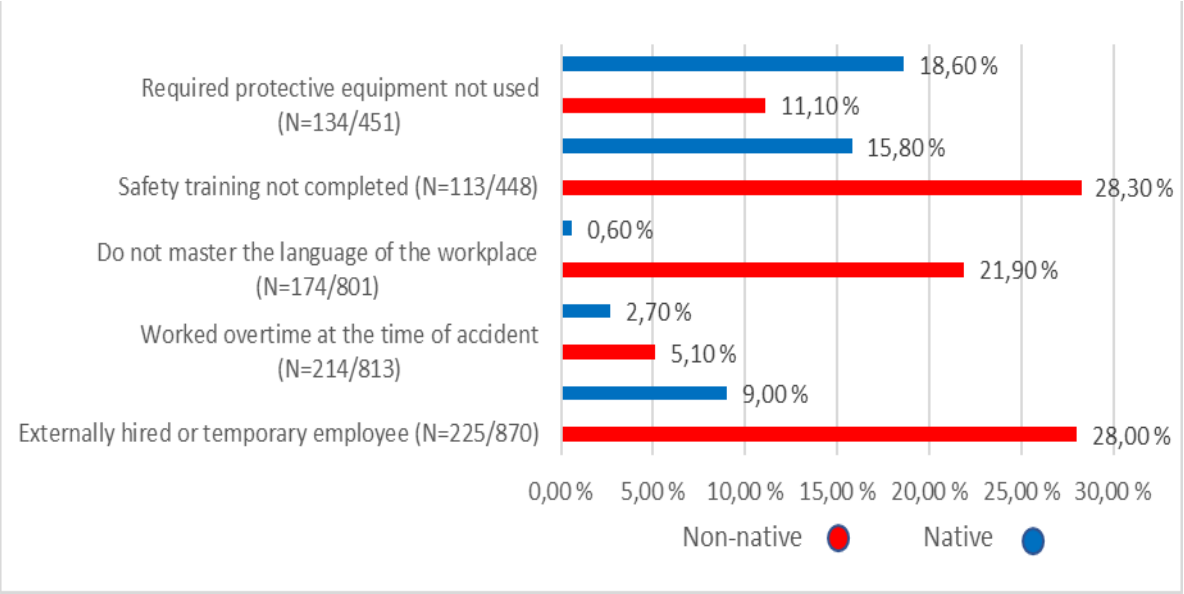

Figure 1 Comparison of accidents between national and non-national employees based on different factors (Arbeidstilsynet, 2012)

Figure 1 shows that, a total of 22% of the foreign employees who got injured in occupational accidents; did not speak or understand the language spoken at workplace and had weaker communication skills compared to other employees. Language and communication barriers have been mentioned as serious safety challenge in different sectors over the years. Other important factors for occupational accidents are mentioned as temporary or external employment (28% foreign employees against 9% of Norwegian employees), working overtime (5,1% against 2,7%), lack of safety training (28,3% against 15,8%). Both national and non-national employees are involved in accident, but the risk for the foreign employees is 46% higher compared to Norwegian employees.

According to analysis, Norwegian employees (18,6%) are more often injured, because they do not use required safety equipment, which is about 7,5% higher compared to foreign employees (11,1%). Other explanation to this may be; because organizations have more focus directed on the safety of foreign workforce and their working conditions that make them overlook the local employees' safety.

> *"A significant proportion of the foreigners who are injured or perished in work accidents do not understand the language spoken at workplace"* (Arbeidstilsynet, 2017).

> *"Some reports of anxiety also mention that personnel with poor knowledge of language, who come out on work facilities, are also perceived as a safety problem to handle."* (Arbeidstilsynet, 2016)

In the latest STAMI-report (2018, p. 159) in collaboration with national monitoring of the working environment (NOA), shows that a higher amount of employees report that the mistakes they make at workplace can create dangerous situation and harm other employees. The report also points out that about 97% of employees, who report that their mistakes can put other employees' life in harm, have enough time to perform operations in safer manner. In the Norwegian petroleum sector, about 40% of employees report that dangerous situations occur because of cultural differences and that everyone at workplace does not speak the same language. Based on AKU-report in 2013, NOA have previously anticipated that the real number of land-based occupational accidents lies above 100000 per year (STAMI-report, 2018, p. 167), but because 90% accidents never get reported, this increases the challenges with appropriate safety work in multicultural organizations. In 2017 about 50% of all accidents reported were related to land-based operations in different sectors, but mainly in construction, oil and gas industries and manufacturing (See table 1 for illustration).

In the analyses of 176 accidents in 2016, in which 183 people got injured and 4 were dead; the reports showed that about 45% of these were probably while 25% were possibly fatal accidents. Reports also stated that 40% of people involved in these analyses were employees with non-Norwegian backgrounds, and 3 out of 4 who died were foreign employees (Arbeidstilsynet, 2016 in STAMI-rapport, 2018, p. 199). In the period from2014 to 2017, 41 of 129, which mean 1 of 3, who died on the land-based operations were foreign employees. This indicates that foreign employees enriched workforce in the Norwegian production cycle has a higher risk (46%) compared to Norwegian employees (STAMI-rapport, 2018, p. 164).

According to STAMI-report (2018, p. 183 & 199), foreign employees work more often in physical, manual and riskier professions that do not require education and experience. The report also points out, high risk activities, externally hired personnel, under 30 years age class, short time in organizations and lack of language knowledge as the main factors why foreign employees more often die or get injured in occupational accidents. Thus, *"Studies do not provide an answer to whether the increased work injury risk primarily has to do with the fact that immigrants work in occupations where the risk for injury is higher, or whether the increased risk for accidents is related to other factors."* (STAMI-report, 2018, p. 183).

In general, it is employees between the ages of 25 to 39 and 40 to 54, who are mostly involved in occupational accidents. Thus, the risk for accidents amongst foreign employees between the ages of 25 to 39 is 36% higher compared to national employees. This group of employees are often foreign employees, sub-contractors/temporary hired from other companies, trainees or summer substitutes, who have limited work experience and do not understand the spoken language at workplace and do not have appropriate knowledge of safety routines and procedures related to activities (Arbeidstilsynet, 2016; STAMI-report, 2018, p. 166).

In the period 2011 to 2016, a total of 234 occupational deaths were registered of which 55 were non-Norwegian background. This indicates that the risk for foreign employees to lose their life is 1.4 times greater than other employees (STAMI-report, 2018). According to the reports, following five factors explain the disparities between local and foreign employees.

1. Higher frequency of workers
2. More often subjected to bullying and discrimination
3. More often exposed to physical heavy work
4. Experience less control over their own work situation and
5. Poor self-assessed health and mental health problems

However, studies suggest that language and cultural barriers within organization between groups can rise dangerous situation, there has been very little attempt to study the phenomenon more thoroughly to process appropriate preventative measures in a more MCML context. Language difficulties and other implications related to safety in MCML sharp end operations are factors that we know are serious challenges for organizations to handle, and therefore makes a good part of departure to carry out this investigation.

2. Theory

In this chapter, relevant theories concerning the research question *"How a risk-based approach could be used to overcome safety barriers in multicultural organizations?"* have been described. This chapter has commenced in-depth literature review of risks at the sharp-end activities in MCML firms. The focus has mainly been on theories related to risk, risk communication and the elements of risk-based model, as well as other relevant risk science that can explain the increasing human contribution to complexity at the front-line operations. This chapter alsodiscussesthe relevant science and its limitations in major MCML industrial operations.

2.1. The concept of safety and its limitations

Although, safety science and risk science on some points overlap each other, it is still not equipped with theories to handle safety in MCML organizations. According to Marvin Rausand (2011, p. 61), safety is a problematic concept with different meanings and definitions depending on who uses the term and in what context. Based on this safety is defined as;

"A state where the risk has been reduced to a level that is as low as reasonably practicable (ALARP) and where the remaining risk is generally accepted."

This definition of safety is about reducing the risk to a level As Low As Reasonably Practicable (ALARP), and to a level of tolerability and acceptability regarding a system or an activity. It is then; a system or an activity is considered as safe and harmless (Rausand, 2011, p. 61, Bouder et al., 2007, p. 90-91). Safety is an essential part of organizations and should be placed in the core of all systems, activities and operations in order to overcome barriers (Reason J. 1997, p. 114-115)especially, in modern and diverse MCML production era.

Having appropriate safety goals lay the foundation for a more dynamic and futuristic safety work. It can also ensure planning, maintenance and improvement of safety in organizatione.g. the *"Zero harm to human vision".* However, safety concept introduces two extended safety approaches, *"Safety-I"* and *"Safety-II"* (Trond Kongsvik, 2013, p. 137). It does not account for the human factors in MCML context. Safety has been a central concept and there have

been conceptual concerns, because we want people to be safe on workplace, but they are very leaner and do not take human factors on-board. Human factors are addressed insufficiently in the safety science, as it is today. Basically, what the point here is, that there is that bit that is often missing. One limitation is that it leads to models that are leaner and do not account much for human behaviour in MCML working environments. However, there are some theories around risk approaches, which are related to safety. They go one step further and take the human factors on-board.

2.2. Risk

According to Rausand (2011, p. 3), the word risk has many different definitions depending on who we ask. In some cases, the word is exchanged with "*chance, likelihood, or possibility"* that something will happen, but in other cases the word risk is replaced with other similar words such as "*hazard, threat and danger"*. It is the same in the scientific world, where the word risk is used in different contexts for example, in assessments, textbooks, articles, standards and guidelines. According to Klinke A and Renn O, (2002) risk is defined as;

"The possibility that human actions or events lead to consequences that harm aspects of things that human beings value"

This definition places focus on human actions that can cause hazardous situations and that can have consequences to what they value. In this paper, risks related to MCML organizations refer to the cultural disparities, language and communication barriers at the sharp end activities. Since, the aim isto address risks associated to human-beings and their interaction with each other in MCML context, a risk-based model to overcome barriers would be an appropriate approach to study the challenges in the organization. What this means is that it is possible to gather all relevant information and knowledge about the risks and provide a form of common consensus on what is dangerous and what is not dangerous (Engen O. A, Kruke B. I, Lindøe P. H, Olsen K. H, Olsen O. E, Pettersen K. A, 2016, p. 80-82).

Even though, risk science puts risk perception, risk communication, human behaviour and psychology in the very centre, they do not account for language barriers and multicultural aspects of a community. Much of the studies that take place are in monolingual context. The

main purpose of risk science in psychometric studies is that it has focus on risk perception and risk communication. It has focus on understanding human psychology and understanding human behaviour, and that is something we need to mobilize to revisit the safety theories. But again, even though they have done that, if we think about the language barriers in MCML context, it is not taken on-board. All these risk perception and risk communication are taking place in an environment where everyone speaks a common language (English and/or Norwegian). We use English, because most of the research is done in English speaking countries such as, US, UK etc. In the following sections, we will elaborate on the limitations of risk science, as well as its importance to overcome barriers in MCML organizations.

2.3. Risk-based Approach

With risk-based approach we mean activating preventive measures before dangerous situations develop to accidents. According to Qatar Regulatory Authority (QRA) (2018, p. 7) risk-based approach is defined as;

> *"a management tool for developing and managing a firm's systems and controls."*

It is about involving all the key stakeholders and using their knowledge to address the risks that the organizations are facing. *"The risk-based approach allows firms to allocate additional resources to areas of high risk."* (QRA, 2018, p. 7). To activate the right preventive measures, it is important for organizations to address specific risks related to working in MCML firms and the risks associated to cultural differences as well as language and communication barriers, which are perceived as some of the main risk factors in diverse production lifecycle. For the risk-based approach to be most effective, it is important that the risk assessment is carried out in three specific steps (QRA, 2018, p.11; Ruasand, 2009 and Aven, 2011).

1. Identification of the inherent risks related to different types of activities.
2. *"Assessing the Control Environment – mitigating, managing, control, monitoring and periodic reviews."*
3. Arriving at the residual risk – The final risk of the organization.

According to Rausand M & Utne B. I (2009, p. 1) risk assessment is a process, which is performed based on three basic questions, which are important to have in mind if we wish to identify the barriers in major multicultural industrial operations.

1. What can possibly go wrong?
2. What are the possibilities that unexpected events can occur?
3. What consequences can each of the events have on the Human, Technology and Organization (HTO)?

The main purpose of a risk-based model is to identify all the hazards and dangers related to a task, decide who is at risk and how, evaluate the risks and process preventive measures to prevent dangerous situations from occurring, implement the preventive findings and finally review and update your approach if necessary (Rausand M., (2011, p. 9).

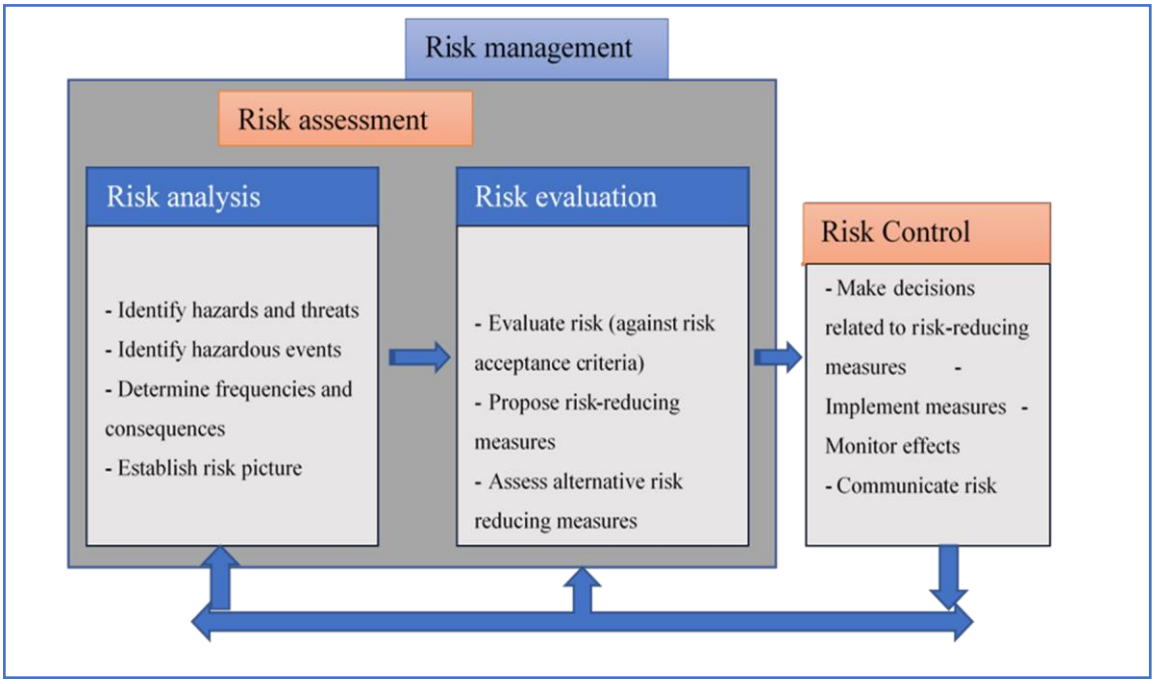

Figure 2 Risk analysis, evaluation and management (Rausand, 2002, p. 10)

Risk assessment is a continuous process, which sets out what is at risk, evaluates the uncertainties and calculates the probabilities for unexpected events and its consequences to paint an understandable picture of risk (Aven & Renn, 2010, p. 76).

Although there are many benefits emerging from risk assessments in relation to safety, there are also some challenges that researchers question when it comes to using different risk assessment methods. For example, risk models are used to serve the interests of organizations. They are used to illustrate that activities are safe and that necessary measures have been taken

accordingly to maintain safety. It is also difficult for employees who are not expert in the risk science to appropriately understand its premises and assumptions.

Complex risk models may allow authorities to hide behind *"rationality"* and *"objectivity"* as they allow risky activities that are believed to be according to rules and regulations. Such disclaimer gives the authorities the opportunity to allow activities that may harm HSE in organizations (O'Brien, 2000, p. 106).

Finally, it is argued that most risk models are constructed on *"selective information, arbitrary assumptions and enormous uncertainties*" (Aven, 2011, p. 13). However, different risk assessments frameworks consist of different elements and sub-processes, most risk processes never go beyond these three steps;

1. *"Risk Appraisal"*
2. "*Risk Communication"* and
3. "*Risk Management"*.

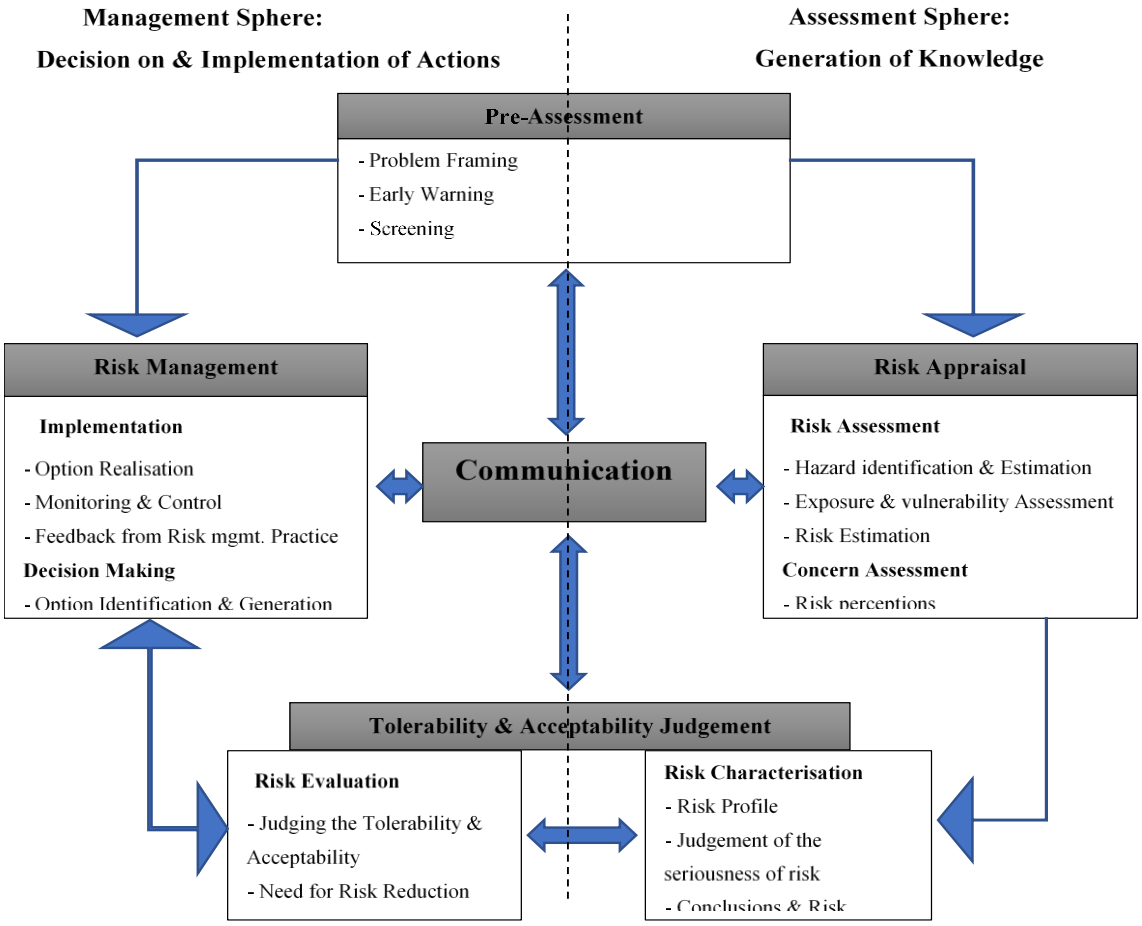

Figure 3 Basic elements of the IRGC framework (Bouder et al. 2007, p.9 and Renn, 2008, p. 365)

There are many different risk models and processes to measure risks and uncertainties at workplace, and perhaps one of the most appropriate models is the International Risk Governance Council (IRGC-model), which presents five basic elements to risk management (See figure above). IRGC-framework is dependent on mutual trust relations amongst authorities, firms, experts and the general public. It also has to be possible to perform a pre-assessment of the risk with all relevant parts involved. All elements in the model are linked to each other through communication in its core, with the intention that different facts and risk understandings should weigh up against each other and through debates and discussions in relation to the risk we are standing upon, we can come to reliable solution (Engen et al., 2016, p. 346). Despite their completeness, they lack an important aspect of the modern working environment and it's diversity.

