DEVELOP A FRAMEWORK OF CULTURAL ASPECTS THAT FACILITATE SAFETY IN HEAVY INDUSTRY IN SWEDEN

Author background

- Born in Ireland
- Six Sigma Master Black Belt 2006
- Lean Master Black Belt 2007
- Scrum Master 2013
- Currently studying for Masters in Operational Excellence
- Has worked in: Ericsson, Flex, IKEA, ABB, Sandvik, Alfa Laval, currently COO at Radinn, over 30 years experience in international industry.
- Study plans: PhD in management and finance

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Thesis - Background

Based on data from 2015, the average fatality rate (fatal accidents at work) in Sweden is 0,73 per 100,000 employed. The dispersion across Scandinavia, per country is Denmark 1.02, Sweden 0.73, Norway 1.3 and Finland 1.1.

Based on data sourced from the Swedish Work Environment Authority there is an increasing number of fatalities within industry in the years between 2015 and 2018.
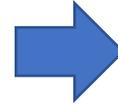
2015 => 34
2016 => 37
2017 => 44
2018 => 50
2019 => 36
2020 => 30 (trend)

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Thesis – Aim, Objectives and Research Question

Aim
To develop a framework of cultural aspects that facilitate safe working within heavy industry in Sweden

Objectives
The aim will be achieved through:
- data analysed primarily from interviews across industrial companies in Sweden
- secondary data will be collected through literature review and safety publications in Sweden/Scandinavia and the SÄKU survey
- input from leading safety experts and professional networks within heavy industry

This will deliver a framework for measurable improvement, to be validated by experts

Research Question

What are the cultural aspects that facilitate safety within heavy industry in Sweden?

Automotive industries
Industrial electronics
Furniture manufacturing
Machine/equipment manufacturing
Metal fabrication
Mining industry

Thesis – Literature Review

This section of the thesis covered:

- Legislation

- Accident definitions

- Accident causation models – sufficient (single factor or set of factors that alone are sufficient to cause an incident/accident) and necessary (causes are those that, if absent, would remove the conditions for the incident/accident to happen)

- Accident investigation

- Organisational culture

- Safety culture

- Leadership regarding safety

Thesis – Methodology and Data collection

Methodology

- An inductive approach (finding new theories from existing data) has been chosen to carry out this research. The information to be gathered necessitates in-depth interviews to be carried out with a completely open mind

Data collection

- The primary data collection: carry out in-depth interviews with several companies
- Secondary data: based on the questions created by Warszawska and Kraslakski, and adapted by the Swedish Säkerhetskulturnätverkets secretariat in Stockholm, (www.säku.se).

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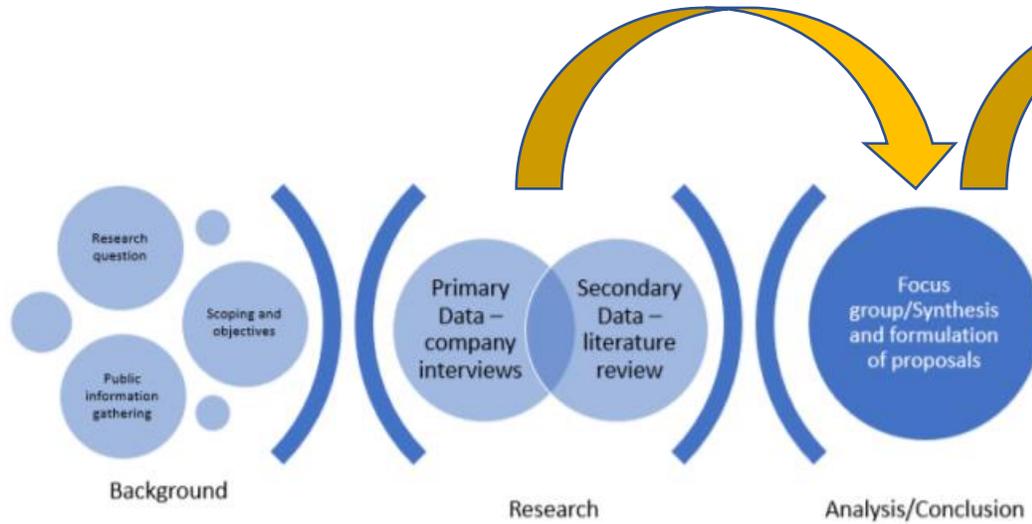*Relentless execution*

Thesis – Hofstede – Organisational Culture

Power distance - there is a positive correlation between Power Distance and Fatalities indicating that as Power Distance grows there is an increasing number of fatalities. Sweden ranks low regarding Power Distance. This is reflecting in the relatively flat organisations in Sweden and the openness of direct manager/employee communication.

