

ISIR Journal of Business and Management Studies (ISIRJBMS)

ISSN: XXXX-XXXX (Online)

Frequency: Bimonthly

Published By ISIR Publisher

Journal Homepage Link- <https://isirpublisher.com/isirjbms-home/>

ISIRBMS Vol - 1 Issue - 1 (July-August) 2024



ANALYSIS OF SAFETY CULTURE AND ITS IMPACTS ON THE OPERATIONAL PERFORMANCE OF THE STEEL MANUFACTURING INDUSTRY IN UAE

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Article History

Received: 15/06/2024

Accepted: 12/07/2024

Published: 14/07/2024

Vol – 1 Issue – 1

PP: -68-77

Abstract

Understanding safety culture in the steel manufacturing industry in the United Arab Emirate can be a complex and challenging process due to various hurdles and factors unique to the industry and the region. This includes cultural diversity, language barriers, high employee turnover, resource constraints, rapid growth, hierarchy and reporting structures, cultural perception of risks, diverse safety regulations, supply chain safety etc. This study provides an overview of a comprehensive research study conducted on the Occupational Health and Safety (OHS) culture within the steel manufacturing industry in the United Arab Emirates (UAE), by conducting study in a steel manufacturing company operating in the Emirate of Abu Dhabi, UAE. The research aimed to understand the existing OHS culture, its impact on operations, and to recommend strategies for improving workplace safety in this critical sector.

INTRODUCTION

Considering the high risk nature of steel making process, employees in steel making industry poses several occupational health and safety risks. In order to ensure success of steel making process, every entity need to ensure those inherent risks are addressed with utmost importance with an approach of as much as practically possible in every aspect of operations. Safety culture can be described as the values, attitudes, behaviors, practices and beliefs that employees as well as entity demonstrate when it comes to ensuring safety as well as wellbeing of entire workforce and the stakeholders. A strong safety culture is shown by collective commitment to continuous improvement, effective communication, identification of hazards, assessing the risks and mitigating the risks. Learning from near miss incidents and accidents in order to avoid repetition is also important. In a situation where less priority provided to occupational health and safety, than other business factors, will eventually result in higher incident/injury rates, loss of employee morale, loss of reputation in market, asset losses to organization, legal interferences etc.

Focus and Scope of Research:

In this study we focus on the Safety Culture of Steel Manufacturing Entities and its impacts over the business of

those organizations. We have selected a Steel Manufacturing company in the GCC Middle East Region (United Arab Emirates). Poor communication and reporting, insufficient training and education, blame culture and lack of accountability, resistance to change and continual improvement initiatives etc resulting in incidents are the common prevalent issues which we want to analyze by conducting this study. Focus is specifically set and benchmarked against the steel manufacturing industries in the Middle East region (UAE). Research is intended to cover the employees working for the selected steel manufacturing company and they will be the targeted community to conduct the study.

Relevance and Importance of Research:

Steel manufacturing companies during its operations in the core process of steel making, poses occupational health and safety risk which are related to the gap in the safety culture of organization. Research on safety culture and its impacts over operation of organization can provide valuable insights and guidance to help solve prevalent safety problems in a steel plant. This study will help to analyze the gap in the safety culture of the selected company against the best industrial practices among other reputed steel manufacturing entities within the region and globally. This research can contribute to safety problem-solving by identifying the safety challenges,



analyzing root causes, assessing safety culture, recommending interventions, proposals for monitoring and evaluating and sharing industrial best practices. Right now there is limited researches published specifically focusing the safety culture of steel manufacturing industries in the GCC region. Several safety aspects; other than the ones covered in the previous studies; such as Change Management, Impacts over employees during Continual Improvement initiatives will be covered in this research. Considering the fact that, steel manufacturing industry is comparatively a new sector in the GCC region, especially in the UAE, study will lead to several aspects which are never covered industry specific.

Problem Statement:

Despite the increasing recognition of the importance of safety culture in the manufacturing industry, there remains a lack of comprehensive research examining its specific impact on the operations of steel manufacturing companies. This knowledge gap hinders the development of effective strategies and practices to enhance safety performance and operational efficiency in these organizations. Therefore, this research aims to investigate and analyze the influence of safety culture on the operations of a steel manufacturing company, with the goal of identifying key factors, barriers, and opportunities for improvement. By filling this research gap, valuable insights can be gained to guide the development and implementation of targeted interventions, policies, and training programs that promote a positive safety culture and contribute to enhanced operational performance in the steel manufacturing sector.