Risk assessment models are good and effective for the purposes they are developed for. They are informing about preventive measures based on risk analyses and risk evaluation of specific activities and tasks, but they come from mono-cultural context. Thus, they do not cover multicultural aspect of workplace, which is composed of people with different nationalities, cultures, languages and communication skills, a system where risks are directly related to humen and their interaction with each other.
Risk models related to technical tasks may ensure that operations are safe to perform, but they will not address barriers in MCML working facilities, which is a major challenge for organizations to handle.

To overcome the barriers in MCML enterprises require focussing on more multicultural frameworks rather than mono-cultural. Thus, it is important that such risk analysis are carried out systematically and holistically to prevent accidents in MCML industrial operations (Renn, 2008, p. 364 and Bouder, 2008, p. 285). If we use the same risk tools as we did for 30-40 years ago to overcome barriers, we may not get the results we expect. Thus, we must change our focus in accordance to the modern threats and risks in MCML societies (Hollnagel, 2014, p. 107). We must demonstrate that the motion of the risk in the society has changes, and that is something we need to explore a bit more. Scientists/experts need to look at the whole picture of modern risks and uncertainties.

2.4. Risk Perception

According to Wogalter et al., (1999, p. 6), Risk perception is defined as:

> "a term that refers to people's perception, awareness and knowledge of hazards, including potential consequences, associated with a situation or set of circumstances".

Risk perception is a subjective understanding of the risk one faces, and it is about individuals' personal experiences, cognitive abilities, values and personal perception of reality (Engen et al., 2016, p. 90). Aaron Wildavsky and Karl Dake (1990, p. 101), present the most widely used theory *"theory of knowledge".* According to this theory, technology or other things that are defined as dangerous are because people know and have knowledge of the risks associated with them. Part of economy it associated with globalization of the production life and free labour movement between countries that can influence workplace safety by including untrained, unskilled and inexperienced employees in the system.

Based on the knowledge about the risks in MCML working environment, preventive measure can be taken to overcome the barriers. The principle of ALARP is being put forward as an approach to reduce the disparities between national and foreign employees at the front-line operations (Bouder, Slavin and Løfstedt, 2007, p. 120). Although, risk perception is subjective, in this case it is about forming a common understanding of risks throughout the system, and the consequences it can have on workplace safety and people. Common risk perception can motivate both local and foreign employees to work towards common goals, which is to overcome safety barriers in MCML organizations, and perform activities safely.

All they need to know is; what are the benefits of respecting barriers and procedures (Fischhoff, 1995, p. 141). They need to establish a common understanding of risk factors that can have consequences to themselves and others around them. Risks are based on predications and mostly dominated by scientific analysis. It is often therefore, the outcomes of such analysis that do not make sense to employees at the MCML sharp end working industries, at least not for everyone.

"When the numbers do not speak for themselves, explaining them is an obvious next step. Those who attempt such full disclosure face significant technical problems, including a largely unprepared audience." (Fischhoff, 1995, p. 140).

According to James Reason (1997, p. 61), *"people design, build, operate, maintain, manage and defend hazardous technologies."* It is therefore important that everyone in MCML industrial systems understand the risks the same way. It is no longer appropriate to have subjective risk perception. However, it may not be as simple as it sounds, because risk perception in multicultural organizations is influenced by various factors such as; psychometric factors, social factors, cultural factors and employees' personal behaviour (Renn, 2008, p. 137-142). *"The relative effectiveness of these criteria in forming opinions and in judgements about risk tolerance varies considerably between different social groups and cultures."* (Renn, 2008, p. 118). Risk perception in MCML communities is based on where individuals come from, their social and cultural background.

Human behaviour is controlled by the psychological factors, but also by other situational factors and free will. *"Human behaviour is primarily driven by perception and not by facts, or by what is understood as facts by risk analysts and scientists.*" (Renn, 2008, p. 93). Risk in MCML societies is governed by individuals' knowledge, experience, values and emotions. People in multicultural settings may not always have the same risk understanding as everyone else in the system. They come from different backgrounds, they are used to different type of rules and regulations in relation to risk and risk mitigation. People with different psychological mind-sets, see risk differently and behave differently. Thus, different mind-sets and different behaviour in MCML organization is a common factor, which may lead to an unrecognizable risk picture and make the risk management process insufficient and problematic. Thus, it is important to account for MCML aspects of diverse workplaces.

According to Reason (1997), Renn (2008), Wogalter et al. (1999) and Flin et al. (2008), the role of creating a common risk perception in MCML context is an essential part of risk governance. When assessing, controlling and managing risk in multicultural settings, it is important to consider psychological, social, cultural and employees' personal behaviour in wider context, rather than monocultural context. This is also important to avoid the blame cycle, whether it is blaming the situation or other people for our actions. To break the cycle of blame in organizations it is central to recognize four basic facts about human nature and error (Reason, 1997, p. 127-128). (1) Human actions are almost always constrained by factors beyond an individual's immediate control, (2) People cannot avoid actions that they did not

intended to perform in the first place, (3) Errors have multiple causes; personal, task, situation and organization related and (4) Within a skilled, experienced and largely well-intentioned workplace, situations are more amenable to improvement than people.

2.4.1. Risk Regulation

Risk regulations in Norway can be traced back to when the first law about workers' protection was issued in late 1890s (Lindøe P. Kringen J. and Braut S. G. (2015, p. 18). The purpose of implementing regulations is to ensure safety at workplace. Until 1970s risks were handled based on pre-written and detailed rules, regulations and safety procedures. At the same time as new production methods, technological improvement and globalization provided new opportunities; it also opened for new types of risks and vulnerabilities.

In Norway, there is the act of working environment § 1. The working environment regulations and intern-control regulation that create the framework for how safety work should be done in the Norwegian working environments. The working environment act was first issued in 1977 and the purpose of this act is:

a) *"To ensure a working environment that puts the foundation for a meaningful and health promoting situations, that gives full safety against physical and mental adverse effects, and with a welfare standard which is always in compliance with the technological and social improvement in the society.*
b) *To ensure safe employment relations and equal treatment in work.*
c) *To facilitate adaptations in the employment relationship related to the individual employee's conditions and life situation.*
d) *To provide the basis for the employer and employees in organizations to safeguard and develop their own working environment in collaboration with the business partners, necessary guidelines and public authorities.*
e) *To contribute to a including working life".* (Lindøe et al. 2015, p. 35):

The intention and message of the working environment act is very clear and straightforward, but under this law there are other regulations, that may not be as clear as the overriding act and may not account for the MCML aspects of major industrial operations.

2.4.1.1.Intern-control regulation

Intern-control regulation is specified for all land-based organizations in Norway. This regulation demands that the management in organization must seek to systematically follow up the safety requirements in their organizations. This should be done in collaboration with employees and their representatives. The purpose of intern-control is to predict and prevent errors before it is too late. It also covers requirements for fire safety, electrical safety, safety against pollution of nature and food safety. Intern-control is a precise recipe of how organizations should control their HSE. Intern-control regulation is also known as the HSE-regulation. According to Norwegian labour inspectorate (2019) and *"lovdata"* (2017) intern-control is defined as:

"Systematic measures designed to ensure that the activities of the enterprise are planned, organized, executed, secured and maintained in accordance with the requirements laid down or in accordance with health, environment and safety legislation."

Intern-control for the land-based enterprises mean that organizations have responsibility to develop plans and systematically monitor all activities that the firm is responsible for and have responsibility that the organization is in compliance with the regulations. Intern-control for land-based production is;

- Organization's HSE is included in the system
- To improve safety and environmental efforts
- Personnel control and order in firm
- Active management engagement in HSE work
- A continuous work in organization

According to Terje Sørby (1996, p. 97), *"Intern-control §6 elaborates on the employer's duty to safeguard HSE."* and *"Central to the company's intern-control is that the person who carries out the audit shall report to the company's manager and perform his/her tasks independently of the authority chain that lies in the management line."*

Negative effects of relying on intern-control in MCML settings are; (Sørby, 1996, p. 48).

- Increased bureaucracy

- Internal-control systems are pure paper systems
- Organizations can be left for themselves with all the responsibility
- Situations that are challenging to measure/control are less prioritized
- Less focus on MCML aspect in organizations
- Employees' participation is difficult
- Challenges in dealing with psychosocial factors

Although, the message is *"to ensure safe working environment"* and *"to contribute to an including work life"*, it says nothing about how to handle different types of people in MCML firms. There are no specified requirements for safety associated to foreign employees, who are temporary employed, or work based on sub-contracts in short-term projects. It says nothing about language requirement, or employees who are not aware of their own rights.

One of the main challenges states, organizations, enterprises and societies face today is the complexity of how different parts of the modern society is composed of different nationalities and cultures. Complexity and vulnerabilities are integrated in the core of our systems. It is therefore important to ensure that everyone in the system has the same risk perception and follows the same safety regulations (Lindøe et al. 2015, p. 72-73; Lindøe, Baram & Renn, 2014). Laws and safety regulations are amended to emphasize the common goal descriptions of what companies should achieve with their safety procedures and provide the facility to achieve these goals (Lindøe et al. 2015).

2.4.2. Regulatory Differences in Different Countries

Safety regulations are different in each country and it depends on the risk perception in those countries. In a case study of occupational safety regulations in France and the UK in 2007, Henry Rothstein and Anne-Laure Beausier argue, that risk ideas are filtered and formed through nationally entrenched institutional and political agreements in ways that reveal significant differences in the underlying logic of safety regulation in different states (Rothstein, H., & Beausier, A., L. 2007, p. 1).

"Countries think about and govern risk in very different ways – ways which seriously constrain the extent to which the rationales underpinning novel policy approaches such as risk-based regulation make sense in different country settings. In contrast to the focus of transatlantic comparisons of risk regulation on the degree of precaution in statutory goals." (Weiner et al. 2010; Vogel 2012; Rothstein & Beausier, 2007, p. 12).

Studies indicate that risk perception in different countries is not entirely the same but they to some extent deal with same types of risks, and barriers. For example, the threats related to "*working in heights"* are not any different in other countries compared to Norway. Although, the risks may be the same, countries still do not have the same type safety regulations, standards and procedures as Norway. Despite the focus on safety on the international arena, safety seems to be more about compliance with prewritten procedures based on scientific risk models rather than compliance with actual safety regarding daily operations (Løfstedt, R., 2011; Kelman, 1981; Vogel, 1986;) Rothstien & Beausier, 2007, p. 11).

"The much bigger problem is that regulatory requirements are misunderstood and applied inappropriately." And that *"There is a need to stimulate a debate about risk in society to ensure that everyone has a much better understanding of risk"* (Ragnar Løfstedt, 2011).

To maintain and achieve the expected level of safety in MCML firms, all we need to do is provide integrated and comprehensive safety standards, guidelines and procedures, which do not exceed employees' ability of understanding. All we need to do is explain the message as simple as possible. Studies show that employees on the operator level prefer specific, logical and simple procedures linked directly to their tasks. Thus, all we have to do is show them that taking responsibility for their own and others' safety is good deal for them and the organization in general. All we need to do is treat them nicely, make them partners and show them that they have handled similar problems in the past, regardless of where they come from (Baruch Fischhoff, 1995, p. 138).

Different approaches to safety contribute to increased confusion and misinterpretation of safety information within organizations and between groups, especially in MCML working environment where different groups are used to different types of safety models and regulations. Thus, it is important that everyone involved in the diverse production life has the same risk understanding and are able to follow common set of safety procedures. This may also help to prevent misuse of foreign employees, who are not aware of their rights.

2.5. Barriers at modern sharp-end

Gibson (1961) and Haddon (1980) state that accidents happen when uncontrolled and harmful energy influences an element in the absence of barriers. System that does not have adequate barriers are easily exposed to accidents (Rosness et al., 2002, p. 18). The main idea of energy

and barrier model is to separate harmful energy and vulnerable objects from each other. It is also possible to reduce accidents by overcoming barriers related to human beings, which is a source of energy that triggers dangerous actions. If we implement this perspective in MCML working environment, temporary or foreign employees with different risk perception, language knowledge and communication skills can be seen as dangerous source of energy, and employees' safety can be the vulnerable element.

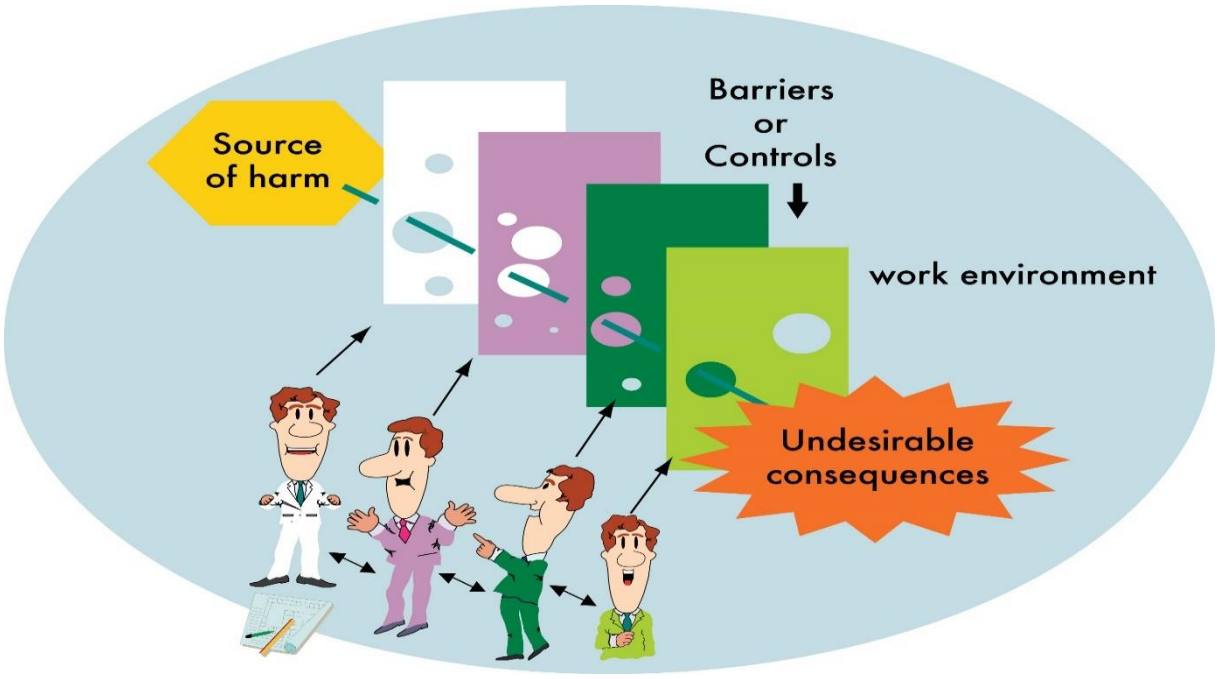

Figure 4 Swiss-Cheese model, representing multicultural work environment. (Reason, 1997, p. 9)(Retrieved from; https://upload.wikimedia.org/wikipedia/commons/0/00/Swiss_Cheese_model.jpg, 02.05.2019)

Reason (1997) includes barrier perspective in complex system, and that it is then, it is possible to retrieve a complete picture of why accidents occur. He also claims that systems are dynamic and that it is not right to study only one error, factor or barrier at a time. According to him, accidents can be prevented through preventive measures in all layers to create redundant solutions. Accidents are avoided only if barriers perform as expected and that they are not dependent of one another. If one barrier fails, other defences capture the danger signals and avoid accidents from happening. Accidents happen when harmful energy passes through all the barriers. Each person in the figure above represents a different level of barriers in multicultural industrial operations, starting from higher authorities all the way down to front-line operators.

Employees at the sharp-end activities are the last layer of protection of the system's defences. According to Reason (1997 in Rhona Flin, Paul O'Connor and Margaret Crichton (2008, p. 2)

employees at the front-line activities can be "*heroes by providing the essential resilience and expertise to enable the smooth operation of imperfect technical systems in threatening environments."* It is also argued that humans involved at the front-line activities can be responsible for the "*active failures*" and they actively contribute to losses and injuries. Based on different analyses in different industries it is indicated that about 80 to 90% of all accidents are caused by active human failures (Helmreich, 2000; Reason, 1990; Wagenaar and Groenweg in Flin et al, 2008, p. 1).

As the modern technical systems have become more reliable and highly integrated with safety and redundancy, the human factors related to accidents have become more transparent than ever. The more MCML front-line activities, the more people must interact with each other and with complex technical systems, and even more barriers are added to the system. Thus, it is important that we "…*understand the human dimension to their operations, especially the behaviour of those working on safety-critical – the 'sharp end' of an organization."* (Flin et al, 2008, p. 1).

According to Flin et al. (2008, p. 1), human errors cannot be eliminated entirely, they may even get more complex and challenging in more MCML contexts. However, efforts can be made to predict and prevent human errors, even in MCML industrial operations. We only need to ensure that all employees, especially at the multicultural communities, have appropriate skills, shared knowledge, common risk perception and positive behaviour to cope with the threats, uncertainties and barriers related to their tasks.

Other theories regarding human contribution to accidents is "*The Bad Apple*" theory of Sydney Dekker (2006), who distinguishes between "*the old view*" and "*the new view*" on human failure. According to "*the old view*" humans contribute in 2/3 of the accidents. It is employees at the sharp end who are the barriers "*The bad apples*", who do not follow rules or act negligently and cause accidents. Poor language knowledge and negative behaviour towards safety procedures, routines and regulations could be some of the underlying reasons to why some people in organizations do not perform as they should. Under *"the old view"* every employee who do not understand their position and procedures, who do not take responsibility and have negative behaviour are responsible for accidents. This view could be applied in MCML settings, because human being with cultural disparities, language knowledge and poor communication skills are the barriers in multicultural firms.

"The new view" on the other hand suggests that human failure should not be seen a root cause of accidents but as a symptom of deeper and more underlying problems. The mistakes employees make are not random, but on the contrary. They are closely tied up to the system, working environment, tasks and the equipment that are used to perform operations. It is not the people who cause accidents, it is the complexity in the system and procedures itself and therefore, employees at the MCML sharp end are just a bit of the whole complex system (Dekker, 2006). This view of *"The bad apple"* blames the system for occupational accidents but it does not eliminate the fact that human factors also play a central part in accidents.

There is no doubt that accidents happen due to system complexity, but we must realize that the complexity in the systems exists, because workplaces have become more diverse than ever before. Along with the modern technology, human interactions within organization between groups increase the complexity in the modern system. This is something neither *"the old view" n*or *"the new view"* accounts for. Aside from technological complexity, if we replace *"The bad apples"* with good apples, meaning employees with poor language knowledge, negative behaviour and poor communication skills with other employee, who are appropriately trained, have good language knowledge, understand safety procedures, and have stronger communication skills and take responsibility for their own as well as others' safety; the chances are high that we would most likely be able to overcome barriers, reduce the complexity and prevent occupational accidents, as well as improve and maintain safety.

The modern society, we are living in will continue to change its social, economic and cultural patterns on global basis. It offers enormous opportunities for increased competitive productivity and efficiency. It also introduces new types of barriers, risks and complexity between different groups within organizations and the society in general. As the world gets smaller, the necessity for safety in the MCML contexts increase, thus, it is important to improve the capacity of risk models and safety management tools to include the MCML aspect of modern production life (Jan Erik Karlsen, 2016, p. 104). The sooner we develop safety in the MCML contexts, the closer we get to overcome barriers and achieving our safety goals.