Long-term vs Short-term views - there is a no correlation between Short/Long-term thinking and Fatalities indicating that as Short/Long term thinking grows there is no significant increase/decrease in the number of fatalities. Sweden ranks in a middle in Hofstede's study regarding Short/Long term thinking. This was surprising for the studied companies in the project as they felt that their focus was very long-term.

Individuality - there is a negative correlation between Individuality and Fatalities indicating that as Individuality grows there is a decreasing number of fatalities. Sweden ranks high regarding Individuality. This is reflected in the way people take care of close family and colleagues – fast response to accidents involving colleagues, and tendencies towards being a close-knit society

Masculine/Feminine - there is a no correlation between Masculine/Feminine and Fatalities indicating that as Masculine/Feminine grows there is no significant increase/decrease in the number of fatalities. Sweden ranks very low regarding Masculinity, Sweden is a Feminist country reflecting in the socialist fabric of Swedish society, caring for all and being modest.

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Thesis – Focus Group

Actions	Driving Forces	Current State	Ideal State	Restraining Force	Actions
Step 4	Step 2	Step 0	Step 1	Step 3	Step 5
Outline actions that help the driving force to get stronger and create more support for the ideal state	Identify 5 driving forces that help to achieve the ideal state, things that help and support.	Describe briefly the current state	Define what you believe the ideal state would be (3-5 bullets)	Identify 5 restraining forces that block or limit progress to achieve the ideal state, things that do NOT help and support	Outline actions that reduce/eliminate the restraining forces, creating more possibilities to achieve the ideal state.

Background

Research
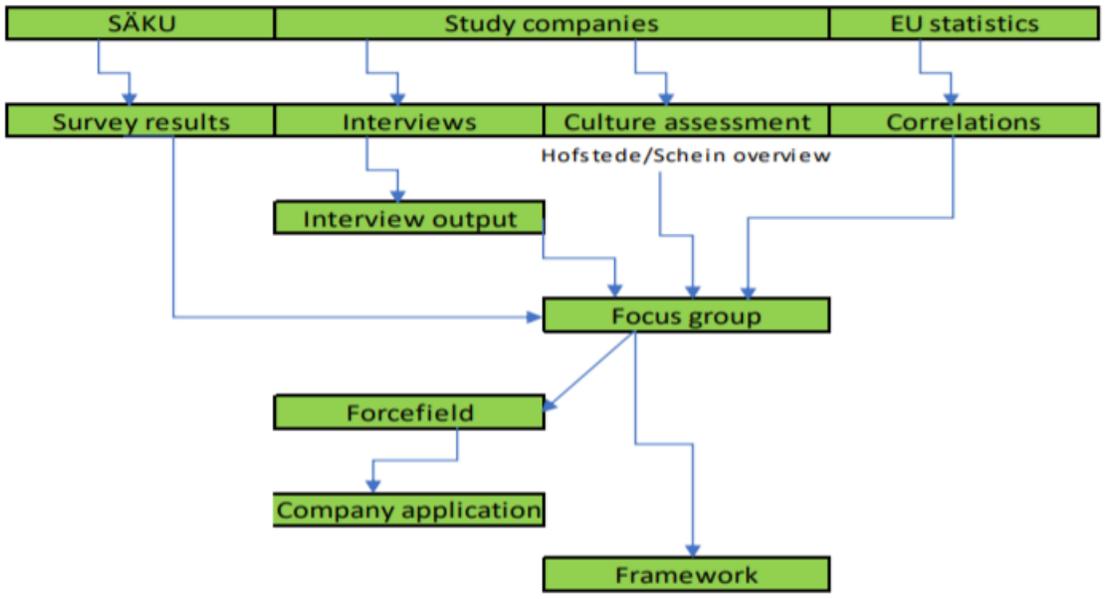
Analysis/Conclusion

Thesis – Input to Output

Figure 12 - Overview of the process to build the framework from multiple inputs to framework application.