The research will focus on a specific steel manufacturing company in United Arab Emirates, located in the emirate of Abu Dhabi. The research aims to investigate the impact of safety culture on the operations of the organization. The research will be conducted in the context of the employees of the selected company operates at Abu Dhabi in the United Arab Emirates. The purpose of the research is to understand how safety culture influences operational efficiency and performance in the steel manufacturing sector; specifically for selected organization.

Aim of the Research:

The aim of this research is to assess the impact of safety culture on the operations of steel manufacturing entity. Specifically, the research aims to examine the relationship between safety culture and operational efficiency, identify key factors influencing safety culture within the organization, and explore the potential barriers and opportunities for improving safety performance and operational outcomes. By achieving these aims, the research aims to contribute to a better understanding of the role of safety culture in the steel manufacturing industry and provide insights to guide the development of strategies and practices that enhance safety culture and improve operational performance. Research aims to identify the critical factors that may impact the safety culture within the organization as well.

LITERATURE REVIEW

Review of existing literature and theoretical frameworks related to safety culture and its impacts on operations of Steel Manufacturing Industry.

In the literature review efforts are made to understand the Occupational Health and Safety Culture and impacts it makes in the steel manufacturing industry. Workers engaged in the steel making sector faces many occupational health and safety risks due to the operational nature of the process in iron and steel manufacturing industry which poses inherent risk of a high-risk industrial process. Working atmosphere in a steel manufacturing facility poses several occupational health and safety risks such as that of extreme temperatures, radiant heats, liquid metal spurting, handling of hazardous materials and chemicals, fires, explosions, nuclear radiations etc.

The term 'safety culture' first made its presence through a report in the 1987 Organisation for Economic Co-operation and Development Nuclear Agency report (INSAG, 1988) over the 1986 Chernobyl nuclear power plant disaster. Safety culture refers to the shared values, beliefs, attitudes, perceptions, and behaviors related to safety within an organization. It encompasses the overall safety climate and the collective norms and practices that shape how safety is prioritized, communicated, and managed within the workplace. A positive safety occupational health and culture within an organization is characterized by factors such as leadership commitment, employee involvement, effective communication, continuous learning and improvement, hazard identification and risk management, accountability towards safety. Safety culture has a significant impact on the performance of a steel manufacturing industry in the UAE. Some ways in which safety culture impacts the overall performance of an organization are reduced accidents and incidents, enhanced employee morale and engagement, improved operational efficiency, cost savings, compliance with legal regulations and standards and positive reputation with business opportunities.

To realize these benefits, steel manufacturing companies in the UAE should invest in safety leadership, employee training, clear communication channels, regular safety audits, and the establishment of a reporting and learning culture. Continuous evaluation and improvement of safety practices are essential to ensure the ongoing positive impact of safety culture on industry performance.

Rafiq M Choudhry (The nature of safety culture: A survey of the state-of-the-art 2007) explains safety culture of any organisation as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management." It can also be defined as, safety culture is a collective set of values, beliefs and behaviours that shape an organization's approach to safety.

Gerard Zwetsloot and Jakko van Kampen (Ranking of process safety cultures for risk-based inspections using indicative safety culture assessments, Journal of Loss Prevention in the

Process Industries 2020) explains safety culture as "the way things are done around here with respect to safety." This definition prominence the importance of organizational norms and practices in developing a positive organisational safety culture. A positive safety culture is characterized by a strong commitment to safety, open communication about safety issues, learning from mistakes and incidents, empowerment of employees to take safety actions, and continuous improvement in safety practices. It is crucial for organizations to foster a positive safety culture as it can have a significant impact on preventing accidents, incidents, and injuries in the workplace. Creating and maintaining a safety culture often requires ongoing efforts from leadership, employees, and all stakeholders involved.

Guldenmund, Frank. (2010) in the work "Understanding and Exploring Safety Culture" explains organisational safety culture as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organization's health and safety management." This explanation matches with the one of Choudhry et al.'s definition and emphasis the importance of both individual and organizational factors in developing an organisational safety culture. Overall safety culture refers to the collective attitudes, beliefs, perceptions, and values shared by members of an organization or a group regarding safety. It encompasses the overall safety-related behaviors, practices, and norms that influence how individuals and groups within an organization perceive and manage safety risks.