2.5.1. Cultural barriers

Culture is an ambivalent and complex concept (Reason, 1997, p. 191-193). However, this paper with culture refers to the differences between different groups based on their

background, their behaviour to safety, their abilities and attitude to safety implementation. According to Barry Turner (1976) occupational accidents have a cultural dimension, which we choose to overlook, because we only focus on its technical or organizational aspects (Engen et al. 2016, p. 141). Turner mentions several commonalities in accidents, including elaborating on perception of risk and numerous misleading information transfers within organizations and between groups (Turner, 1976, p. 389). In other words, there will always be someone in organization that is aware of the weaknesses or threats that could lead to accidents, but the problem is that information will not reach to the place where it is needed to prevent safety critical operations (Rosness et al. 2010, p. 75).

The fact that cultural disparities influence safety is nothing new for organizations to deal with. Even though, the concept of cultural difference can be beneficiary for organizations to study risks from different perspectives and to overcome safety barriers. It can also increase risks for interpersonal conflicts, injuries and accidents. Internationalization of sharp end activities means increased interaction within organizations and between people with different religious beliefs, political affiliation, community traditions or differences simple as language knowledge (Flin, et al. 2008, p. 78; Reason, 1997).

The possibility of sub-culture formation due to the cultural disparities and commonalities within organization's culture may create conflicts and implications for safety and effective risk communication. However, sub-culture is not studied as a barrier in itself, but fear among foreign employees with cultural differences might prevent employees from reporting accidents just to avoid the "*blame and shame*" burden (Collins, 2002, p. 18).

Disparities between cultures are interpreted as barrier in itself, because people are accustomed to different sets of regulations. They have different perceptions of risks and are accustomed to different types of organizational hierarchy. Cultural barriers can be simple as how employees behave; whether they respect the rules, procedures and limitations or extend extra to get the job done as fast as possible. To improve safety, predict and prevent accidents in multicultural sharp end operations, what we need is simple but very essential (Lungren & McMackin, 2009, p. 331). We must design safety cultures in internationalized domains, where all human beings at all levels are considered equally important regardless of their nationalities, occupation, level of experience and education. We must develop safety cultures where no one is outside of the law, which means despite their cultural differences everyone has equal rights.

2.5.2. Language Barriers

Employees who do not speak and understand the spoken language at workplace will have difficulties to participate in communications, understand safety documents and integrate in the community that is mainly driven on Norwegian terms (Wogalter, Frederick, Magurno, and Herrera, 1997a; in Wogalter, 1999, p. 152). We do not need to travel far to experience language barriers. Language conflicts can occur between two people who speak the same language with different dialects. It is very common to hear people in the west complain that they do not understand everything when they communicate with citizens from other parts of the country.

"As workplace become much more multicultural, recognising that gestures that have one meaning in some cultures can have a completely different meaning in others becomes particularly important. For example, a thumbs up in most western cultures means good luck or approval, whereas in Middle Eastern cultures this is an obscene gesture. The 'OK' sign used in scuba diving (forming a circle between forefinger and thumb with the other fingers raised) can be seen an obscene gesture in Germany. The simple head nod is accepted as meaning 'Yes' in Western Europe, China and North America, whereas in Sri Lanka and many eastern European countries, a nod actually means 'No'." (Flin et al. 2008, p. 76).

Language barriers in multilingual organizations may influence teamwork and training process, as well as compliance with safety procedures in general. As mentioned so far that people at the sharp end activities have different skills, competences, understanding abilities and that people at front-line vary in how much they wish to get involved in safety work. *"To ensure that people learn safety related information, training may be necessary"*. (Wogalter et al. 1999, p. 168). Thus, to ensure that the result of training is as expected, use of appropriate language is central. The main purpose of training should be to promote appropriate knowledge and skills in actual real-world operations (Flin et al. 2008, p. 115; Wogalter et al. 1999, p. 168).

According to Cannon-Bowers and Salas (1998 in Flin et al., 2008, p. 115), safety training and teamwork in multicultural firms are affected by following barriers, which are directly linked to complexity of information and common language knowledge;

- Multiple information sources/complexity in information
- Incomplete and conflicting information
- Rapidly changing and evolving scenarios

- Requirement for team co-ordination and adverse physical conditions
- Performance and time pressure
- High load of work or information load
- Auditory overload/interference

2.6. Communication

"The biggest problem with communication is the illusion that you have achieved it." (George Bernard Shaw)

This is especially an issue of concern in the MCML industrial activities. As mentioned earlier differences between groups within organizations, make the human interactions complex and to manage such complexity, communication is the lifeblood. Communication is simply in the core of all succeeding operations (Cees, B. M. & Charles, J. F. 2007, p. 1). But what if communication itself is affected by other barriers?

According to Tannæs, A. M (1992, p. 67) communication has two structures; the first one is power-based structure, in which communication is a "*one way"* process that happens on a "*top-down*" principle. The information is mostly communicated only from leadership to operators, without the possibility to give feedback or to confirm the information received.

The second and the most preferred communication strategy is *"a two-way communication*", where communication is happened in all directions and involves all relevant parts. In the "*communicative-structure*" the main purpose is to achieve agreement, common goals and allow all the stakeholders to participate (Erlien, B. 2010, p. 125-126; Flin et al. 2008, p. 72).

Although, communication is the lifeblood of effective organizations, it is almost never free of implications. One of the main problems with communication is the conflict of interest and misunderstanding of the information within organization between groups. Such complications can occur first of all due to different understanding of the information, due to language barriers, and the way information is communicated. Common language knowledge is the most important factor for communication to work at all. According to Flin et al (2008, p. 74), a communication process is 7% Words, 38% Tone and 55% other non-verbal clues, for

example, gestures, posture, facial expressions and other body language. This indicates the complexity of a communication process.

Wogalter, et al. (1999, p. 15) presents a framework (C-HIP model) for communication and human information process, which they believe is necessary for the communication to achieve its intended goals. *"The model decomposes the receiver component into the stages of attention, comprehension, attitudes and beliefs, motivation, and behaviour."* And that *"The receiver must notice the information and understand it."* (Wogalter et al. 1999, p. 15).

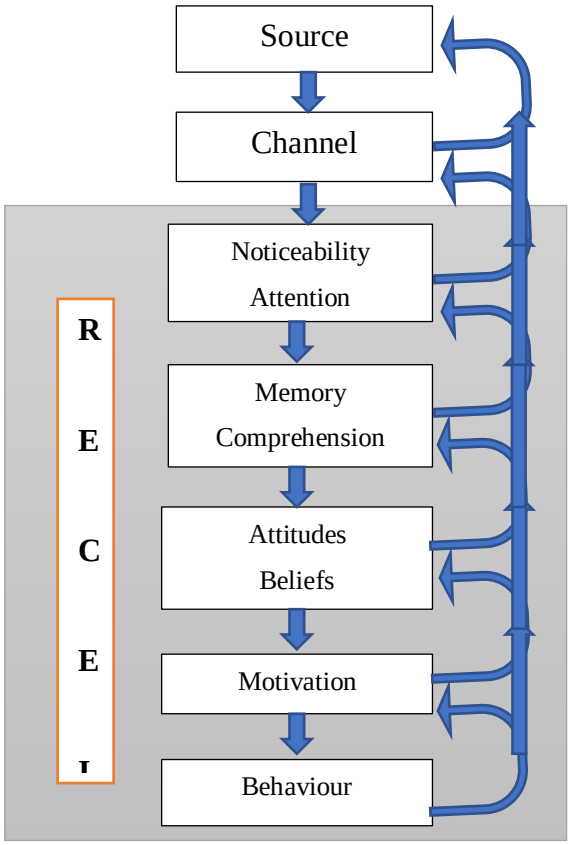

Figure 5 C-HIP-model of communication-human information processing with feedback loops (Wogalter, 1999, p. 19)

In a multicultural context, understanding of the information requires that individuals have appropriate knowledge of the spoken language to read, understand and communicate. Reason (1997, p. 135) presents three communication barriers that can lead to human error and reduce employees' performance.

1. *"System failures in which the necessary channels of communication do not exist, or are not functioning, or are not regularly used;*

2. *Message failures in which the channels exist but the necessary information is not transmitted; and*
3. *Reception failures in which the channels exist, the right message is sent, but it is either misinterpreted by the recipient or arrives too late".*

Communication barriers can be both internal and external and can lead to misunderstandings or misinterpretations of the safety information. Internal barriers are linked to individuals, whereas external barriers are associated to environmental factors.

Internal barriers	**External barriers**
• Language difference	• Noise
• Culture	• Interference or distraction
• Motivation	• Separation in location, time
• Expectations	• Lack of visual cues (e.g. body language, gestures, facial expressions)
• Past experience	
• Prejudice and Status	
• Emotions and Moods	
• Deafness and Voice level	

Table 2 Internal and external barriers to communication (Flin et al. 2008, p. 78)

"However, just as with verbal communication, non-verbal communication can be ambiguous and open to misinterpretation, especially when communicating with someone from a different culture." (Flin et al. 2008, p. 75-76).

In MCML organizations everyone does not speak the same language and have different behaviour to procedures. To avoid conflicts and misunderstandings within teams and to overcome communication barriers in MCML firms, it is important that the members support each other, put aside or resolve their personal issues, co-ordinate and exchange information based on the communicative skills listed below (West, 2004 in Flin et al. 2008, p. 98);

- Employing communication that maximises an open flow
- Using an open and supportive style of communication
- Using active listening techniques
- Paying attention to non-verbal messages
- Taking advantages of the interpersonal value found in the greeting other team members, engaging in appropriate small talks, etc.

2.6.1. Risk Communication

Risk communication is a major element of all safety models. It is especially fundamental to efficiency and safety assurance in MCML firms. It is based *"on exchange of information, feedback or response, ideas and feelings*." (Flin et al. 2008, p. 69). To improve and maintain safety in MCML organizations, it is important that the information about risks is successfully delivered to the audience (Wogalter et al. 1999, p. 9), which in this paper are employees with cultural disparities and language barriers. Risk communication is an interactive communicating processes with the main purpose to convey information about risks related to tasks and activities (Regina, E. Lundgren & Andrea, H. McMackin, 2009; Wogalter et al. 1999; Bouder et al. 2007 & Renn, 2008). According to US national research council (NRC, 1989, in Aven, 2011, p. 124) risk communication is defined as;

"An interactive process of exchange of information and opinion among individuals, groups and institutions. It involves multiple messages about the nature of risk and other messages, not strictly about risk, that express concerns, opinions or reactions to risk messages or to legal and institutional arrangements for risk management."

The figure below, distinguishes between three types of risk communication *"Care communication", "Crisis communication"* and *"Consensus communication"*. In MCML operations, *"Consensus communication"* has the abilities to serve the purpose of risk-based communication. It is also about environmental impact, safety planning and setting appropriate health and safety regulations.

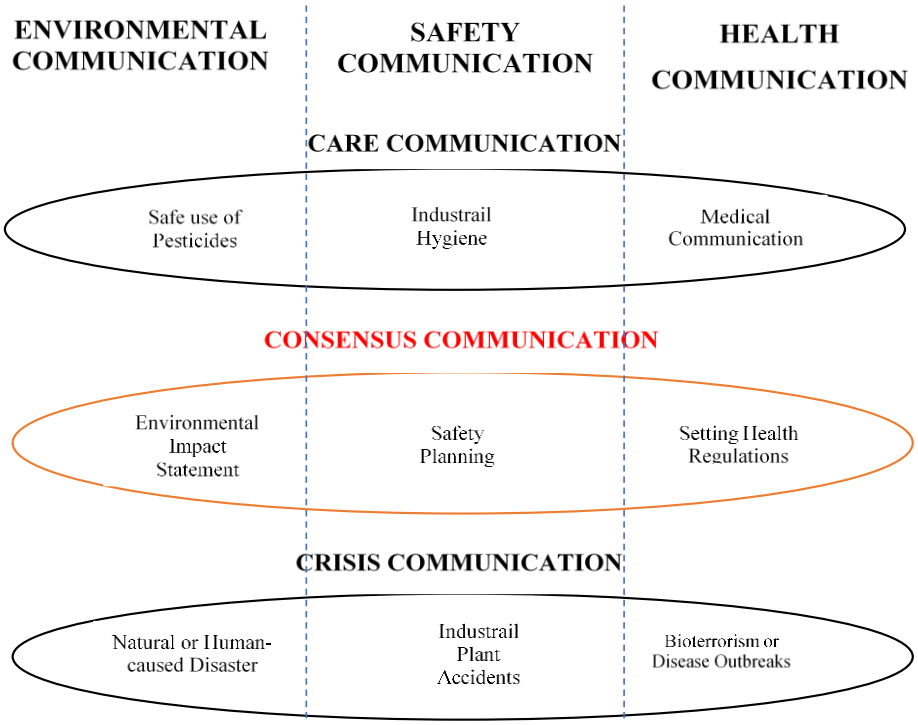

Figure 6 Example of various types of risk communication (Lungren & McMackin, 2009, p. 3)

> *"Consensus communication is risk communication to inform and encourage groups to work together to reach a decision about how the risk will be managed (prevented and mitigated"*

Based on Lungren and McMackin's (2009, p.4) definition above, *"Consensus communication"* involves all stakeholder to participate in building consensus about safety statements, rules and regulations and safety planning. However, all three forms of communication involve people on different levels, consensus communication requires that risk is communicated with audience who can speak the same language and have same communication skills to reach to a consensus course of action (Lungren & McMackin, 2009, p. 5). It is important when we communicate safety with audience in MCML settings, that we communicate honestly, clearly, compassionately and that all participants receive the same information (Wogalter et al. 1999; Lungren & McMackin, 2009 and Marsdal, 2018). Another central element in effective risk communication is the language for information and adjusting the information to people with multi-language problems.

To achieve safety goals, firms must develop Internationalized risk communication strategies that look for, and recognize the risk similarities between countries, address cultural differences, and plan for cross-country safety communication (Lungren & McMackin, 2009, p. 329).

According to Fischhoff (1995, p. 137), "*over the past 20 years or so, risk communication research has undergone its own evolution."* Consciously or unconsciously, the development of risk management points to where communication has moved from focusing on scientific numbers to logical explanation, safety information, appropriate human treatment and employee involvement (Fischhoff, 1995, p. 138).

To successfully accomplish effective risk communication in MCML industrial operations, cultural knowledge and appropriate use of language for information materials is crucial. Following five steps presented by Lungren & McMackin (2009, p. 149-150) are important to achieve effective risk communication in MCML working environments;

1. *First, avoid any kind of language that might give your audience the feeling that you have no control. "Victims" process information less effectively and react with greater hostility.*
2. *Do not present estimates as facts. Rather than presenting estimated facts that can create uncertainties, give your employees the information to judge what the model results mean.*
3. *"Avoid scientific notation, mathematic formulas, and exponents." Although you can explain some of these to some extent, just the fact that endless rows and zeroes are used will scare some readers into avoiding your message.*
4. *Define and explain complicated words clearly to your audience or avoid using difficult terms at all to prevent misinterpretations.*
5. *Know your employees, their cultures and consider appropriate use of words that make sense to them.*

Based on the steps above, the purpose of effective risk communication is to deliver information, create situation awareness, increase common risk understanding and overcome barriers by developing safety procedures, routines and regulations (Flin et al. 2008; Lungren & McMackin, 2009; Fischhoff, 1995; Fischhoff, 2012). We need a communication process that accounts for the MCML aspect of the modern production age and that facilitates criteria for collaboration and information delivery between different types of people and firms.

2.7. Risk Management in MCML organizations

"Risk management starts with a review of all relevant information, particularly from combined risk appraisal, consisting of both a risk assessment and concern assessment where the latter is based on risk perception studies, economic impact assessments and the scientific characterization of social response to the risk source." (Renn, 2008, p. 173). Effective risk management is how we need to manage the barriers in MCML sharp end industrial activities and to assure an appropriate level of safety.

On the other hand, poor management skills can affect safety and may also contribute to occupational accidents (Flin et al., 2008, p. 131). Leaderships' involvement in the workplace safety is an important factor to achieve compliance with safety rules and regulation. Risk management is mainly referred to as managers' and supervisors' behaviour towards safety outcomes, for example, *"monitoring and reinforcing workers'* safe behaviour; participating in safety activities; being supportive of safety initiatives and emphasising safety over productivity (Flin and Yule, 2004 in Flin et al. 2008, p. 131).

The table below summarizes important characteristics and competencies a leader should have, especially when handling MCML teams. It is essential that the management is aware of the differences between groups, has cultural understanding and has the ability to emphasise that cultural difference can be beneficiary for organizations to overcome risks from different perspectives. "*Culture can provide powerful lenses for seeing through the fog of uncertainty."* (Cvetkovich and Earle, 1990 in Lungren & McMakin (2009, p. 330).

Leader characteristics	**Leader competences**
Willingness to take a leadership role	Leadership ability
Emotional stability	Communication skills, especially briefing and listening
Stress resistance	Delegating and team management
Controlled risk-taking	Decision-making, under time pressure and stress
Self-confidence	Evaluating the situation (situation awareness)
Self-awareness	Planning and implementing a course of action
Decisiveness	Remaining calm and managing stress in self and others
	Pre-planning to prepare for possible emergencies

Table 3 Characteristics and competencies for leadership (Flin et al., 2008, p. 144)

Furthermore, we distinguish between three different styles of leadership, such as "*Authoritarian*" or (Directive), "*Democratic*" or (Participative) and "*Laissez-faire*". The first one is a centralized authority style, where work methods are dictated and leave limited space for employee participation and all decisions are unilateral. This kind of leadership style may contribute to create dangerous situations rather than preventing them. Thus, it is least needed leadership style in MCML working environment. The "*Laissez-faire*" leadership style is entirely the opposite of the "*Authoritarian*" with minimum manager participation and gives complete freedom to employees to make decisions. Leaders are only involved when requested. In multicultural organizations leaving employees in charge without active leader participation, can create interpersonal conflicts and may influence safety and arise dangerous situations. What we need is a "*Democratic*" leadership style that "*involves employees in decision-making, delegate authority (empowerment), encourage participation in deciding work methods and goals."* (Lewin et al., 1939 in Flin et al., 2008, p. 136).

According to Reason's (1997, p. 126) theory of *"Error Management"* there are some challenges related to the current form of risk management, which includes the following;

- They *"firefight"* the last error rather than anticipating and preventing the next one.
- They focus on active failures rather than latest conditions.
- They focus on the personal, rather than the situational contributions to error.
- They rely heavily on exhortations and disciplinary sanctions.
- They employ blame-laden and essentially meaningless terms such as *"carelessness", "bad attitude*", *"irresponsibility"* - even in Total Quality Management (TQM).
- They do not distinguish adequately between random and systematic error-causing factors.
- They are generally not informed by current human factors; knowledge regarding error and accident causation.

In the modern society, firms are too busy with the technological developments, efficiency and productivity. It seems like the technological advancement is stealing the attention from the risks related to human factors in MCML working environment. We should not forget that it is the people of multicultural society with multilingual problems, who must handle these modern and highly complex technological systems (Reason, 1997; Hollnagel et al. 2009; Bouder et al. 2007 & Marsdal, 2018). Thus, it is important to address the barriers and errors that may lead to dangerous events and regulate risks in a more multicultural context and last but not the

least, have effective risk management that understands both the importance and the risks related to multicultural working environment.

To overcome barriers, it is important to involve all the levels in the risk management, because everyone involved in an operation is a barrier in MCML working environment, regardless of their hierarchical level. Everyone has an explicit responsibility to contribute to a safe and more including working environment. Safety is both strengthen and weakened based on the participation of stakeholders on different levels.

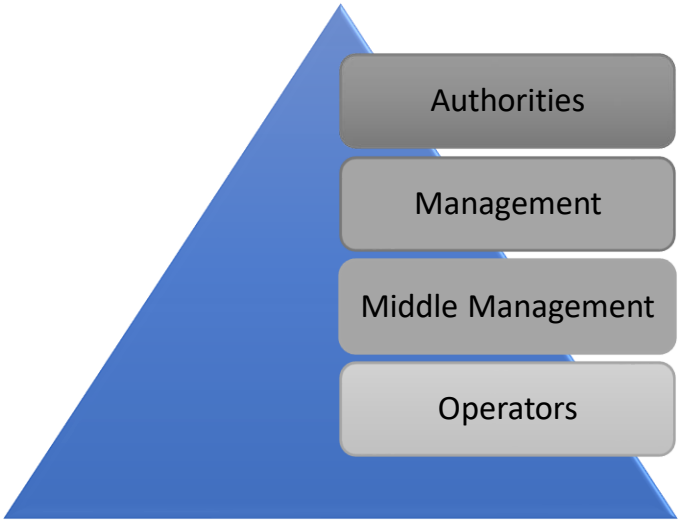

Figure 7 Different levels of Risk-based management in multicultural working environment. (Karlsen, 2016, p. 133).