Results - Framework
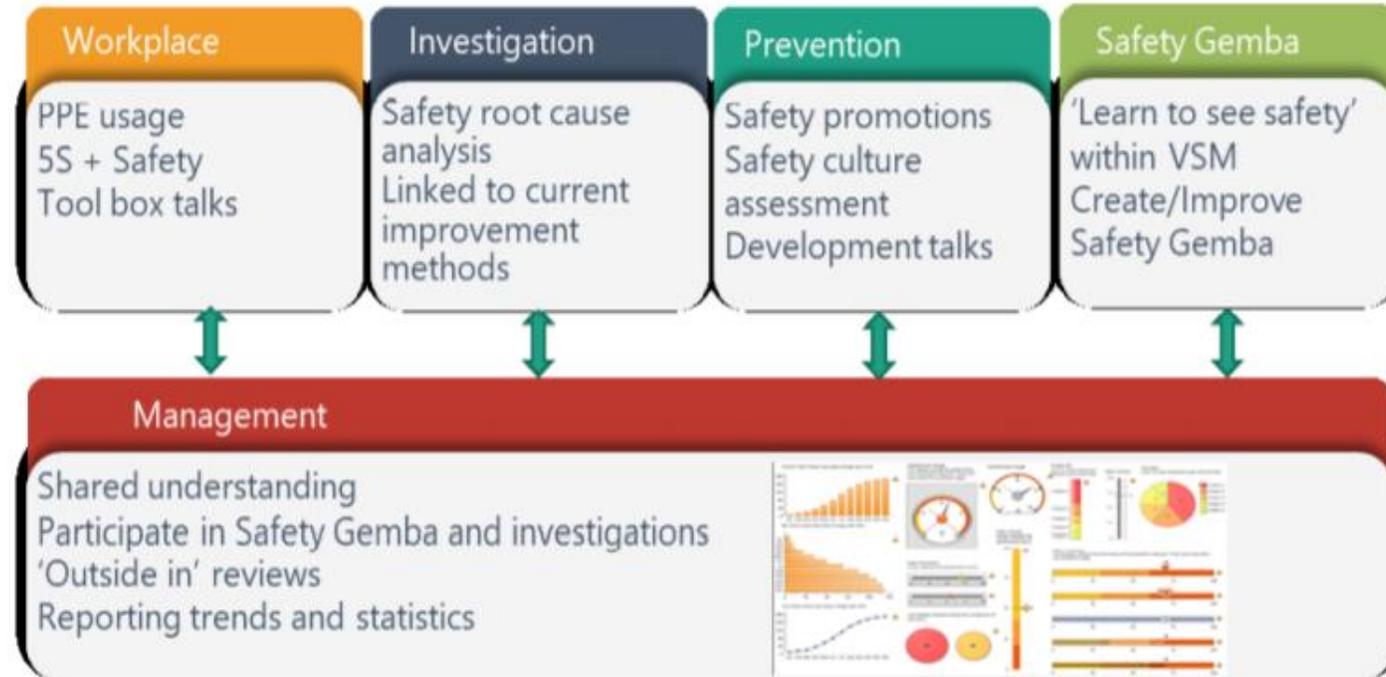
The framework seeks to:
- combine several proven methodologies to create a robust iterative cycle of safety culture improvement.
- provide a link into ongoing improvement methodologies
- use robust dashboards and data to follow the progress of implementation
- provide a guide to useful tools and reporting mechanisms in the safety arena
- focus on inclusion of all employees in the development of safety culture
- address cultural aspects that affect safety

The framework can be implemented in the following way:
- assemble the safety team/resources and clarify the current state.
- work through the step by step content and modules.
- use an agreed prioritization tool chart to determine needs, flow and sequence of relevant events
- follow implementation and execution using a relevant and agreed dashboard.

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Results - Framework

The framework outlined below was constructed by the focus team and later validated 'externally' from the focus team.