According to M.D.Cooper Ph.D (November 2000) in his article "Towards a model in safety culture" outlines "To greater or lesser degrees, accident causation models recognize the presence of an interactive or reciprocal relationship between psychological, situational and behavioral factors". Safety culture reflects the shared understanding of the importance of safety and the extent to which safety is prioritized and integrated into daily operations and decision-making processes. Heinrich et al. (1980) observed the interactive relationship between behaviour, situations and personal factors at the operator level.

With reference to Tsung-Chih Wu, Chia-Hung Lin, Sen-Yu Shiau (October 2010) in their article "Predicting safety culture" as the the capability of an employer to define and set the safety rules by which the organization operates, to use their strength to reward or to punish and to review staff behavior. Power is a capability to influence other team members or decision-making process. Therefore, employer's can use their power to require employees to meet occupational health and safety targets and to reward or to take disciplinary measures against employees for their safety-related behavior. Safety culture is mentioned as employers' occupational health and safety leadership (safety monitoring, safety training, and safety controlling) predicts safety culture of that organization. Safety interaction refers to the directions, guidance and advice given by managers as a part of executing organization's occupational health and safety plans and programs.

Theories of Safety Culture:

Safety culture in the manufacturing industry refers to the shared values, beliefs, attitudes, and behaviors related to safety within an organization. It involves how safety is perceived, prioritized, and integrated into the daily practices and decision-making processes. There are several theories and models that attempt to explain and improve safety culture within manufacturing industries. Some of the important theories of safety culture includes

Haddon's Theory of Safety: Developed by William Haddon Jr., (Haddon W. Advances in the epidemiology of injuries as a basis for public policy 1980) this theory focuses on understanding and preventing accidents through three phases: pre-event, event, and post-event. The theory emphasizes that safety should be integrated into the design of processes, equipment, and systems rather than relying solely on post-incident responses. The theory emphasizes that safety measures should be implemented throughout all stages, rather than just focusing on responses after an incident has occurred. It is widely applied in various fields, including the manufacturing industry, to enhance safety practices and prevent accidents. This theory promotes a comprehensive and proactive approach to safety management by integrating safety measures into the design and operation of manufacturing processes. It emphasizes learning from past events to continuously improve safety practices and prevent accidents from recurring.

Swiss Cheese Model: Developed by James Reason (Diagnosing "vulnerable system syndrome": an essential prerequisite to effective risk management-2001), this model likens the layers of defense in an organization to slices of Swiss cheese. Each layer may have holes (weaknesses), but if the holes in multiple layers align, an accident can occur. By improving each layer's effectiveness, the likelihood of accidents can be reduced. The model is designed to explain how accidents and incidents can occur despite multiple layers of defense and safeguards being in place. It likens the layers of defense to slices of Swiss cheese, which have holes or weaknesses.

The main idea behind the Swiss Cheese Model is that each layer of defense in a complex system has its own inherent weaknesses or flaws (represented by the holes in the cheese). These weaknesses can sometimes align or coincide, creating a clear path for an accident or error to occur. When the holes align, they create a "trajectory" that allows the accident to pass through all the layers of defense and cause harm. There are seven key elements in Swiss Cheese model.

Safety Pyramid: Proposed by Herbert William Heinrich (Industrial Accident Prevention: A Scientific Approach 1931). This model represents a hierarchy of accidents, ranging from minor incidents to more severe ones. The pyramid suggests that for every major accident, there are several minor incidents and near-misses. By addressing and learning from the minor incidents and near-misses, organizations can prevent major accidents. The Safety Pyramid, also known as the Heinrich Safety Pyramid or the Haddon Safety Pyramid, is

a graphical representation that illustrates the relationship between the number of incidents and their severity in a workplace or any other system. The pyramid is based on Heinrich's research on workplace accidents and injuries and is often used as a tool to understand the frequency and severity of incidents within an organization. It includes key features such as Pyramid base layer, middle layer and top layer. At the base of the pyramid we find the largest number of incidents, often referred to as "near-miss incidents" or "unsafe acts." These are events where no actual harm or injury occurred but had the potential to cause harm. Near-miss incidents serve as warning signs and provide valuable opportunities for organizations to identify potential hazards and improve safety measures. The middle layer represents incidents resulting in minor injuries or property damage. These are often referred to as "first aid" or "minor incidents." While the severity is higher than near-miss incidents, the injuries or damages are relatively minor and do not result in significant harm or loss. The top of the pyramid represents the most severe and least frequent incidents, such as major accidents resulting in serious injuries, fatalities, or significant property damage. These incidents are relatively rare, but their consequences can be severe and have a significant impact on individuals and the organization.