Concluding this chapter with saying, that globalization has been an important factor for achieving the economic growth we have experienced in our times and has led to improve life qualities to some extent (Sørbø, 2006, p. 11). It has also restructured our society by mixing different types of nationalities, cultures, beliefs etc. Internationalization of sharp end activities has also increased the complexity, vulnerability and has created conflicts in the society. A basic question according to Jens Rasmussen (1997, p. 183) is: *"Do we actually have adequate models of accident causation in the present dynamic society*?" This question was asked about 22 years ago, but it is still as relevant today as it was at that time. Do we actually have adequate models to overcome safety barriers in the present dynamic MCML society?

3. Methodology

This thesis aims to answer, *"How could a risk-based approach be used to overcome safety barriers in multicultural organizations?"* It has been chosen to perform a qualitative research, which is a combination of semi-structured interviews, active field observation and relevant document analysis. In this chapter the research method, design and methods for data collection, as well as data analysis process have been described. Methodology chapter will also contain a review of questions related to validity, reliability and ethical and confidentiality issues regarding research process. According to Kvale and Brinkmann (2009, p. 1), qualitative research is defined as;

"Attempts to understand the world from the subject's points of view to unfold the meaning of their experience, to uncover their lived world prior to scientific explanations"

A qualitative research is completed through systematically performing seven stages, which are; selection of a subject to study, designing a research question, data collection, analysing data, verification and reporting at the end (Kvale & Brinkmann, 2009, p. 19-20).
To successfully perform this project, it is required to go over all these steps accordingly.

In the discussion section the focus will be on the following three hypotheses in order to have an understandable, informative and relevant discussion between results and the literature presented in chapter 2.

- A risk-based approach can help identify cultural and language barriers in multicultural organizations.
- A risk-based model is likely to give more room to the systematic study of human factors and the need to develop risk communication.
- Risk-based approach can integrate and maintain safety by providing common risk understanding.

3.1. Research Method

Within the qualitative research methodology, different types of methodical approaches to perform an investigation exists (Johannessen et al., 2016, p. 78). Choice of methodical approach to answer our research question is decided by a combination of the methods with best skills, available resources, confidentiality and the possibility to implement the method within the time frames for the research (Johannessen et al., 2016, p. 96). As mentioned earlier in this paper, a case study has been chosen as our methodical research approach to perform this project. Within the case study method there also exist different types of strategic approaches. With the desire and background for this study, which is to look into safety barriers within MCML Oil and Gas industry, a case study may be well suited. A case study provides us the opportunity to inter employees' inner circle and study their real world as it is.

3.2. Open-ended Interview

Before, starting the research, attempts were made to interview the Norwegian labour inspectorate, who has the responsibility for land-based activities and HSE. After more than two months of waiting for a response to the request. The following answers to the questions were received;

"The labour inspectorate does not prioritize having activities aimed at the oil and gas industry at the present." (A3)

"We have no on-going activity towards the oil and gas industry, and it is therefore a small number of supervision we have the opportunity to follow up during this period and it is therefore, difficult to provide answers." (A2)

"We, therefore, have limited information about the land-based oil and gas industry with regards to occupational safety and risk factors related to language and communication." (A2)

However, studies suggest the oil and gas industry is one of the industries with most occupational accidents. It is also an industry with highly MCML working environment, where

people from different cultures interact with each other. It is an industry, where one employee's safety depends on other colleague's skills, behaviour and abilities. Thus, one wonders, which sector is prioritized if not this one? The respondents referred to previous studies, which they believe could be relevant to this project *"We published a report last year which mentions the risk of work injury deaths for foreign workers vs. Norwegian workers in general in the land-based working life."*(A1). Though, it is worth to be curious what these studies are based on, when they say that this industry is not prioritized. And also from where and how they have retrieved the data that they are referring to? Can we actually trust the outcomes of these studies, when they say that they have limited information with regard to occupational safety and risk factors related to MCML industrial operations?

1 of 4 respondents also mentioned that *"we currently have limited resources available here in Stavanger."* (A1). According to authorities, this is a subject they have limited information about, yet, there is no direct research done on this field. I believe we have a serious problem in the society, when authorities do not have the capacity or resources to follow up organizations in over 11 years. These open-ended interviews with experts informed this research design and has motivated me to carry out this investigation from the inside.

3.2.1. Research Design

In this research neither hypothesis are tested nor new theories developed. The task is to simply understand and explain *"How could a risk-based approach be used to overcome safety barriers in multicultural organizations?"* This paper is about studying peoples' unpredictable behaviour, language and communication barriers in multicultural settings. According to Brinkmann and Kvale (2017, p. 225), we must use a more dynamic abductive research design to investigate the human factors from different perspectives based on the research itself and the capacity it leaves us with.

3.3. Methodology Triangulation

Results in this paper are based on 17 face-to-face interviews with employees on different levels, both local and foreign employees, as well as 5 representatives from 5 different organizations and a background review of the company's relevant documents. However, there were not many and thus looked at and analysed systematically what of relevant documents

and previous studies throughout the paper were found. Also, a participatory field observation stretching over a period of 7 weeks has been performed. Group meetings, formal conversations in relation to accidents, and informal conversations associated to on-going activities and the challenges related have been attended and observed.

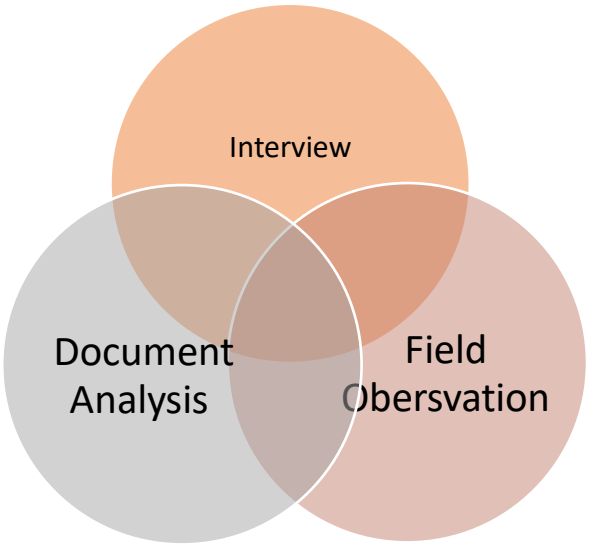

Figure 8 A triangulation of data collection.

3.3.1. Field-based Observation

A case study is an empirical study that examines a simultaneous phenomenon in its real context, especially when the boundaries between the phenomenon and its context are unclear (Yin, 2003, p. 13-14). To study the human factors in MCML working environment, we must take an open participatory observer role to carry out this investigation from the inside of the organization. Thus, it was needed to fabricate a status that created the possibility to get into workers' environment and observe them in different settings. Participatory observation is probably the best method to get into employees' real-life and to observe their disparities.

The purpose of participatory observer role is basically to study human-beings and to get behind the façade and bring the backstage data to front-stage and to study its relevance to this research question and to keep track of data received and observed through informal conversations and observations. Data was written and analysed for further process. As they say, *"If you want to catch the thief, you have to become/think like one"*. Similarly, to study MCML employees, it was required to think like and become one of them. In my opinion, this

is how one can properly bring backstage data to front-stage, especially in more complex and unpredictable systems.

3.3.2. Planning and Performing Interview

Both native and foreign employees on different levels were interviewed to study if there is a common understanding of the barriers within the oil and gas industry. Before attending interviews, the necessary preparation were done in advance and was aware of the power relationship in the conversation, which to some extent was different from interviews with front-line employees compared to other key stakeholders on administrative level (Kvale & Brinkmann, 2017, p. 176). For example, HSE management, who had better knowledge of the safety concept compared to welders and painters etc.

Interview as a way of collecting data gave respondents the freedom to open up and lead the conversation. To show openness, understanding and respect to the information and statements that the interviewees came with, without rejecting or pointing out misinterpretations helped the researcher to obtain valuable information (Kvale & Brinkmann, 2017, p. 160). Interviewer has used his own experience to control and lead the interview objects on the right path in case interviewees got off track. However, it was not always to keep the conversation relevant, because of the language barriers.

Initially, the plan was to carry out all interviews in English and to interview as many people as possible, but due to time limitations and respondents' language knowledge, a Norwegian version of the interview guide was prepared. This made both the interview process and analysis process more complicated and more time-consuming than planned. Thus, wasn't possible to interview more employees, who may have provided more relevant information and contributed to increase credibility of the project. However, it helped interviewees to open up and shared information they would not have otherwise. Despite the confidentiality, 2 of 17 interviewees (P2 and P7) wished to participate only if they were not recorded, so exceptions were made there as well.

3.4. Analysis Process

According to the literature within social science methods (Grønmo S, 2004, p. 245; Halvorsen K, 2008, p. 210) there are no standards for how qualitative data can be analysed, which can be

related to that qualitative data as an unstructured information, and therefore, the goal should be to find a suitable structure and meaning to the collected data. Based on that people were interviewed and the information that came to hand during the interviews was transcribed (Blaikie, 2010, p. 254). The purpose with transcription was to look for conditions that are prominent (Jacobsen, 2015, p. 199). The analysis process is based on the figure below, which starts with transcription and ends with data and literature discussion.

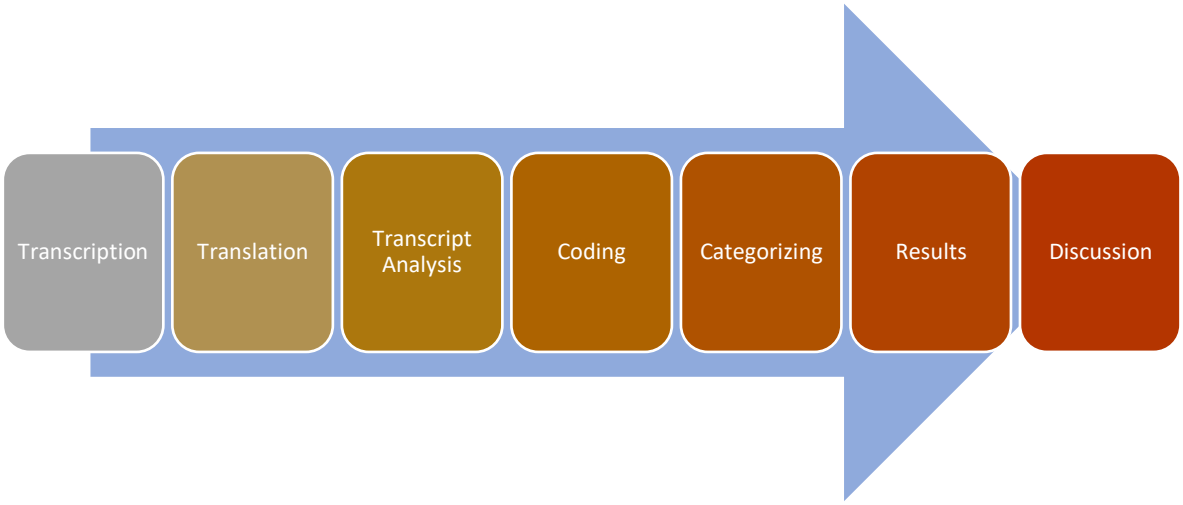

Figure 9 Qualitative data analysis process.

After forming an impression of important factors in the data material, coding was used to condense the information. Coding information is about establishing key words that could present wider parts of the content (Grønmo, 2004, p. 246). Given that, the aim has been to study and understand a phenomenon, open coding was used. This in many ways reflect the abductive research design in which the investigation becomes a dialogue between the data on one hand and the literature on the other hand (Blaikie, 2010, p. 156). Moreover, the coding formed the basis for categorizing and developing concepts.

The categorization tightened the system a notch from the coding. Here common denominators were considered when it came to the characteristics of the phenomenon, for example, in the analysis of the data, human factors could be categorized to a positive or negative status towards working in MCML organizations, in the same category. This is because these statements have the common characteristics that they express an attitude to the safety in work environment. Coding and categorizing of data gave an oversight over the textual material obtained (Kvale & Brinkmann, 2017, p. 226).

Furthermore, in the analysis process the results of coding and categorization were summarized in a matrix. In the figure below the X-axis represents interviewees, and the Y-axis,

understanding of barriers in MCML working environments. With the help of a matrix it is possible to analyse data both horizontally and vertically. This approach is used to identify repetitive factors, which can describe causalities across the information on a more general level to create a synthesis (Yin, 2018, p. 196-199).

X \ Y		Perceptions of barriers in multicultural operations.				
		Working environment	Language	Communication	Risk perception	Safety
Interviewees	Respondents; P1, P2, P3 …					
	Respondents; PA, PB, PC …					
	Respondents; Pa, Pb, Pc …					
	Respondents; CI, CII, CIII					
	Respondents; A1, A2, A3…					

Figure 10 A matrix example for organizing results from coding and categorization (Grønmo, 2004, p. 256)

3.5. Validity & Reliability

Questions related to validity and reliability are in the literature (Johannessen et al., 2016, p. 231; Yin, 2018, p. 42) referred to as criteria for the quality of a research project. Hereby validity shows that an investigation studies what is meant to be studied, and reliability shows whether the results are reliable or not (Kvale & Brinkmann, 2017, p. 137). In this paper how these criteria are related to the quality of our case study is presented.

According to Kvale & Brinkmann (2017, p. 278), validity shows work as qualitative controlling barrier through all the studies of a research.

3.5.1. Internal Validity

In a qualitative case study similar to this, internal validity is related to the extent to which our approaches and findings in a credible way reflect the purpose of the investigation (Johannessen, 2016, p. 232) therefore, the research's credibility is conserved by continuous observations, methodical triangulation and return of results.

When it comes to continuous observation, it was a stated goal in the study to become well acquainted with the phenomenon both through interviews and field observation. As seen, this could accompany the fact that enough time was devoted to get acquainted with the context of the phenomenon. Thus, it had the potential to result in a credible study.

Earlier in the paper it was mentioned that a methodical triangulation by implementing desktop analysis of previous studies and relevant documents, interviews and field observations is being done. Many instances that contributed to project's credibility were found. Stopping observation and returning to the results was a difficult task to plan. It was even harder to actually stop searching for more data.

3.5.2. External Validity

External validity refers to whether the results from the research are generalizable beyond this study (Yin, 2018, p. 45), and it is tightly linked to transferability. The question thus becomes which questions are related to how our investigation in its approach wishes to produce this type of credibility. If we link this to transferability, we can say that this is about establishing descriptions, concepts, interpretations and explanations that can be useful in areas other than the study looks at (Johannessen et al., 2016, p. 233). The purpose of this case study is in many ways innovative to prepare general descriptions, concepts, interpretations and explanations. This is because this study is looking at one of the biggest and most MCML industries in the market, and therefore, we can generalize the results and that this can give transferability to other sectors nationally and globally.

3.5.3. Reliability

Reliability is mentioned earlier to study's credibility. According to Johannessen et al. (2016, p. 231) unlike quantitative research, it is difficult to duplicate a qualitative research. As such, it has been attempted to refer to other methods to ensure reliability. In this case study, it

shows in many ways the essence of the answer. In fact, it has been strived for to give readers a detailed description of the phenomenon being investigated, and a transparent and detailed presentation of the methodological approach (Johannessen et al., 2016, p. 232).

3.6. Obtaining Consent

One classic ethical issue linked to research on human is related to retrieving consent. Consent implies that we as investigators are forced to obtain consent from our interviewees, who are voluntary, informed, competent, and understand about the purpose of the study (Annas G. J., 1992, p. 121). This indicates that during the planning phase we must obtain the informed consent of the interviewees (Kvale & Brinkmann, 2017, p. 97). To be on the safe side, this paper has developed a consent document, which all respondents are aware of and given their consent by willingly signing to participate in this voluntary investigation. (Attachment: 8.1)

3.6.1. Confidentiality

Confidentiality refers to that it is between researcher, interviewees and the company in agreement about what the collected data can be used for (Kvale & Brinkmann, 2017, p. 106). This implies for example whether the organization or interviewees can be identified or not. A solution can be anonymity of the interviewees and organizing data in a way that it could not be linked back to respondents or the company at all. This way we safeguard the familiarity between us as researchers and interviewees. To ensure the respondents' identity, employees have been coded with different codes. The same way, representators from different companies have been coded to preserve their safety as well. It is only the researcher, who has access to the interviewees' personal information, thus, the results are presented based on codes introduced in figure 11 above.

4. Results

In this chapter, important findings from interviews and observations are presented. Main focus has been given to the data that is directly relevant to the main research question. Based on this, the interview results have been divided in five main categories which are; *multicultural working environment, language difficulties, communication in the organization, foreign employees and occupational injuries and employees' involvement in safety work.*

Furthermore, results based on the 7 weeks of field observations and informal conversations with relevant stakeholders in the organization are available. Data collected is sorted under *field observations*, with three under categories which are*; information processing challenges, meeting/seminar observations and handling of PPE/ work tools.* To keep an overview of the results presented based on data retrieved through interviews and field observation, a *summary of the safety barriers in company X* is presented in section 4.7. However, not that many relevant documents to analyse were found; this chapter is concluded with an analysis of relevant data from documents at hand in section 4.9 and 4.9.1.

4.1. Multicultural working environment

All respondents agree that they are working in multicultural organization and that the industry is getting more and more multicultural. According to one interviewee, (Pa), a multicultural working environment is defined as; *"having different cultures working together and where those cultures are intermixing and making a community that is not divided."* It is about having different nationalities, cultures, behaviour and working methods under the same roof. Even, Norwegians can be described as multicultural, depending on which part of the country they come from. All interviewees mentioned that working with employees from different backgrounds is an indication that the workplace is multicultural. They have been involved in activities with over thirty different nationalities working together and have faced different challenges in collaboration with different types of people. An employee (PC), who has worked for the company for over twenty years said that; *"there has been big change since 2004… back then it was basically only Norwegians but now there are employees from many different countries."*

All respondents agree that working in multicultural settings can both have consequences and advantages. However, for 15 of 17 respondents, it is obvious that there are advantages

associated with multicultural organizations. The 2 others are "*not sure if there are any advantages."* (PC) or it is associated with other barriers (CI).

4.1.1. Advantages

8 of 17 interviewees said that by working in multicultural societies, you get to know different types of people and cultures. They also mentioned that in a multicultural working environment, they can learn from each other. *"You can learn from different cultures of course. It is more fun. It is about becoming more tolerant to others and seeing the world from different perspectives."* (Pa). 7 respondents agree that with different cultures involved in an organization, we can have different perspectives on things, learn different working methods and may also get valuable suggestions on the table. According to (Pc), *"you grow in person by getting to know other people and other cultures. You understand better each other, and it in turn creates a better cohesion in the workplace."*

Other advantages of working in multicultural organizations are that you can have a more efficient workplace; you can have a more structured workplace by defining things a bit more (Pa). 4 of 5 representatives from different companies, also agree, that with different cultures and different backgrounds you can get different approaches on how things are done in different systems and in different countries. It is clear that there are major differences in what is being done for example, in Poland, Lithuania and China in relation to what is being done for example, in the US, Canada and rest of the Europe (CIV).

All interviewees agree that there are negative consequences associated with working in multicultural organizations. Cultural differences can create increased diversity. There can be some direct and in direct safety issues, because of the interpersonal differences. Based on all interviewees' response, the main consequences associated with multicultural communities are presented in the sections below.