Workplace	Investigation	Prevention	Safety Gemba
PPE usage 5S + Safety Tool box talks	Safety root cause analysis Linked to current improvement methods	Safety promotions Safety culture assessment Development talks	'Learn to see safety' within VSM Create/Improve Safety Gemba

Management

Shared understanding
Participate in Safety Gemba and investigations
'Outside in' reviews
Reporting trends and statistics

Results - Framework

Workplace (W)	Investigation (I)	Prevention (P)	Safety Gemba (SG)	Management (M)
Process of investigation	Root cause analysis	Risk assessment	'Learn to see' safety within Value Stream Map	'Shared understanding
First-aid competence	Reporting authorities	Personal protective equipment	Create GEMBA flow	Participation Gemba + Investigations
Personal protective equipment usage	Key tools	Toolbox talks concept creation	Improve GEMBA flow	Dashboards
Risk assessments complete	Key competences	Development talks	Forcefield Analysis	'In house' review
Goals agreed and followed	Improvements link to current methods	Safety promotions		Management reporting/ trends/statistics
Top three safety priorities	Next steps: Re-evaluate / Risk Assess	Daily safe feeling		Walkthrough of KPIs
KPIs in place		Culture assessing tool		'Outside in' review
Toolbox talks completed		Hiring for safety		Committee assembly and attendance
Safety engagement surveys		Design for safety		Work with HR
5S + Safety				

Figure 30 - Framework overview including all the elements in each of the 5 focus areas.

Framework – Implementation example

Investigation activity	Month 1-3	**Root cause analysis**
		Working with root cause analysis entails having a questioning attitude, a creative sense of shared vigilance, watching out for each other, having a proactive learning culture.
		Reporting authorities
		Make sure routines are in place and well known regarding how reporting to authorities takes place. Utilize the coaching nature of the authorities to strengthen safety culture.
	Month 4-6	**Key competences**
		List the key required safety competences, work through resource issues with management, be sure to have at least minimum numbers in place and resources to cover all working hours.
		Key tools
		Many basic tools can be combined to create unique specific safety root cause analysis tools. These are available through networking, google etc.
		Improvement link to current methodologies
		Connecting Safety improvement to existing improvement methods will help adapt/integrate mindset and reduce resistance.
	Month 7-12	**Next steps: Re-evaluate/Risk assess**
		Utilize the output of investigations to re-evaluate risks and existing risk assessments. The severity of accidents will remain high unchanged unless specific design/process changes are implemented, focus initially on recurrence reduction.

Figure 33 – Investigation elements and implementation plan

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Issue background | Fish bone | HERCA

Issue background

Problem background:

What happened?

When does it happen?

Who was involved?

Where did it happen?

Which customer was involved?

Which supplier was involved?

What recent changes were made in the process?

Has the sequence of events been clarified?

Can a timeline analysis benefit the investigation?

Task analysis

How should work have been done?	What pre-requisites are in place?	What instructions etc?

Change analysis

Barrier analysis

What physical control barriers are in place (poka-yoke)?	What administration barriers are in place?

Agreed output of Task, Change and Barrier analysis:

Fish bone

Man

Machine

Material

Problem:

Measurement

Method

Environment

Main prioritised output of fishbone exercise:

5 why

Why?

Why?

Why?

Why?

Why?

Comments to 5 why analysis:

Agreed output of 5 Why analysis:

HERCA

Problem area		Common actions	
Competence			
1.1 Lack of training		One-point lesson	
1.2 Lack of understanding of instructions/process		Visual aid	
1.3 Lack of experience		Training	
1.4 Lack of repetitive training			
1.5 Long absence from workplace/workstation			
Work instructions			
2.1 Instruction is unclear		One-point lesson	
2.2 Instruction is not complete		Work instruction	
2.3 Instruction is missing			
Work environment			
3.1 Sound problems, light problems, temperature, vibration, ergonomy…		Improvement program	
Work process			
4.1 Process is not capable		Supplier development	
4.2 Process can easily be carried out incorrectly (missing Poka Yoke)		Poka Yoke	
4.3 Material supplied to the process is of poor standard/quality/incorrect		One-point lesson	
		Work instruction	
		Improvement	
Work organisation			
5.1 Work volume too high		Improvement	
5.2 Workplace is not correctly organised		Work instruction	
5.3 Workplace organisation is not followed			
Technical problems			
6.1 Equipment and tools incorrect for the task		Poka Yoke	
6.2 Machine/tools poorly constructed		Improvement	
6.3 Lack of base condition (maintenance) of the machine			
6.4 Tools are not available for the task			
Problem to follow work instruction			
7.1 Operator made mistake due to lack of attention		Discussion with operator, involve HR	
7.2 Operator did not follow work instruction		when necessary	
Personal situation			
8.1 Operator is over-stressed		Discussion with operator, involve HR	
8.2 Operator is over-tired		when necessary	
8.3 Operator has health problems			
8.4 Operator not engaged in the task/work			
8.5 Other issues - alcohol, depression etc			