4.2. Religion, culture and discrimination:

According to (PB), *"Religion is big issue for discussion but that is not something that is discussed a lot, but it could be a source for conflicts."*. Another respondent (Pc) said that there are some people who do not accept each other and "*That they take new cultures and new way of living as a threat*" but this depend on peoples' personal values. According to (P5 and

P7), employees are treated differently based on where they come from. *"Sometimes, it happens that employees are discriminated."* For example, one employee gets the good tasks every day, while other gets bad tasks. (P5) also mentioned that *"Even though, foreign employees do a better job, they still get worse work tasks compared to Norwegians."* And *"that foreign employee do not have career opportunities, even though, we have talent. We do not grow."* (P5). This respondent also said, that *"it is normal"* and it happens everywhere. While 2 of 17 interviewees have personally experienced discrimination, other 2 mentioned this as a barrier in the company.

4.3. Language difficulties

17 of 17 interviewees perceive language as the main risk factor associated with accidents in multicultural working environments. Language issues are perceived as one of the main barriers in multicultural setting. Interviewees believe that they struggle *"with getting the messages through."* (CIII). *"I am not really sure whether to say language or culture because language is very often associated with culture."* (Pa and CII). Language difficulties create misunderstanding and make the information communication difficult on every level and create conflicts between groups. It is also a safety issue at the sharp end activities, because there are misunderstandings within the groups in the organization.

While 2 of 7 front-line operators have not experienced any loss of information due to language difficulties, other 15 respondents have, several times. Especially, the middle management and higher management mention, that when they speak about safety with different types of people, with different levels of language knowledge, it creates misunderstandings. *"I have talked to people who have actually replied to me and I didn't understand what they were saying, even though or perhaps, they were talking to me in Norwegian."* and *"these were people who have actually lived in Norway for a long time*." (Pa). All 4 middle managers say that they are actively involved in the production itself, and when operators are told to work in a specific way, and that there are things that need to be considered clearly only with the gut feelings when talking to people, one sees that message has been completely misunderstood and misinterpreted.

Another language barrier in company is that employees with different cultures and with language knowledge limitations interact very little with other colleagues because they mostly sit, eat and talk with people from their own countries or with the people who speak the same

language. *"They will talk to other Norwegians, but obviously, they don't have much to contribute with, because the language is still a problem."* (Pa). It has also been observed that people in the organization reside in groups, based on which country they come from, what language they speak, which department they work in and even based on what kind of food they eat. However, there is a more visible distinction between operators at the front-line compared to employees at the offices.

According to (CIII), language and cultural differences do not have big impact on daily basis. But, *"The risk is if you have a crisis and if you suddenly need to communicate quick and in stress situations and/or if you get a major accident."* That is when we understand the importance of common language knowledge in complex systems.

4.3.1. Sub-contractors or Temporary employees

Employees from external companies who come to the facilities create language barriers, and the communication has to happen through other people "*translators*". All respondents admit that there are people who do not speak English well, we have people who do not understand Norwegian, and we also have people who neither understand Norwegian nor English, at all.

It is those bigger differences in how things are handled based on the land employees come from, for example; *"Some employees, especially from southern Europe part, all the way north as Lithuania, Estonia, etc., they take so many risks, which are unnecessary, because, that is what they are used to, which is anticipated as a horrible solution,"* (CIV). Interviewee also mentioned that it does not mean that native employees do not take risks. They do, but not as much as foreign employees. The problem is that sub-contractors/temporary hired employees from different companies/countries do not follow or understand our safety procedures.

14 of 17 interviewees said that there are no language requirements to work in this company, but it is an advantage if employees can speak English or Norwegian. There are also employees who come to work for short-term projects, who do not understand any other language except their own native language. We have exceptions "*Free pass*" for such employees. According to (Pa), the problem is that the language requirements are not specified in the contracts with their suppliers. *"It needs to change, and we have to have at least one language requirement"*.

4 of 17 respondents mentioned, that it is not only externally hired employees who struggle with language and communication, but also other employees with non-Norwegian backgrounds who have lived in Norway for a very long time. Interviewees said that when communication in multicultural organizations happens through other people, very often the information that is conveyed disappears even if; messages are translated to other languages. *"One thing is to get the work done in a proper way and the other thing is the safety issue there."* Thus, *"we cannot have people we cannot communicate with."* (Pa).

4.3.1.1.Yes behaviour

8 of 17 respondents mentioned that there is "*yes behaviour*" in the organization, which means that employees tend to say "*YES*" to everything that is said to them regardless of whether they understand the information or not. *"Employees with different cultures and language often cannot understand each other but pretend that they understand everything. This is a challenge."* (P2). *"It is clearly a challenge that they are so polite to yes, but do not understand the content of the message."* (PC).

4.4. Communication within the organization

13 of 17 respondents said that it is difficult to communicate with employees from different countries, because some of them do not speak English or Norwegian at all. Especially, with employees from Eastern Europe *"who are mostly from rented companies."* and *"cannot even speak English."* (PC).

6 of 17 Interviewees said that communication in the company in general is not as good as it should be and one of the main reasons is believed to be the language issue. These respondents state that they have several times experienced loss of communication. While 9 of 17 respondents seem to be a little confused, because they on one hand describe the communication as good based on the information at hand, but on the other hand the same interviewees complain about lacking language knowledge between groups on different levels. For example; employees said that sometimes it gets very difficult to work here, because of bad communication and because it gets difficult to understand each other. An interviewee (P5) also said that they struggle to get the information to right place because most of the times we are heard and ignored right after.

It is also mentioned that *"very often messages drown in the complexity of the procedures or the way things are being communicated. We need to simplify messages to the level of almost stupidity."* (Pa). All Interviewees agree that there is a language issue in the organization, but when it comes to the management and middle management, it is believed that they are not doing a good enough job either, or all they say is, *"well, that is how it is."* They blame *"the little people"* (front-line employees) all the time, because they do not try good enough themselves. So, they need to blame someone else for their irresponsibility.

All respondents at some point agreed that communication failure occur when people do not respect and understand the content. For example, *"when something is said and they do totally the opposite of what is said, so then obviously some communication is lost."* (Pb). As mentioned earlier, miscommunication does not have any serious consequence on daily basis but in crisis and when major accidents happen, then, the consequences can be fatal and uncontrollable (CIII and CIV).

Miscommunication can occur just by giving wrong instructions, for example, if you say to someone *"don't stand there, stand there."* and that can be a wrong place to instruct somebody to stand. Miscommunication can be lack of instructions and lack of understanding the content of what is communicated. *"Very often what you will see is that the workers will adhere to safety instructions without necessarily understanding it."* (Pa). Some interviewees say that *"Affirmative communication can be the solution in many cases but very often they are so bad in both English and in whole, so you explain but it does not help at all."* (PC). *"Communication is Alfa and Omega."* It is better to ask 10 times more, than performing tasks wrong and unsafe. (CIV).

4.5. Foreign employees and occupational injuries

When asked about the reasons that could explain foreign employees' involvement in occupational accidents compared to native employees. It seems like there are mixed feelings about it. 7 of 17 interviewees agreed, that foreign employees who come to Norway, work in high risk activities, which are very often low paid. While other 4 informant disagreed and say that *"It has very little meaning that they work in high risk activities, because Norwegians perform the same task."* (PC). Other 6 interviewees claim that it is a combination of both, because they work in high risk activities but also because of their language knowledge, lack of safety training and experience. *"For us it is a serious challenge to handle those with*

different language and that they come from different cultures." (PC). because, *"if there is someone who is gonna be on the roof, it is gonna be a foreigner most of the time."* (Pa).

The increasing disparities between national and non-national employees are also linked to cultural differences, because foreign employees may come from cultures where safety and HSE is not as focused on as it is in Norway. People are different and come from different places, and therefore, some are more accident prone than others. Other important factors that are mentioned to explain the differences between foreign and native employees are their ability of risk understanding, their personal values, behaviours and an acceptance for taking the time to do things safely.

"Safety is so drilled into Norwegians." (CIII), but there is also a risk of being so self-confident, especially, when you are well trained. However, foreign employees' involvement in accidents is to some extent linked to *"high risk activities"*. But it is always linked back to language knowledge, cultural differences between groups and their communication skills. Both national and non-national employees say that *"language is the biggest factor, because we do the same things in the production as the foreign guys*." (PB).

4.5.1. Risk perception

According to respondent (Pa), it is important to talk about risk perception and people must understand what risk is and they need to understand why those risks appear. Some respondents agree that the risk understanding within the organization is the same among all employees, while others say that risk perception is subjective, and it might also have something to do with where employees come from. *"Very often it is about where you are brought up."* (Pa).

"If you are brought up say, in a place where macho culture is common. Then you are not allowed to make errors, because, if you make errors. You are mocked." (Pa). 6 interviewees believe that in some cultures employees try to stretch a little longer and may not stop when limits are exceeded. They take short cuts instead of informing about the deviations and lack of resources. Non-national employees take more risks compared to national employees.

Some respondents also say that employees have enough time to stop and think before performing risky activities, but they do not take the time. It is because that is what they are

used to and that is how they do things. Often it happens that employees attempt to be quicker and more efficient, but they end up stopping at different times. *"They can be as solution oriented as they wish to, but that is not how we want it here. We should work safe and try to create common risk understanding and how we work in different work situations."* (PC).

According to another interviewee (Pa), the risk understanding in the organization in general is *"nowhere near it should be. Very often they are doing a formal assessment through risk analysis but the people, including the management are far away from doing something about the risks that they see."*

4.5.2. Fear of losing job

5 interviewees agree that in Norway organizations are very flat, which mean that everyone is on the same level and there is very little hierarchy or management fear. For most of national employees, it is not a problem to go to their leaders and say, *"here is a problem and that something needs to be done."* (Pb). People with other backgrounds on the other hand, fear to inform about errors and deviations. They even fear to ask for help. *"Many say yes, only because they have to, and this can be something cultural because, if they do not say yes, so they may get fired."* (PC). It is because foreign employees have a higher threshold to ask, to challenge and to inform compared to national employees (Pa).

"With a foreign worker used to strict hierarchy, with a lot of people climbing the ladder. They are used to not speak up, because if they speak up, they can be exposed, and they can lose their jobs." (Pa).

According to these interviewees, there is an issue with foreign employees, they do not address risks the way they should, because they are instructed to avoid accidents at all costs. Thus, they choose not to report accidents at all, because they do not want to have a bad safety record, which might damage their career. *"There is a fear of losing their jobs among foreign employees, and it is wrong to fear, but it is a valid fear because, foreign workers who are coming here, are not hired by the organization."* (Pa). They are sub-contractors from other companies (PC). When external employees are often exposed to accidents that can damage the relationship between two cooperative companies. Thus, chances are high that these people might not get hired again. There are so many actors in the market that offer the same type services. Thus, foreign employees try to hide their mistakes at all costs.

"If it is possible that there is lacking of the safety culture in the rental organization then maybe employees from that company should not have that job, because they are actually putting peoples' life in danger. Maybe it is correct, if they are accident prone and have terrible safety culture. We know that there are cowboy companies out there and we know some are more accident prone than others. You pick those that are safer to work with." (Pa).

4.5.3. Current approach to achieve safety

All 17 interviewees agree that the current approach to achieve safety goals *"The Zero Vision"* in organizations is not good enough to prevent accidents. However, there is extremely high focus on zero accidents in every company. Some interviewees say that they are not taking proactive stands. Even though, we know we have language and planning issues. *"It is not about just having a safe job analysis, but it is about more."* (Pa). *"It is never good enough because people are people and we don't always do as we should, or we are not aware and awake."* (CIII). It can always get better, because accidents happen all the time. The reason for this, especially in the last years is that there have been cuts in budgets, we have less money available, we have less resources to put early in the planning of projects for example, and in addition adequate provision for safety work in the course of projects. *"If the current approach was good enough, we would not experience accidents."* (Pc).

4.6. Employees' involvement in safety work

When it comes to the involvement of employees in the safety work, it seems to be mixed interpretations. Some respondents say that everyone is involved, because everyone has a responsibility for their own safety and those around them, while others are not fully aware of how much they are involved in safety. A respondent (PC) said that "*There will be information and instructions in larger scale on what to use, because you may not have them in special groups. You are sometimes dependent on translators who can translate the content. That is the challenge and therefore, they are never completely 100% integrated."*

Another interviewee (Pa) agreed with the quote above and said that the involvement in safety work is not great in the organization, neither for national nor for foreign employees and "*It is about lack of management."* and their ability to get involved. "*Right now, it is just toolbox talks, stuff introduced and talked about but never mentioned again. And, that is a waste."*

Some interviewees agree that more safety training and more HSE courses would be better to involve everyone in the safety. Organize training and courses in a way which is easy for everyone to be a part of. For example, instead of only talking and listening, we should convey the message through pictures and videos. A respondent (CIII) suggested, that involving advertising agencies in the safety work in larger and more multicultural organizations may contribute in achieving the expected safety goals *"The Zero Vision"*.

4.6.1. Safety procedure complexity

Although, complex procedures and safety documents are simplified in form of safety handbooks and other HSE cards, they are still not simple enough for everyone to understand (Pa and CII). 3 of 17 interviewees agree that procedures are often very complex and that messages are not understandable, because *"We use too many words, too many wrong words."* There are different cultural and language layers in the organization that need to be identified. It is also said that we often perform risk analysis of tasks, Personal Protection Equipment (PPE) and prepare procedures, but we have never addressed the cultural issues. Even though, we know they exist.

According to interviewee (Pa), the whole start is wrong, because safety procedures are prepared in foreign countries with complex and foreign expressions. Thus, *"Very often the message drowns in the complexity of the procedures or the way things are being communicated."* HSE managers who work with such procedures on daily basis say that they often do not understand the content hidden in the complexity of the standards and procedures. Another interviewee (CIV), do not agree and claim that procedures are quite clear and straightforward in terms of what and how things should be done. In multicultural organizations, language barriers on the other hand may have influence on whether safety procedures are understood or not. *"Safety procedures are written both in English and in Norwegian but for those who come from other countries, it can be written in any language, if they do not understand, then they do not understand."* (CIV).

4.7. Field Observations

After my first interaction with organization, it could be said that, this was one of the most welcoming organization I have come across so far. It was a lot easier to collaborate with them, because the organization was to some extent aware of the barriers and challenges, they have to handle. They were open for discussions and to see the possibilities for improvement and development. They assisted me kindly by providing relevant information sources, by providing full access to the facilities at all times and by providing the possibilities to interact with key stakeholder on every level.

Before starting the investigation, I had to take the organization's net-based HSE course,that is designed to inform new employees about the safety procedures. The course lasted for about an hour and ended with test that had to be passed to get access to the main activity area. The course was mainly listening to what was said on the other side, through a headset. It was impossible to remember everything that was said. However, I passed the test, maybe because I was familiar with the safety terms that were used in the final test. This was also mentioned in one of the interviews (P1) that employees with poor language knowledge cannot follow and remember everything that is said in such computer-based courses.

People in the organization seemed to be very open and polite, especially when they learned that the research is anonymous and no personal information is recorded. Employees came to discussing safety and communication issues that have been bothering them for some time. On the second day, on 21 March, I received two frustrated employees from different departments complaining about communication challenges. After asking them why they do not inform their management about the issue. They said that they have been trying for a long time, without succeeding to reach through. It is, therefore, they contacted me, so I can mention this in the paper. Some said that they are being treated differently because they are not directly hired to work for this company.

While I was busy retrieving data, I heard rumours of accidents. I could not follow up all the accidents but fortunately, I was to some extent involved in of the accidents, where we had conversations with parts involved. After discussing the accident with employees involved, it seemed there had been lack of communication between employees from different shifts. It seemed like, it was easier to blame the other shift rather than taking on responsibility. Several times, during our interaction with employees involved in the accident, it was mentioned that *"It was the other shift."* However, similar tasks are performed based on similar procedures,

regardless of which shift is performing the activities. It may also indicate that the organization does not have work transitional safety procedures between shifts.

I also received information about an accident that had happened a day before it was reported. The person who was involved in the accident had not seen the necessity of reporting the accident. The accident was reported the next day, because the employee had to call in for a sick leave based on the injury from the accident. He was a new apprentice, and it looked like he was afraid to report the accident, because "*it was the first time he was involved in an accident."* (Pc) The employee was uncertain of what would happen if he reported the accident, so perhaps, that is why he chose not to inform anyone, at all. Maybe not to the same extent as foreign employees but there is a sense of fear among Norwegian workers as well. Especially, among new and inexperienced employees, apprentices and summer substitutes.

Since the first interaction with employees, it seemed that the organization has communication challenges regardless of where it is happening. There were reportedly complaints about communication failure between different people, between two shifts and between different departments. It was also mentioned that communication is not as good as it should be, because the information is often miscommunicated and misunderstood from either parts.

4.7.1. Information processing challenges

One issue is communication, because information is not delivered to the right place at the right time. Another important challenge is the information processing in the organization. During the time with the organization, I recall several incidents where I felt that the information given was so bad, that I had to overlook the content of it, because I could not understand what the other person wanted to convey. For example; during the guided tour at the facilities, a person, who was employed with another company but was performing some activities at the shared activity area was met. He tried to say something, but because he could not speak Norwegian and had very poor English knowledge, it was not possible to communicate with that person.

The project is written in English, so it was normal to carry out interviews in English as well, but after the first interview with (P2), who seemed very involved in the subject of this paper, though he was not comfortable in speaking English. Thus, the interview had to be translated in Norwegian during the conversation. Although I had to repeat myself several times just to get as much information as possible, it felt like communication between us had

lost its potential due to misunderstandings and translation of the research questions. The person (P2) seemed a little frustrated because people did not understand the information that was given, and it was because they could not speak the language. Very early in the project, I realized that interviewees should be given the possibility to choose between Norwegian and English. Despite I prepared a Norwegian version of the interview guide. Our conversation never reached its full potential, because respondents had poor knowledge of the language they chose. Thus, we had to continue without understanding each other (P6).

Another interviewee (P5), who happened to be from the same country as I come from and have been living and working in Norway for about 11 years. As everyone else, he also received the alternative to choose between English and Norwegian. The interviewee chose Norwegian due to poor English knowledge. Once we started the conversation, it was felt that what was being looked for was not being achieved and the interview was not going in the direction planned. I was forced to continue (translate) the interview in our native language, which is neither Norwegian nor English. When the best in a group does not understand the common safety terms that are used in daily activities, then how can we communicate with those who do not have the same language knowledge or communication skills? It is also a challenge in the organization that the people responsible for the groups, who neither speak Norwegian nor English, have poor English knowledge themselves.

Another challenge is the information flow among external employees. Employees, who work on sub-contracts from other companies, may not have significant information in advance from their own companies. Some of the employees, who are sent over, do not even know what their duties are. During an encounter with a group (10-14 people) of external employees, where only one of them could speak more or less English, who translated our conversation; when asked, what were they going to be doing in company X, what are their professions? The answer was disappointing and shocking at the same time, because they did not know what they were sent to do, but they were open to perform any kind of tasks that are given to them. This also indicates that there is communication failure between companies. Other than this, some of the middle managers who have the responsibility for these groups of employees; do not have appropriate language knowledge to communicate with the operators. It poses a significant risk in multicultural organizations like this.

Having information and safety posters at the corridors or passages can be overlooked because, people just pass through without even paying attention to what is written behind the door. This is being referred to because this happened to HSEQ mangers that were on tour at

the activity area. When HSE people, who are busy with designing safety signs and procedures, are not able to notice such signs, how can we expect front-line operators to pay attention to such *"hidden"* warning signs? There are signs that inform about dangers such as, noise, chemicals etc. but they are too small and often hidden and difficult to see.

Through an informal conversation with an employee (P5) at the front-line, it was discussed that there are some employees who use headsets to listen to music during work at the main activity area and that this can be a serious risk factor in some cases. For example, it can lead to accidents with materials that are transferred by cranes. It can lead for these employees who listen to music to not hear other colleagues who are nearby and other important messages. According to the source, this is both dangerous for the employee himself and others because they are working very close to each other at all times and one employee's safety depends on how other employees behave.

There is great difference of safety understanding between management and employees at the front-line. This can be clarified by looking at the length of the interviews with employees on different levels. Initially, it was planned that each interview would last between 30-45 minutes, but it was not as expected. The shortest interview was about 14 minutes, where the longest was about 50 minutes. This is a clear indication that employees at front-line activities do not have the same understanding of safety concepts as management and other employees.

4.7.2. Meeting/seminar observations

On the last day of the investigation, there was the opportunity to spend about two hours in a group meeting to observe how communication was carried out and the way information was delivered to the front-line employees with non-Norwegian (Polish) background. Quickly found out that it was not a group meeting but a one-sided information delivery. According to the interviews, employees at the meeting could not speak English at all and those who did speak some English, the level of their understanding was low. During this period of time about 8-12 employees actually fell asleep and it is believeed the rest did not seem interested in a word that was said, because they were yawning all the time and did not understand anything. I choose not go into details but point out some of the main weaknesses that were observed with this meeting.

i. Inappropriate meeting environment; Canteens are operators comfort zone, where they eat, drink and relax, and should not be used for important safety meetings.
ii. Too formal and too fast. It seemed like one of the speakers had other important plans, so he had to finish as fast as possible and run away.
iii. Very high level of language. We speak to employees with poor language knowledge, because they do not understand complex procedures.
iv. Extremely little employee involvement. They were physically present but mentally, waiting for the meeting to finish so they can go back to work.
v. Yes behaviour. It's certain that about 90% of information was not understood at all, and yet they said "*yes, they understood everything."* It is because that is what they are used to, to say yes, and do the opposite.

I also participated in a relevant seminars at STAMI, the state's working environment institute on 28 March. The seminar to some extent had the same focus as this case study, working environment safety among Norwegian and foreign employees. It also highlighted some of the barriers mentioned above.

STAMI seminar was mainly about priorities associated with preventive work environment for ensuring safety and high labour participation. Among other safety challenges in multicultural environments, the seminar touched on challenges that contribute to immigrants ending up in industries or having to take on jobs with higher risks. This can happen because immigrants do not get their education approved, have lower education level, poor language knowledge and are unskilled to do the job. The seminar also attempted to answer questions related to foreigners' having a higher risk of occupational injuries, bullying and discrimination.

A clear weakness with the seminar was that it was carried atvery high level of Norwegian language with complex and ambiguous words that were difficult to understand.

STAMI's factbook "*Faktabok*" is based on the recent survey of living conditions among immigrants in Norway (LKU). It is therefore a credible document to consider when working with safety in multicultural firms. Data from STAMI's factbook is also presented in chapter 1 and under previous studies.

4.7.3. Handling of PPE/ work tools

During the period of 7 weeks, it was observed that operators at the sharp end activities are not good in handling of Personal Protective Equipment (PPE) and other work tools at their disposal. They either *"forget"* to use the right safety equipment or because *"they were just going to do that*" when they discover HSE-leaders with green helmets. Then they put on their protective gears immediately. It is like blowing sand in the managements' eyes.

Dangerous placement of work equipment is another safety challenge for employees that are present in the production area all the time. It has been observed several times, that employees misplace working tools that can cause serious injuries, for example, placing heavy tools at heights, on thinner surface, in the middle of the way, on the stairs, etc. Examples of these include, wrenches, bolts, sanders, etc. that can fall down and hit employees who are not aware of it and cause injuries.

4.8. Summarized safety barriers in company X

Safety in multicultural societies depends on what employees bring with them in their backpacks. We know that people are going to make mistakes, so we have to make sure that people are not allowed to make mistakes. *"This organization is far from building barriers in the system. They are relaying totally on PPE and the sharp-end, and it is down to the last barrier way too often."* (Pa). The interviewee also said that we need a safety culture that is not just down on the floor level "*operator level*" but all the way up to the management. Based on the data collected through interviews and observations, the main risk barriers that influence safety in the organization, and the amount of interviewees (17) who address the following safety challenges in their organization have been listed.

No	Safety Barriers in company X	Frequency
1	Language	17
2	Culture	15
3	Communication	13
4	Yes behaviour	8
5	Work in high risk activities	7
6	Employee involvement in safety	7
7	Handling of PPE / work tools	5
8	Fear of losing job	5
9	Discrimination	4

Table 4 Summarized safety challenges in multicultural working environments.

According to interviewees, we need to constantly talk about risk perceptions, we have to address the safety culture within the organization, and we need to stop people from going against safety regulations. We also need to address the language barriers, because if alien workers do not understand our safety procedures, then why would they do as they are expected.

4.9. Documents Analysis

After thoroughly studying the documents at hand, that employees must have read, that are used to inform managers about what workers supposed to do and inform the workers what they are supposed to do such as, HSE handbooks and risk assessment related to specific tasks. One thing is quite clear, that it does not address the MCML aspect of the organization. Regardless of whether the documents are more in general or prepared in a technical context. They state much about the activities, and what could go wrong and what do we do, which is important, because everyone involved at the front-line activities in the company is a brick in socio-technical system. What these documents do not say anything about is, who handles the various activities, what knowledge and expertise do they have, and who is exposed to accidents when barriers are broken.

For example, risk assessment documents are built on very straight forward general risk reducing activities that must be adopted and implemented. E.g., the following 5 of 15 risk reducing activities focus on human factors.

1. Compliance to procedures
2. Pre-shift meetings before work start
3. Familiarization seminar following mandatory HSE intro course
4. All personnel shall understand Norwegian and/or English
5. All HSE risk assessments to be issued and distributed among the workforce. Last version to be easily available.

However, these do not say anything about how to perform activities in compliance to procedures in a multicultural working environment and it does not mention how to perform group meetings. Risk assessment manuals mention mandatory HSE intro course, but they do not say how often it should be organized. Based on the interviews and observation, it seems

like there is a great interest for more training and safety courses, both among the management and operators.

Another important point in the assessment document is that it says that *"All personnel shall understand Norwegian and/or English."* But it does not look like the organization is doing a good job there, because 17 of 17 interviewees mentioned that they have language barriers in the organization. 6 of 17 even said that there are employees who neither speak Norwegian nor English.

As mentioned above, all risk assessments are prepared based on task related safety, and they do not say anything about how to organize and perform training, and how to manage teams in MCML context, that are composed of different types of people with different nationalities, cultural disparities, different language and communication skills.

It is pointed in the assessment models that *"All HSE risk assessments to be issued and distributed among the workforce. Last version to be easily available."* However, it says nothing about the recipients' level of understanding, use of language and level of complexity. In other words, the current risk assessment documents, do not address the cultural, language and communication barriers, and do not say anything about how to overcome such barriers in the organization.

4.9.1. SJA (Safe Job Analysis)

It also seems like that the organization is using JSA (job safety analysis) in most of their analysis process, which is a simple risk analysis model that goes over seven steps (See figure below). This is a very task-oriented model, with the main purpose to break each task or activity into more specific tasks *"for which observation, experience, and checklists are used to identify hazards and associated control and safeguards*." There are different alternative models, methods and names to JSA such as SJA *"safe job analysis",* JHA *"job hazard analysis"* and THA "*task hazard analysis*".

This is one of the most used risk analysis model which *"is carried out by team, and most of the work is done in meetings."* (Rausand, 2011, p. 457). However, it does not say anything about how to construct a team and how to manage it, especially a team which is composed of different qualities, cultures and level of knowledge. It also says nothing about how to communicate and share the information with the front-line operators. SJA is a complete risk

analysis model for the purpose it is developed for, but it does not contribute to addressing barriers in multicultural organizations.

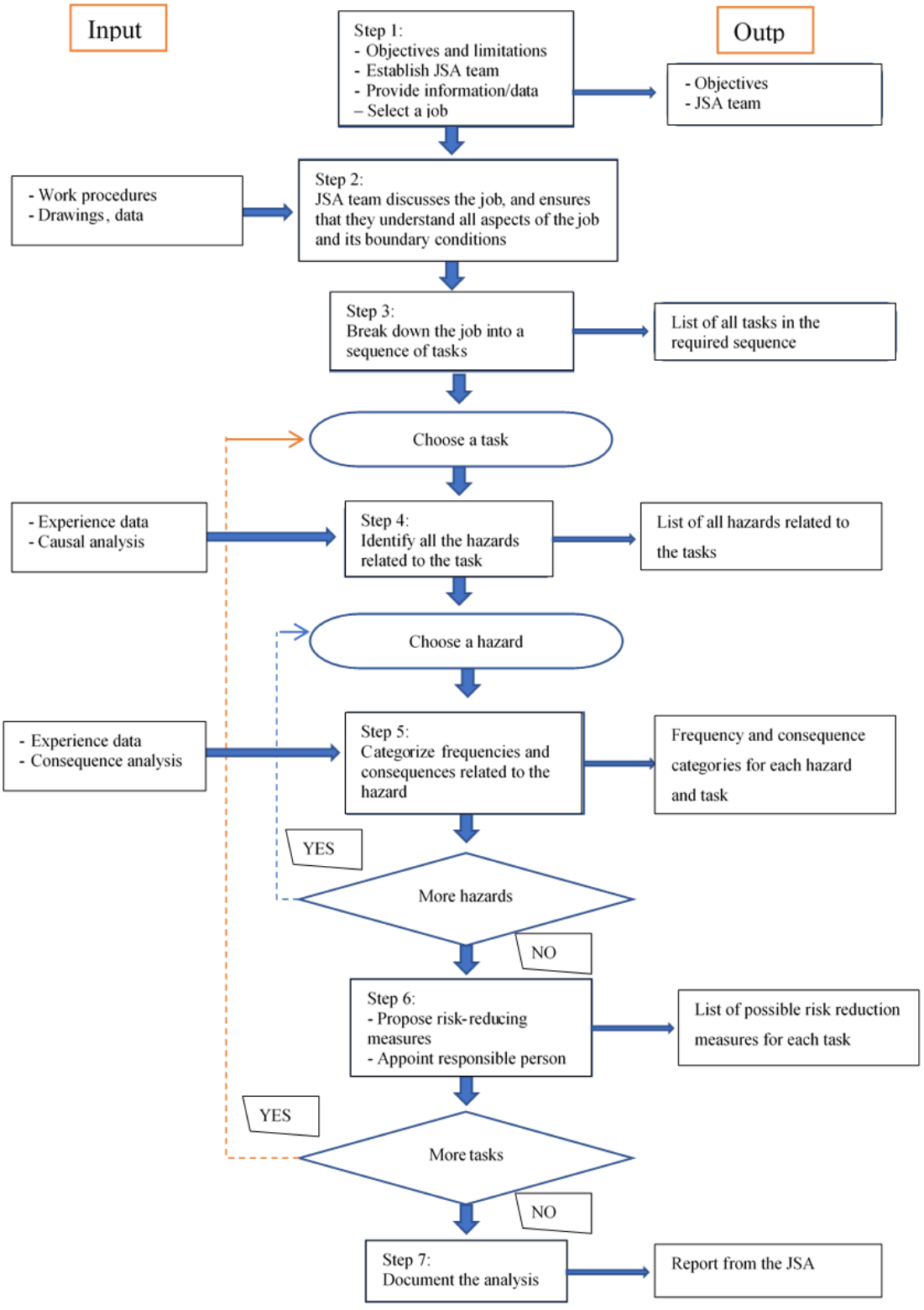

Figure 11 SJA-framework (Rausand, 2011, p. 460).

5. Discussion

For the discussion to be relevant and appropriate, the following three hypotheses have been prepared to discuss the importance of risk-based approach to overcome barriers in MCML industrial operations. This chapter is completed with a more general discussion of the various relevant findings from the investigation.

1. **Hypotheses 1:** A risk-based approach can help identify cultural and language barriers in multicultural organizations.
2. **Hypotheses 2:** A risk-based model is likely to give more room to the systematic study of human factors and the need to develop risk communication.
3. **Hypotheses 3:** Risk-based approach can integrate and maintain safety by providing common risk understanding.

5.1. Hypotheses 1:

With respect to hypotheses one, when respondents were stating that the safety in multicultural organization is influenced by cultural disparities within the organization between groups, it was almost always linked to language barriers. It is believed that language barriers in the organization lead to misunderstandings, misinterpretations, interpersonal conflicts and miscommunication within organizations and between groups. It is said that, because everyone at the workplace does not speak the same language makes it difficult for employees to work with each other on daily basis. If we see cultural and language barriers in relation to the risk-based management, it is important that employees have appropriate knowledge of the spoken language to be able to read and understand each other (Wogalter et al., 1999, p. 151). If people in the organization do not have the same knowledge of the existing risks, *"they need to be warned"* about them first, but in multicultural organizations there are multi-language problems as well, that need to be taken into consideration while delivering information to MCML employees.

According to Wogalter et al., (1999, p. 152), *"If the target audience in a particular geographic area is comprised of persons knowing distinctly different language (not a common one),"* then the information must be available in more than one language. However, translating information into more languages may reduce the availability space of the primary language (common spoken language). When employees in the organization say, that *"they*

struggle with the getting the messages through." (CIII), or when they say, that it is hard to work with employees who do not speak the same language. This is a clear sign that something needs to be done to overcome the language barriers between employees, because this obviously is a challenge for the companies to handle.

Language and cultural barriers are also linked to weakened social cohesion between groups. When people with different cultural backgrounds and people who only speak their native language are not be able to understand other people and may not be able to contribute to the social cohesion. It was both observed that employees in MCML firms seek to create sub-cultures by just bypassing with people from the same culture/country, or with people who speak the same language as themselves. *"They will talk to other Norwegians, but obviously; they don't have much to contribute with, because the language is still a problem"* (Pa). Based on the information available from the interviews and observations; language and cultural barriers cause much more damage to the organization than only influencing safety. Thus, it is possible to overcome these barriers by utilizing the elements of the risk-based model shown in the IRGC-framework (see figure 4).

The pre-assessment phase of risk model also consists of four sub-processes such as problem framing, early warning, screening and determination of scientific conventions. A systematic review of the risks related to language barriers in MCML working environments start with choice of theme that needs to be studied (Renn, 2008; Bouder et al., 2007 and Engen et al., 2016). The multi-language challenges in organization are complex, and therefore, *"A whole host of practical and social issues must be considered."* (Wogalter et al. 1999, p. 152). It is important to have Rausand and Utne's (2009, p. 1) three questions in mind while hiring new employees, collaborating with sub-contractors and temporary employees.

1. What can possibly go wrong? Because people have different language knowledge, skills and competence. Thus, considering employees literacy levels, verbal comprehension skills or education must be central.
2. What are the possibilities that unexpected events can occur due to language barriers? When people with multi-language problems do not have the appropriate language knowledge to read and understand safety procedures, or are not able to communicate with other employees, the chances are high that unexpected events may occur. It is therefore, important that information *"should be designed so that at-risk individuals will be able to acquire the necessary information to keep them safe."* (Woglater et al., 1999, p. 152). However, this is not the case with the most

MCML organizations, because safety information is often developed by more educated individuals, who have more knowledge of the risks and hazards than the employees that comprise the target audience.

3. What consequences can language and cultural barriers have on other employees, on the technology and to the organization? As mentioned by the interviewees, language barriers can lead to misunderstandings, misinterpretation and increase conflicts between groups. It may also lead to misuse of the technology, because employees with MCML problems cannot read or understand the instructions. On the organizational level, the consequences can be that firms may not be able to achieve the intended goals, may reduce productivity and may damage organization's relation with other co-operative enterprises.

"Designer can make the mistake of assuming that everybody knows what they know. This assumption may be correct sometimes, but it may be incorrect with respect to some particularly critical safety information. Incorrect assumptions can produce errors when important information is left out or the terminology is not understood or misunderstood by target users." (Wogalter et al. 1999, p. 152). This can be an issue, especially in MCML organizations, where documents are often developed in extremely technical context and fail to deliver the message to employees with multi-language problems. Thus, it is essential to know who your audience is, before designing complex safety information, and have the MCML aspect of the organization in mind.

According to (CIII), language barriers may not have sensational influence on daily basis, but the risks related to it may amplify in crisis situations. *"The risk is if you have a crisis and if you suddenly need to communicate quick and in stress situations, and/or if you have a major accident."* It is therefore, important to be one step ahead of the unexpected events. If we cannot avoid or eliminate all the MCML problems, we should at least be aware of and have appropriate knowledge of the consequences and its impact on the long-term. That is why, a risk-based approach to overcome language barriers is appropriate, because it has the ability to provide knowledge, awareness and mutual agreement about the underlying implications and consequences in MCML context (Renn, 2008, p. 49). If performed accordingly, it provides the possibility to eliminate uncertainties and prevent unexpected events from happening. A risk-based approach could be used to prepare us to handle crisis situations in MCML societies and provide us the ability to see the bigger picture in multicultural context rather than mono-cultural.

5.2. Hypotheses 2:

Although, occupational accidents are very often associated to human factors, (Helmreich, 2000; Reason, 1997; Wagenaar and Groenweg in Flin et al, 2008, p. 1) there is not much information about why and how accidents happen. Through a proper risk-based model and its elements, one can identify the opportunities to study the human factors in MCML context. It helps management to get a complete picture of risks related to different types of people working together. 17 of 17 respondents at some point during the interviews mentioned one or more human factors as a cause to occupational accidents. Thus, it is important to *"Ensure senior management are made aware of the key risks, control gaps and remediation efforts."* (QRA, 2018, p. 8).

According to Reason (1997, p. 61-62), human factors are controlled based on external and internal controls. The external control is a rule, regulation and procedure based-approach that describes which tasks are performed and how. This is basically paper-based control system, which prescribes how the work must be carried out. However, *"internal controls derived from the knowledge and principles acquired through training and experience."* (Reason, 1997, p. 61) though, it does not say anything about the human factors related to the multicultural aspects of an organization. A vast majority of interviewees said, *"For us it is a serious challenge to handle those with different language and that they come from different cultures."* (PC). Hence, it may be necessary to carry out risk assessment of the human factors in MCML context on an equal footing as any other task, activity or operation-based assessment. This is because according to the risk science 80 to 90% of all occupational accidents occur due to human error (Helmreich, 2000; Reason, 1997; Wagenaar & Groenweg in Flin et al, 2008, p. 1), then the focus should also be on human factors rather than on other 10 to 20% technical factors.

However, cultural disparities are not directly linked to safety in MCML work environments, but there are some advantages that may contribute in understanding the human factors, for example, when interviewees said, *"you grow in person by getting to know other people and other cultures. You understand better each other, and it in turn creates a better cohesion in the workplace."* (Pc), and "*that you can learn from different cultures of course. It is about becoming more tolerant to others and seeing the world from different perspectives."* (Pa). In MCML work environments, it is important to learn from each other and see the world from different perspectives. After implementation of the risk-based model in MCML context to

study human factors, one can *"Develop risk mitigation strategies including applicable internal controls and therefore lower a business unit or business ling's residual risk exposure."* (QRA, 2018, p. 8).

One of the main challenges that the organization is facing, is the communication issues within the firm and between groups. As mentioned, 13 of 17 interviewees state, that the communication in the organization is not good, because everyone does not speak the same language. It is obvious when the fundamental factor for communication is missing, how is it possible to communicate at all. Communication is an interactive communicating process with the purpose to convey information about risks related to tasks. (Regina, E. Lundgren & Andrea, H. McMackin, 2009, p. 2 & 345; Wogalter et al. 1999, p. 190; Bouder et al. 2007, p. 9; Renn, 2008). However, risk-communication is whole and covers many aspects in the risk science, it has very little to contribute to communication in MCML work environments. It does not have the integrative power that is needed in modern, complex and MCML societies.

According to Erlien (2010) and Flin et al. (2008), the two-way communication strategy is the most effective way to carry out communication. This strategy is often used to link all the elements of the risk models to each other (See figure 4) and connects all participants to a common goal. However, the whole communication process is unreliable when the receiver and communicator do not have appropriate knowledge of the communication language. To overcome communication barriers and to develop the communication within organization and between groups in MCML working environments, the first and probably the most important step is to eliminate or reduce the language barriers on every level.