Comments to HERCA:

Agreed output of HERCA:

Execution steps

	Who	When		Who	When		Activity	Who
Develop Poka Yoke			Discuss with operators			Thinking beyond the fix (Y / N)		
Carry out improvement			Evaluate / screen solutions			Benefit / effort approved (Y / N)		
Create and train - work instructions			Address risks			Root cause actions deemed preventive (Y / N)		
Create and train - one-point lesson			RCA documentaton/archive			Is Quality or Control plan updated (Y / N)		
Implement visual aids			RCA comparison/link to other RCAs					
Execute training			Other: specify					
Develop supplier								

RCA overview (circle Y or N)

Financial data:

Relevant finance notes:	
Quantify the relevant costs	
Material	
Extra work	
Transport	
Other (Specify)	
Total	

Approved by:

Date:

Responsible for RCA execution:

Responsible for RCA information publishing and archiving:

Further notes:

Critical input: Management

The focus of the management element is support and participation. Building the guiding coalition through organisation layers, building and improving the vision and supporting execution of that vision are all interlinked with each of the earlier framework elements. To avoid unclarity, there needs to be strong operational definitions in all areas of safety and a determination to promote correct companywide behaviour-based safety.

Management activity	Month 1-3	"Shared understanding"
		The most vital concept - to create an environment that is physically, socially and emotionally safe. Having shared respect, knowledge and values is the foundation for safety culture.
		Participation in Gemba + Investigations
		Management needs to show their regular willingness to take part in the 'daily life' in both GEMBA and safety investigations. This is needed to understand the underlying root causes and see reality as it is, not as conference room-based management imagine it to be.
		Dashboards
		There needs to be safety dashboards - showing all the agreed and operationally defined relevant measurements, both leading and lagging.

Discussion

- A key element ignored?! – Less than 10% of companies interviewed mentioned the psychological aspect of 'white collar burnout'. In Sweden in 2018, 770 people died of work-related. This is significantly more than safety related accidents. In the framework this is mentioned in the prevention section regarding development talks.

- Each company also showed clearly defined targets and strategies, and all had different ways to get there. This is due partly to global organizations demands and also adapting to ideas/philosophies grown from past experience/incidents/accidents.

- Most attribute the development of safety culture in Sweden to the fact the Arbetsmiljöverket (Swedish Labour Authority) takes an active role in investigations and are willing to coach and support in most areas of occupational health and safety.

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Own Experience

Currently responsible for Manufacturing Operations in Gdansk in Poland and Supply Chain in Sweden – we started one year ago and have recently seen very good results.

Difficulties in implementation in Poland compared to Sweden –

- Poland is still a macho work environment – slowly changing, Covid has accelerated this development.

- Data tracking has been seen as a mgmt. view and not collected to benefit the factory floor. Also changing in recent time

Positives – Stress is talked about openly within the Operations team on a daily basis. Each of the staff (9 in Sweden and 5 in Poland) has their own individual action plan for stress and safety.

One example – the production manager in Poland takes a day off each month to 'take a helicopter ride' and look at the flows in the factory, the data, the issues and takes time to breath.

Safety

June			
No incidents or accidents	Near Miss	1st aid case	Lost time accident
27	1	2	0

July			
No incidents or accidents	Near Miss	1st aid case	Lost time accident
25	1	5	0

August			
No incidents or accidents	Near Miss	1st aid case	Lost time accident
30	0	1	0

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What is next?

Safety further work:

- The simple fact that the ratio of stress related fatalities compared to accident fatalities is nearly 15:1 (770:50) should awaken significant interest. Adapting the framework needs to be efficient and not border on over-production/over-safety, selling the framework into companies needs specific focused activities.

Padraic further work

- Applying for PhD studies in Krakow, in the area of management and finance with specific focus on Cost of Poor Quality. Soon launching www.copqacademy.com

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