Based on the IRGC-framework *"effective communication has to be at the core of any successful activity to assess and manage risks."* (Renn, 2008, p. 201). The primary purpose of this element is to develop the communication between experts, assessments and public. According to this theory, William Leiss in Renn (2008, p. 201) states, that the risk communication has over the years evolved from probabilistic thinking about risk, to *"persuasion and focused on public relations efforts to convince people that some of their behaviour was unacceptable."* However, it was not enough to manage the risks in technical context, experts then develop the current risk communication strategy, which is a two-way communication. Despite the developments on the field of risk communication, there are still employees in the organization that say, they struggle to get messages through because of the MCML complexity, and that *"Very often what you will see is that the workers will adhere to safety instructions without necessarily understanding it."* (Pa).

Use of risk-based approach to develop effective risk communication in MCML contexts, organizations need to understand the major functions of the risk communication (Morgan et al, 1992; OECD, 2002 in Renn, 2008, p. 203).

- Education and enlightenment
- Risk training and inducement of behavioural changes
- Creation of confidence in institutions responsible for the assessment and management of risk
- Involvement in risk-related decisions and conflict resolution

However, all the above may be meaningless if the language to risk communication does not have the right requirements for the communication process to achieve its objective. The main objective of communication in MCML sharp end industrial operations is ensuring that; *"those who are central to risk framing, risk appraisal or risk management understand what is happening, how they are to be involved, and, where appropriate, what their responsibilities are"* (Renn, 2008, p. 202) and that others outside this internal communication are informed and engaged in the process.

"Communication is Alfa and Omega" (CIV). But, in multicultural and multilingual organizations appropriate language knowledge is far more important for the communication to be achieved between groups within the organization. Without the appropriate level of spoken language in MCML industrial operations, we may never be able to achieve expected safety goals or get expected benefits of teamwork or other training processes.

5.3. Hypotheses 3:

A risk-based model can also be used to integrate and maintain safety in MCML organizations by providing common risk understanding, but to do so, first we need to reduce the disparities between Norwegian and foreign employees regardless of where they come from, or on what basis do they work. When 4 of 17 interviewees mention that there are obvious differences between different groups of people and that "*new cultures and new ways of living perceived as a threat*" (Pc) then something is not right. The fact that employees feel that they are discriminated based on where they come from or whether they are internal or external employees (sub-contractors) indicates that safety is not interwoven as it seems to be. According to discrimination act § 4, *"Direct and indirect discrimination based on ethnicity,*

national origin, lineage, skin colour, language, religion or belief is prohibited" (Lovdata, 2005). Thus, as long as religion or cultural disparities are anticipated as a source of conflicts between groups, we may not be able to integrate and maintain safety in our systems. Because, there will always be someone, who will feel discriminated, abused, oppressed and misused.

Being treated as outsiders might create fear and uncertainty among foreign employees who are used to different sets of safety rules and procedures. Risk perception is a mental model, and it is different from person to person depending on where the individual is brought up and what kind of risks they are exposed to. *"First of all, it is highly important to know that human behaviour is primarily driven by perception and not by facts, or by what is understood as facts by risk analysts and scientists."* (Renn, 2008, p. 93). It is therefore, important to provide risk information in a way that does not exceed employees' level of understanding. Interviewees said that some employees, who come from other cultures tend to take short-cuts, stretch a bit extra and do not stop when limits exceeded. This is because risk perception has a cultural dimension in which risky situations are not described based on the classical factors, level of probability and the extent of possible consequence. In MCML organizations, it seems like risks are perceived based on *"risk-related patterns"* or *"situation-related patterns"*, which is *"based on the idiosyncrasies of risky situations"* (Fischhoff et al, 1978; Slovic 1987, 1992; Breakwell, 2007, pp26ff in Renn, 2008, p. 94).

It is also believed, that unlike foreign employees *"safety is so drilled into Norwegians."* (CIII). It is not that Norwegian employees do not take risks, they do, but they are aware of risk sources and may stop when limits are reached. Thus, it is important to eliminate the *"idiosyncrasies of situation-related patterns"* by designing behaviour changing training both for Norwegian and foreign employees.

In complex socio-technical systems, there are always obvious risks nearby everyone, but by providing knowledge and awareness about the risk sources one can reduce the probability and the consequences significantly (Wogalter, et al., 1999, p. 150; Renn, 2008; Bouder, 2007 and Reason, 1997). Risk perception, risk awareness and risk knowledge are some of the most important elements of the risk-based model, and therefore have a central role in the integration and maintenance of safety in MCML industrial operations. It is obvious that when people in an organization have subjective perception of risk, safety must be developed in a more individual context, which is not possible. We cannot have 900 different safety procedures, but by creating consensus on the risk sources and common risk understanding, we can both reduce disparities between Norwegian and foreign employees, as

well as integrate and maintain safety more appropriately. Everyone needs to address risks the same way as they are expected to, regardless of where they are from, what cultures they are brought up in, but yet again, this is linked to language and communication barriers, because *"Very often what you will see is that the workers will adhere to safety instructions without necessarily understanding it."* (Pa), and *"language is the biggest factor, because we do the same things in the production as the foreign guys*." (PB).

However, risks in MCML context are perceived differently, the actual risks are the same for Norwegian employees as they are for foreign employees, "*because Norwegians perform the same task."* (PC). Thus, the fact that foreign employees are 8% more involved in the sharp end activities *"high risk activities",* is overruled by other factors such as, foreign employees' language knowledge, lack of safety training, poor communication skills and lack of relevant experience. It does not mean that involvement in high risk activities do have a significant part to play, but they also take more risks when they are not supposed to, because they blindly follow the safety procedures, they do not understand. It does not matter what language there are provided in, they do not understand because of mismatch between their language knowledge and procedure complexity. *"Safety procedures are written both in English and in Norwegian but for those who come from other countries, it can be written in any language, if they do not understand, then they do not understand."* (CIV).

According to Wogalter et al. (1999, p. 234), people are not motived to comply with the information they do not understand, and therefore their respond to risks may vary in terms of precautionary behaviour, compared to those who understand and adhere to safety procedures. We must simplify all safety relevant procedures in a MCML context, so that everyone can address risk the same way. Some even suggested involving advertising agencies then the message may be better communicated. Although, some employees understand the safety procedures, *"Frequently taking a risk is associated with a number of benefits, such as convenience, pleasure, peer approval, or even economic gain."* (Wogalter et al. 1999, p. 237). This is probably what motivates different types of risk-taking behaviour in MCML organizations. Judgement of employees' risk perception in MCML context is influenced by following variables, which need to be considered when we work with risk-based models in MCML industrial activities (Renn, 2008, p. 106-109).

- Information about expected number of fatalities or consequences evaluates the seriousness of risk,
- Information about the degree of impact (Catastrophic potential of risk)

- Information about risk sources and the nature of risk (Risk-related characteristics)
- Information about situations where risks manifests (Situation-related characteristics). It also includes aspects as voluntariness and personal control.
- Beliefs associated with the cause of risk and persons' attitude that he or she holds about the cause of risk, for example, technology, human, an activity or natural event.
- "Stigmatization refers to the process of eliciting negative emotions and strong feelings or risk aversion, independent of the cognitive content of the risk information (Peters, E. et al, 2004 in Renn, 2008).
- Emotional responses contribute to judgement of goodness and badness of risk, such as fear and anger on the negative side.
- Personal involvement, both practically and emotionally in risk-related activities.

5.4. Fear and Involvement:

In MCML organizations fear of losing job also seems to be an issue, especially among foreign employees and sub-contractors. It is believed that in Norway organizations have a very flat hierarchy, which mean that everyone has equal rights and are free to speak up when things are not working, as they are supposed to be. However, this is not the case with foreign employees; they are used to strict hierarchy systems with clear differences between the management and the operators. They are not allowed to make mistakes. They are punished, if they speak up. They can lose their jobs, if they are involved in accidents. Although, they work on the Norwegian land, they bring their fear with them and avoid informing about errors and deviations. *"Many say yes, only because they have to, and this can be something culturalbecause, if they do not say yes, so they may get fired."* (PC).

Foreign employees do not address risks similar as other employees, because they are instructed to avoid accidents at all costs. Thus, instead of eliminating the accidents, they are busy hiding their mistakes, because they do want to be addressed as accidents prone that can damage their career and the relationship between companies. An interviewee mentioned that if they have terrible safety culture and do not address safety as it should be, then maybe the fear is correct. We cannot put other peoples' life in danger, because sub-contractors or foreign employees do not have the same safety culture as we do. *"There is a fear of losing their jobs among foreign employees, and it is wrong to fear, but it is a valid fear because, foreign workers who are coming here, are not hired by the organization."* (Pa). However, it is not

only sub-contractors hired by other companies, who are more focused on hiding their mistakes than reporting them. There are also employees with non-Norwegian backgrounds, who have lived in Norway for a very long time and still do the same, because they are not aware of their rights. They are not aware of the consequences of hiding errors.

Everyone working on the Norwegian land is considered as equal. Thus, it is important that they are made aware of their rights and that they are not outside the law. To change the culture of fear, it has to start with the higher authorities. Based on the open-ended interviews with the authorities, they mentioned that the oil and gas industry is not prioritized at the present and that they do not have enough information about risk factors in MCML work environments.

To overcome fear issues and to involve all employees in effective risk management, authorities must take more responsibility and demand that employees are made aware and understood of their rights, whether they are Norwegian, foreign employees or sub-contractors. Organizations must design attitude and behavioural changing training to promote safety in MCML context, as well as to eliminate the feeling of fear among employees. However, to change someone's behaviour, the participant must have the desire to change (Flin et al. 2008, p. 255). In other words, this has to be done in collaboration between the employees, organizations and authorities with safety in focus.

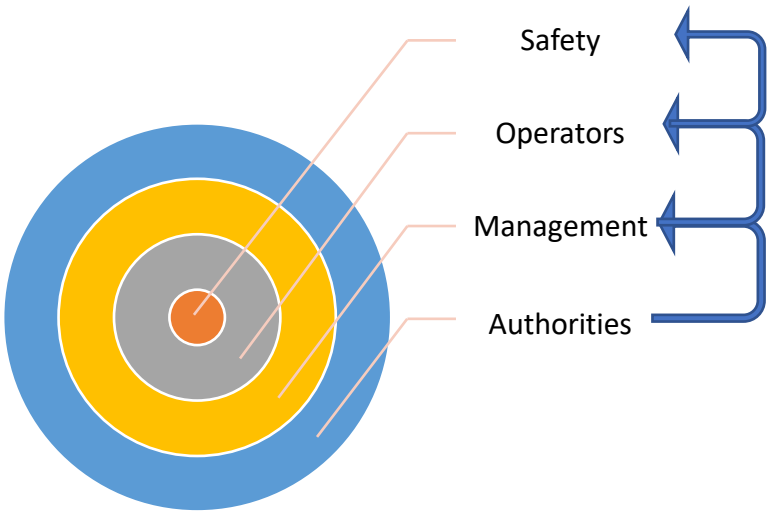

Figure 12, Collaborative process on different levels.

5.5. Implications for the current approach to safety:

According to respondents, organizations have extremely high focus on the *"Zero vision"*, which is not always a good thing, because they are not taking proactive stands. *"It is not about just having a safe job analysis, but it is about more."* (Pa). *"It is never good enough because people are people and we don't always do as we should, or we are not aware and awake."* (CIII). Lack of current approach's ability to achieve safety goals is also related to budget cuts, which makes the safety work difficult. In general, the current approach is not good enough to prevent accident, because if it was, we would not experience as many accidents as now. Previously, the safety barriers in MCML organization such as, language difficulties, cultural disparities, traces of discrimination, fear and employees' involvement, the blame cycle and so on were discussed. These are obvious reasons to why the current approach is not working in MCML context.

Safety in multicultural work environments is much more than just toolbox talks, task-based risk analysis and introducing new procedures. *"Very often the message drowns in the complexity of the procedures or the way things are being communicated."* (Pa). Much more than this is required to handle challenges and overcome safety barriers in MCML firms. All the elements in the risk models that are used to study task-based or technological factors can be used to study human factors. For example, organizations must;

- Perform pre-assessment to frame the problems, provide early warnings and monitor employees' development in multicultural/multilingual context.
- Identify hazardous events, explore vulnerabilities and exposure. Estimate risks and consequences related to human behaviour and conduct a concern assessment of risk perception, social concerns and socio-economic impacts.
- Perform a tolerability and acceptability assessment by characterisation of framed risk, its seriousness and prepare risk reduction options that are developed in multicultural rather than mono-cultural context.
- Manage the risk through monitoring, feedback from risk management practice and control the risk's development.
- Last but not least, develop effective risk communication strategies that account for the language barriers among different groups. A Communication Risk Management (CRM) that focuses on information processing challenges, whether it is direct information in form of paper, one to one communication or group meetings.

- Have the same requirement to sub-contractors, because "*We know that there are cowboy companies out there and we know some are more accident prone than others. You pick those that are safer to work with."* (Pa).

6. Conclusion

In this paper it has been attempted to answer the research question; *"How could a risk-based approach be used to overcome safety barriers in multicultural organizations?"* With the help of the methodology triangulation and an overview of previous studies and relevant literature, the barriers in MCML land-based oil and gas organization have been highlighted.

Barriers in MCML industrial operations are present at all times. It is just that the current risk science methods do not have the ability to capture them, but it does not mean that these challenges are not real. They are as real as any other technical barriers in the system. The question is whether organizations are not familiar with them or do they choose to overlook them. Such barriers may not have major consequences on daily basis, but they can be potentially harmful in more dangerous, stress and crisis situations.

Despite the focus of safety and risk science in the society in the last 20-30 years, it has very little to contribute with regard to safety in multicultural contexts. There are no theories that account for risk factors, or how accidents can be prevented in an appropriate way in MCML domains. Even risk communication which is the most developed and the most important element in risk management, does not account for diverse workforces.

There are no risk models and frameworks developed that studies human factors in the same manner as they study technological factors. Despite the fact that about 80 to 90% of accidents occur are related to human factors, there is still more focus on technical issues rather than non-technical. However, if there are any risk models that account for the non-technical aspects of a system, they are developed in monocultural context and cannot be used to evaluate risks in MCML context. An example would be, the safe job analysis model, which is one of the most used risk analysis models.

Language barriers are perceived as the main risk factor in MCML sharp end operations. This is an obvious challenge for organizations to handle, because a significant amount of people who come to the facilities do not have appropriate language knowledge of the spoken language. This only makes it difficult for employees to work together. Language barriers also have a significant impact on how safety information is understood and implemented.

Language barriers are often related to cultural disparities, which mean that different groups of people are used to different types of safety systems. In Norway safety and HSE is

very common among employees to consider when they are performing their tasks. However, it is not the same among foreign employees. People accept different level of risks based on what kind safety culture they are used to, what kind of training they have received, what to do when they are associated with risks.

A higher level of fear among foreign employees is, because they are used to more strict administrative roles, they are not aware of their rights and because they have been scared off by their leaders/organizations. Thus, they spend more time hiding errors rather than preventing them. Such behaviour creates challenges for risk management to integrate and maintain safety in appropriate manner, because fear lead people to do unpredictable things.

According to act of the discrimination, it is illegal to treat people differently based on their differences. However, this is not something that is visible at all times, but it exists, and people are discriminated against indirectly just to avoid legal issues. What is thought-provoking is that people who are discriminated against say, it is normal and that it happens everywhere. This is perhaps the reason why different groups are not welcoming other people into their social circle. The fact that organizations have the illustration of a perfect working environment is an active contributing factor to poor social cohesion and discrimination in MCML organizations.

Effective communication is the core of every successful operation. However, it is not surprising that in MCML organizations the communication level is very poor. People intend to believe that they have achieved the communication to the fullest, but they forget that communication is not just saying or listening. Communication about understanding the content of what is communicated, and language is the most important component for proper communication. When the most important element of risk communication is missing, how can it be said that the communication is good and effective? Language barrier is a major challenge for the effectiveness of crisis communication both within MCML organizations, as well as the society as a whole.

Blaming others is nothing new for us. This has been happening since the start, and it is still happening. There is a tendency that different shifts blame each other for common mistakes. The process of blame works downwards, the lower in the system the higher the chances to be blamed for errors and accidents.

Due to organization's diversity, employees have adopted a "*Yes behaviour",* which means that foreign employees with poor language knowledge say *"Yes"* whenever spoken to

regardless of whether they understand or not. This is also a challenge, because often they say *"Yes"* only, because they have to. There are several factors to *"Yes behaviour"* such as, fear of losing their jobs, if they do not say *"Yes",* do not understand the content, but say *"Yes"* anyway or they are not interested and want to be left alone.

Both employees and management wish more employee involvement in safety work in the form of coursing, meeting and training, but yet again language is an issue. There are people in MCML organizations who do not participate in the safety work actively, because courses, trainings and meeting are designed in a language that they do not understand.

Providing more paper or complex procedures in MCML context with language and communication barriers is not an effective way of promoting safety. Employees at the front-line do not prefer to read big and complex scientific documents. Giving them such documents is considered as lack of information because they are often not read at all.

The Norwegian labour Authorities has a central role in the safety work on land-based oil and gas activities. When they say that this industry is not a priority and that they do not have enough resources and that they do not have any information about the language and communication challenges in MCML working environments, then it is not surprising to see that there is social dumping, that people are not aware of their rights and work in fear of losing their jobs, and that people are discriminated against on whatever basis it may be.

Organizations need to work together and share more information cooperating with each other. For example, when new employees or sub-contractors are sent to perform activities on other company's facilities, then the hosting firm should know when, who, how many and what kind of jobs are they coming for. Organizations should agree on common requirements for external workforce, such as, common language, education level, training and experience etc. Sending uninformed workforce may create challenges for the hosting company to handle sub-contractors and may also lead to conflicts between organizations and employees.

6.1. Recommendations

1. To overcome safety barriers in MCML working environment, Companies must first of all overcome the language barriers. Similar requirements should be there for sub-contractors and own employees. 23 nationalities mean 23 different languages and 23

different challenges. To overcome language barriers companies should arrange language courses with focus on internal safety and risk understanding for those who need it.

2. Although, cultural differences are mostly related to negative consequences, there are also positive consequences that could be used to see the world of safety from different perspectives. We just need to provide the facilities to use such differences to develop safety both within organizations and the general society. It is a great advantage to raise awareness among employees about their personal rights, so that they can take a stand when they feel discriminated.
3. Identify and address the risk related to MCML working environment. We need to know and understand our employees, where they come from, what do they know about safety, what is their level of language and how can they contribute to safety. We ought to also evaluate how people in MCML context can be integrated into safety culture.
4. Communication is probably the most important factor in multicultural organizations to be effective, if the goal is to inform employees about risks and safety measures. To achieve effective communication, organizations must overcome the language barriers, because without proper language a proper communication is impossible. Although, employees do not have appropriate language knowledge, we should still develop communication strategies which make it easier for employees to inform and communicate with other colleagues.
5. When working together with other employees in MCML operations, it is important that everyone is involved in the preventive work. By involving employees in safety, it is ensured that everyone is on the same level and has a common risk understanding. This can be done through more training, HSE courses, group meetings and seminars where everyone is an active participant.
6. Simplify all safety procedures to a level making it idiot proof. Employees at the sharp end do not understand the complex scientific procedures that do not speak the language they understand. Thus, words that are easy to understand and remember should be used. More pictures and videos should be used rather than more complex words.

We have an impression that in the most oil and gas companies, organizations perform Safe Job Analysis (SJA) or whatever they may call it (See figure 12). As mentioned, this is a very technically oriented safety model that focuses on specific tasks and activities and most of the

work is done in SJA teams. Although, this is an effective safety model, it is clear that in what they do, and the advice they give, they do not take the MCML factors on-board. Clearly, organizations should revise their frameworks and develop more in MCML context. The model can be enriched, if we make the necessary changes, for example; account for specific MCML factors in the risk communication, while working with the SJA model.

There are many possibilities to involve the front-line employees in the SJA process, for example, in step 1 of the process, it could simply be identified who the workforce is, their abilities and their differences. It is important to know, who is going to perform these activities and who is most exposed to the hazards related to the task.

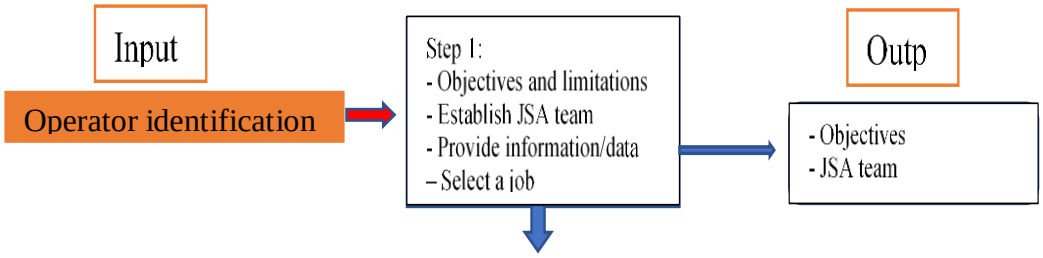

Figure 13, Operator identification including in SJA

After step 4 and identification of all risks related to chosen task, a meeting could be arranged with the operators and have a two-way communication with feedback about the risks, and how they should be prevented.

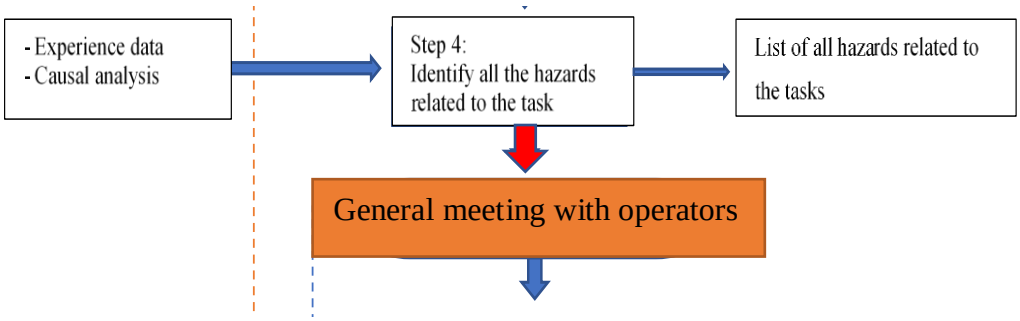

Figure 14 General meeting with operators included in SJA

According to Green et al. (2007, p. 106), over 250 studies show that the printed safety information materials such as procedures, standards, guideline etc. delivered to employees far more exceed the reading ability of an average adult. Thus, before listing safety procedures, under the input and before step 6, again arrange a meeting where all risk-reduction measures are introduced and discuss preventive measures in plenary. Such meetings do not have to be long, but it is an effective way to integrate employees in safety and give them a sense of

empowerment. It is important to receive feedback from employees before presenting complex safety procedures that they have not been a part of.

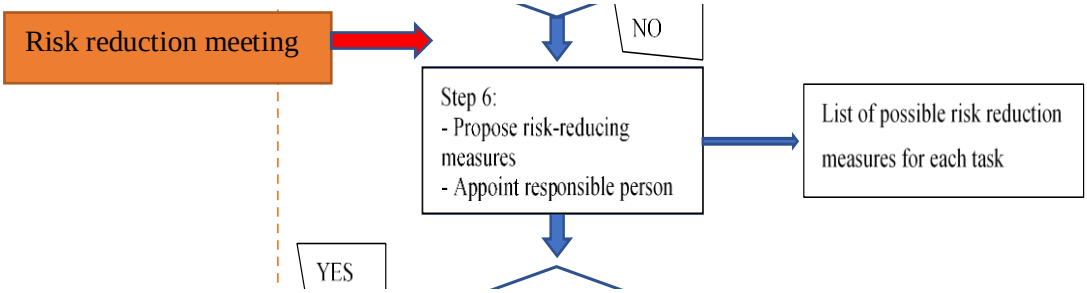

Figure 15 Risk reduction meeting included in SJA

Ultimately, a change of focus towards the human factors in a complex and MCML context is recommended. It would be of a huge advantage to account for the human aspects rather than technical means, because in the end, it is the people with different cultures, language knowledge, training and experience, communication skills and behaviour that have to use the technical materials.

In the same way as the front-line consists of people with different cultural and professional backgrounds, and in order to overcome barriers, the management should also be composed of people with different cultural and professional backgrounds. We need people who understand technology and machines, but we also need people who understand people, especially in multicultural/multilingual societies. We need people who can see the bigger picture, think differently and understand different human behaviours. We need to involve foreign citizens in the safety and security on a larger scale, because this way, safety and security work from different perspectives can be performed. It may also provide the opportunity to capture the risks that are hidden and may not be possible to anticipate if we are not familiar with the culture of risk.

Increased societal diversity can increase barriers, uncertainties and vulnerabilities in multicultural societies with multi-language problems, and if we are not proactive and do not do anything about it now, while we can, slowly, but surely, this will contribute to the increasing differences between Norwegians and foreign employees and citizens. If the trends continue to grow, increased national safety and security challenges could be experienced when things go out of control, especially in major crisis situations. At worst, handling MCML communities can become a national challenge in itself. Thus, it is important to look at the bigger picture. We need to dig deeper to understand MCML barriers and to predict and

prevent unexpected events, because there are barriers and errors in MCML societies that cannot be seen on daily basis, but they do exist.

6.1.1. Further Research

Barriers in MCML working environments are clearly challenges for organizations to handle properly. It has also been shown that in such organizations, there are invisible traces of discrimination and social dumping, leading to interpersonal conflicts and impact on efficiency and productivity. After studying this from the inside, it could safely be said that the reason for foreign employees' involvement in occupational accidents is not entirely because they work in high risk activities, but it is because of their cultural disparities, language knowledge, lack of training, experience and behaviour.

However, this is complex and requires further research on a larger scale. For example, a comparison of land-based oil and gas industry with offshore and petroleum's industry with other industry to study what influence these barriers have in other sectors, and what strategies do they use to overcome barriers in MCML context.

If the barriers in MCML context could be overcome, the identification of preventive measures to overcome other challenges in the society such as, poverty among immigrants, cultural disparities, integration problems, education and communication challenges could be made possible. Cultural disparities and language barriers do not only influence organizations, but also affect the safety and security in societies both nationally and globally. Language is usually the key to solve the problems in a diverse society, but it is not just it. To solve the problems, a common understanding about the barriers and its consequences between organizations, authorities, scientists and the public in general need to be created.

7. Bibliography

Annas, G. J. (1992). *The changing landscape of human experimentation: Nuremberg, Helsinki, and beyond*. Health Matrix, 2, s. 119-140. Obtained from; https://scholarlycommons.law.case.edu/cgi/viewcontent.cgi?referer=https://scholar.google.no/scholar?start=30&q=nuremberg+code+&hl=no&as_sdt=0,5&httpsredir=1&article=1292&context=healthmatrix

Arbiedstilsynet, (2012). Kompass tema nr. 2 2012; *Arbeidsskader bland utenlandske arbeidstakere*. Obtained from; https://www.arbeidstilsynet.no/globalassets/om-oss/forskning-og-rapporter/kompass-tema-rapporter/2012/kompass-tema-nr-2-2012-arbeidsskader-blant-utenlandske-arbeidstakere.pdf

Arbeidstilsynet (2016). Kompass tema nr. 8. 2016. *Ulykker I bygg og anlegg i 2015*. Obtained from; https://www.arbeidstilsynet.no/globalassets/om-oss/forskning-og-rapporter/kompass-tema-rapporter/2016/kompass-tema-nr-8-2016-ulykker-i-bygg-og-anlegg-i-2015.pdf

Arbeidstilsynet (2017). Kompass tema nr 1. 2017. *Helseproblemer og ulykker i bygg og anlegg*. Obtained from; https://www.arbeidstilsynet.no/globalassets/om-oss/forskning-og-rapporter/kompass-tema-rapporter/2017/kompass-tema-nr-1-2017.pdf

Arbeidstilsynet. *Laws and regulations*. Obtained from; https://www.arbeidstilsynet.no/regelverk/forskrifter/forskrift-om-utforelse-av-arbeid/3/22/

Aven, T., & Renn, O., (2010). *Risk management and Governance: concepts, guidelines and applications*. New York; Springer.

Aven, T., (2011). *Quantitative risk assessment: the scientific platform*. Uk; Cambridge University press.

Blaikie, N. (2010). *Designing social research* (2. Utg.). Cambridge: Polity press

Bouder E. F, (2008). *Defining a Tolerability of Risk framework for pharmaceutical products in a context of scientific uncertainty*. (Doctoral dissertation). King's College, London.

Bouder F, Slavin D & Løfstedt E. R. (2007). *The Tolerability of Risk*. London; Earthscan

Collins, A. M. (2002). *Safety culture: a review of the literature.* Health & safety laboratory. Obtained from; http://www.hse.gov.uk/research/hsl_pdf/2002/hsl02-25.pdf

Dekker. S. (2006). *The Field Guide to Understanding Human Error*. Lund University. Ashgate.

Engen. O. A, Kruke. B. I, Lindøe. P. H, Olsen. K. H, Olsen. O. E, Pettersen. K. H, *Perspektiver på Samfunnssikkerhet*. (2016). Oslo: Cappelen Damm

Erlien, B. (2010). *Intern kommunikasjon, planlegging og tilrettelegging*. Oslo: universistetetsforlag.

Faktabok om arbeidsmiljø og helse (2018). *Status og utviklingstrekk.* STAMI-rapport, årgang 19, nr. 3, Oslo: Statens arbeidsmiljøinstitutt.

Fischhoff B., (2012). *The science of science communication*. Carnegie Mellon University. Pittsburgh. Obtained from; https://www.pnas.org/content/110/Supplement_3/14033

Fischhoff B., (1995). *Risk Perception and Communication Unplugged: Twenty years of process*. Risk Analysis, Vol. 15, No. 2.

Flin R, O'Connor P and Crichton M. (2008). *Safety at the sharp end: A guide to Non-Technical Skills*. USA, Ashgate.

Gravseth (2003), Hans Magne, Ebba Wergeland og Johan Lund: *Underrapportering av arbeidsskader til Arbeidstilsynet*. Tidsskrift for den norske legeforening: s. 2057-2059.

Green, M., J. Zenilman, D. Cohen, I. Wiser and R. Balicer. (2007*). Risk Assessment and Risk Communication Strategies in Bioterrorism preparedness*. NATO Security Through Science Series- A: Chemistry and biology, springer, Dordrecht, Nederlands.

Grønmo, S. (2004). *Samfunnsvitenskapelige metoder*. Bergen: Fagbokforlaget.

Halvorsen, K. (2008). *Å forske på samfunnet – en innføring i samfunnsvitenskapelig metode* (5. utg.). Oslo: Cappelen akademisk forlag.

Hollnagel, E. (2014). *Safety 1 and Safety 2: the past and future of safety management*. USA, Ashgate.

Hollnagel, E., Nemeth, C. P. & Dekker, S. (2009). *Resilience engineering perspectives: Preparation and restoration*. Volume 2. USA; Ashgate.

Johannessen, A., Tufte, P.A. & Christoffersen, L. (2016). *Introduksjon til samfunnsvitenskapelig metode* (5. utg.). Oslo: Abstrakt forlag.

Karlsen, J., E. (2016). *Ledelse av helse, miljø og sikkerhet*. (3. edition). Bergen; Fagbokforlaget.

Kelman, S. (1981*). Regulating America, regulating Sweden: A comparative study if Occupational safety and health policy*. London; the MIT press.

Klinke, A. & Renn, O. (2002). *A new approach to risk evaluation and management: Risk-based, precaution-based, and discourse-based strategies*. Risk analysis, 22(6):1071-1094.

Kongsvik, T. (2013). *Sikkerhet I organisasjoner.* Trodhiem; Akademika forlag.

Kvale, S. & Brinkmann, S. (2017). *Det kvalitative forskningsintervju* (3. edition.). Oslo: Gyldendal Akademisk.

Kvale, S. Brinkmann, S. (2009). *Interviews: learning the craft of qualitative research interviewing*. 2nd edition: USA. Sage publications.

Lindøe, P. Kringen, J. & Braut, G. S., (2015). *Risiko og tilsyn: risikostyring og rettslig regulering*. 2nd Edition. Oslo; Universitetsforlaget as.

Lovdata, *Diskrimineringsloven*. Obtained from; https://lovdata.no/dokument/LTI/lov/2005-06-03-33

Lungren, E. R. & Mcmakin, H. A. (2009). *Risk communication: a handbook for communicating environmental, safety, and health risks.* (4. Edition). Canada; Institute of Electrical and Electronics Engineers.

Løfstedt, E. R. (2011). *Reclaiming health and safety for all: An independent review of health and safety legislation*. Obtained from; https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/66790/lofstedt-report.pdf

Marsdal, E. M. (2018). *EØS på 1-2-3: Hvordan avtalen påvirker arbeidslivet- og hva vi kan gjøre med det*. Oslo; Manifest tankesmie.

O'Brien, M. (2000). *Making Better Environmental Decisions*. Cambridge, MA: The MIT Press.

Qatar Regulatory Authorities (2018). *Guidance to the Risk-based Approach*. Obtained from; http://www.qfcra.com/en-us/whatwedo/AntiMoneyLaundering/Documents/Guidance%20on%20the%20Risk%20Based%20Approach%20May%202018.pdf

Rasmussen, J. (1997). *Risk management in a dynamic society: a modelling problem*. Safety science, 27(2-3), 183-213. Obtained from; http://www.ocw.nur.ac.rw/NR/rdonlyres/Aeronautics-and-Astronautics/16358JSystem-Safet

Rausand, M., & Utne, B., I (2009). *Risikoanalyser teori og metoder*. Trondheim; Tapir Akademisk forelag.

Rausand, M., (2011). *Risk assessment: Theory, Methods, and Applications*. USA; John Wiley & Sons publications.

Reason, J. (1997). *Managing the Risk of Organizational Accidents*. England: Ashgate.

Rosness, R., Grøtan, T. O., Guttormsen, G., Herrera, I. A., Striro, T., Størseth, F., ... & Wærø, I. (2010). *Organisational accidents and resilient organisations: Six perspectives revision* 2 (Report A17034). Trondheim, Norway: SINTEF Technology and Society. Obtained from; https://www.sintef.no/globalassets/upload/teknologi_og_samfunn/sikkerhet-ogpalitelighet/rapporter/sintef-a17034-organisational-accidents-and-resilienceorganisations-six-perspectives.-revision-2.pdf

Rosness, R., Skjerve, A.B.M., Alteren, B., Berg, Ø., Bye, A., Hauge, S., Seim, L.Å., Sklet, S., Tveiten, C.K., & Aase, K.(2002). *Feiltoleranse, barrierer og sårbarhet*, SINTEFrapport STF38 A03404. Trondheim.

SSB (2019). *Fakta om arbeid: Befolknings tilknyttning til arbeidsmarkedet*. Obtained from; https://www.ssb.no/arbeid-og-lonn/faktaside/arbeid

SSB (2019). *Reported accidents at work in the period of 2014-2017*. (Table 1) Obtained from; https://www.ssb.no/statbank/table/10914/tableViewLayout1/

SSB (2018). *Flere innvandrere I arbeid*. Obtained from; https://www.ssb.no/arbeid-og-lonn/artikler-og-publikasjoner/flere-innvandrere-i-arbeid

SSB (2017). *60 per cent of immigrants are employed*. Obtained from; https://www.ssb.no/arbeid-og-lonn/artikler-og-publikasjoner/60-prosent-av-innvandrerne-er-i-arbeid

Sørbø, J. (2006). *Globalisering og arbeidsmarkedet*. Obtained from; https://www.ssb.no/en/befolkning/statistikker/innvgrunn

Sørby T. (1996). *Overgangen fra hendelsesstyrt, til risikobasert HMS-styring*. (Master dessertion). Høgskolen i Stavanger.

Tannæs, A.M (1992). Mer enn en jobb. Oslo. TI.forlaget.

Turner B, & Pigeon N. (1997). *Man-made disasters*; 2nd Edition. UK: Biddles Ltd.

Vogel, D. (1986). *National styles of regulation: environmental policy in Great Britain and the United States*. London; Cornell University Press.

Wildavsky A. & Dake K. (1990). *Theories of risk perception: who fears what and why?* Vol. 119, no 4, s. 101-113.

Wogalter, S. M., Dejoy, M. D., & Laughery, R. K., (1999). *Warnings and risk communication.* UK & USA; Taylor & Francis Ltd.

Yin, R. K. (2018). *Case study research and applications – Design and Methods* (6. Edition.). Thousand Oaks, California, USA: Sage publications, Inc.

8. ATTACHMENTS

8.1. Request for participation

This is a case study based on comparison of national and non-national employees at the Norwegian Oil- and Gas Industry. The main purpose of this paper is to study, why foreign employees are more often involved/injured in occupational accidents compared to national employees and how language and communication are linked to occupational safety. Through this project both national and non-national employees performing similar activities at the sharp-end in a multicultural domain will be investigated. This is a Master's project in association with the University of Stavanger and will be submitted for review by 15. June 2019. The research question *"how could a risk-based approach be used to overcome safety barriers in multicultural organizations?"* is based on a subject there is very little available about, and therefore makes a good point of departure to carry out this investigation.

This project is based on a qualitative research method, and to collect the relevant data, performing semi-structured interviews with (15-20) employees on the operator level both with Norwegian and non-Norwegian backgrounds, with new and more experienced employees has been chosen. Moreover, attempt will be made to interview (5-10) leaders/middle management who directly interact with employees at the sharp-end. It will also be sought to interview (1-2) experts within the regulatory sector, for example, *"Arbeidstilsynet"* the Norwegian labour inspector authority. Other than field observations and interviewing employees, analyses of the available relevant safety documents such as safety procedures, risk assessment methods, safety tools and accidents rapports (if possible) will also be carried out.

The interviews will happen on a face-to-face conversation method based on questions prepared in advance and will take approximately 45-60 minutes. This is a confidential investigation, which means that no personal information will be available for others than the researcher. To make sure that all the relevant data is collected, the researcher will both take notes and record the conversation on a private cell phone. This is also important for the analysis process.
To ensure participants' safety, all personal information and other data that could be traced back to interviewees will be deleted immediately after the project is over.

This is a voluntary participation, which means the participants can withdraw from this enquiry whenever they would like to. If you have any questions regarding the project, please contact Javeed Sael on +47 45 76 76 45 or javeed90@hotmail.com or my supervisor at the University of Stavanger, Professor Frederic Emmanuel Bouder at Frederic.bouder@uis.no.

If you would like to be interviewed, please make sure that you read this document and sign with your name and date.

☐ I agree to have received all the information related to this investigation, and willingly agree to participate in this project.

Name:

Date: Signature:

8.2. Interview guide for employees

1. Can you tell me about yourself, your title, your main tasks and how long you have been employee in this company?
2. Do you realize that you are working in a multicultural organization?
    a. What are advantages of working in multicultural organizations?
    b. What are the consequences of working in multicultural organizations?
3. How do you understand and assess risks of being exposed to accidents?
4. Is there same understanding of risk within your organization between groups?
5. What are the main risk factors associated with accidents in multicultural organizations?
6. How much of the time do you work with other colleagues nearby?
7. How would you describe the communication between different groups?
    a. Are there any common language requirements at your workplace?
8. Have you experienced loss of communication/information due to language differences?
9. Can you mention an incident/accident that has occurred due to language and communication difficulties?
    a. What have been the consequences?
10. How would you describe the relationship between employees with different nationalities, cultures and working methods?
11. How do you think cultural differences influence safety in multicultural domains?
    a. How are employees with such differences followed up?
    b. How are employees with cultural differences involved in safety work?
12. Does it happen that you have to perform tasks that you do not think you have had enough training in?
13. What would you say are the main factors for increasing occupational accidents among foreign employees compared to Norwegians?
14. Would you say it is because they work in high risk activities or because of language knowledge, lack of safety training, experience and procedure complexity? Why?
15. How can occupational safety be improved and maintained in multicultural environment?
16. What are the ambitions for safety in your organization?
17. How are you contributing to achieve safety goals in your organization?
18. Do you believe that the current approach to achieve safety (*The Zero Vision*) in a multicultural setting is good enough to prevent accidents?

19. What can/should be done differently to reduce the disparities between Norwegian and foreign employees?