The Safety Pyramid implies that for every major accident (top layer), there are several minor incidents (middle layer), and even more near-miss incidents (base layer). Heinrich's research suggested that for every major accident, there were approximately 30 minor incidents and around 300 near-miss incidents.

Behavior-Based Safety (BBS): Developed from work of Herbert William Heinrich (Industrial Accident Prevention: A Scientific Approach 1931) and Best explained by Dr. Beth Sulzer-Azaroff (Chapter-Behavioral Approaches to Occupational Health and Safety from "Handbook of Organizational Behavior Management" by Frederickson). While not a comprehensive theory, BBS focuses on the role of individual behavior in safety. It suggests that by observing and addressing at-risk behaviors and reinforcing safe practices, safety culture can be improved. Behavior based safety is a safety management approach and theory that focuses on the role of individual behavior in preventing workplace accidents and promoting a positive safety culture. It was developed in the 1970s and has been widely adopted by organizations to improve safety performance and reduce incidents. BBS is based on the premise that human behavior is a significant contributing factor to workplace safety, and by understanding and modifying behavior, the risk of accidents can be reduced. Key factors in behavior based safety includes observation and feedbacks, positive reinforcement, data collection and data analysis, goal setting, training and education, employee involvement and continuous improvement.

Safety Culture Models within Organization:

Safety culture models are frameworks or theories that aim to understand, assess, and improve the safety culture within organizations. Safety culture refers to the shared values, beliefs, attitudes, and behaviors related to safety that are

prevalent among the members of an organization. Having a positive safety culture is essential for promoting safe practices, preventing accidents, and ensuring the well-being of employees. Several safety culture models have been developed to help organizations analyze and strengthen their safety culture. Some of such safety models are

Hudson's Safety Culture Model: This model is developed by Michael A. Hudson (2001) as a comprehensive framework that aims to understand and assess safety culture within organizations. With reference to work by Anastacio Pinto Goncalves. (Safety Culture Maturity and Risk Management Maturity in Industrial Organizations 2012). The model identifies six key dimensions that contribute to an organization's safety culture. By analyzing and addressing each dimension, organizations can work towards creating a positive safety culture that fosters safe practices, reduces accidents, and enhances overall safety performance. The six dimensions of Hudson's Safety Culture Model are

- Leadership and management commitment to safety
- Employee involvement and empowerment
- Organizational learning and continuous improvement
- Communication and information sharing
- Safety policies, procedures, and systems
- Safety climate and worker perceptions

The Safety Culture Ladder: The Safety Culture Ladder, also known as the Veiligheids ladder, is a safety management system and maturity model that was developed in the Netherlands by the Dutch Social and Economic Council (SER) 2012. The Safety Culture Ladder provides a framework for assessing and improving the safety culture of organizations. It is used to evaluate the safety awareness, behavior, and safety management practices within an organization. The main objective of the Safety Culture Ladder is to stimulate continuous improvement in safety culture and promote safety consciousness throughout the organization. The Safety Culture Ladder is often used by companies in various industries to benchmark their safety culture performance, set improvement goals, and enhance their safety management systems. It encourages organizations to move from a reactive approach to safety towards a more proactive and integrated safety culture. The model consists of five levels, each representing a different stage of safety culture maturity, such as Ad hoc, Managed, Proactive, Dynamic and leading.

Zohar's Safety Climate Model: Zohar's Safety Climate Model, developed by Elyahu I. Zohar (1980), is a theoretical framework that focuses on safety climate within organizations. Well explained by MD Cooper (Exploratory analysis of the safety climate and safety behavior relationship – Journal of Safety Research 2014) Safety climate refers to the shared perceptions, attitudes, and beliefs of employees regarding safety in the workplace. It reflects the prevailing safety culture within the organization and how safety is perceived and valued by its members. The model highlights the importance of safety climate in influencing safety

behaviors and outcomes. Zohar's Safety Climate Model emphasizes the role of perceptions and beliefs in shaping safety-related behaviors. When employees perceive that safety is a priority, valued, and actively supported by management, they are more likely to engage in safe practices and adhere to safety protocols. Key elements of Zohar's safety climate model are

- Management's commitment to safety
- Priority of safety in decision-making
- Employee involvement in safety
- Communication and feedback about safety

DuPont Bradley Curve: The DuPont Bradley Curve, also known as the DuPont Safety Journey, is a safety culture model developed by Bradley in 1995, a multinational conglomerate known for its strong safety programs and practices. The model is named after Donald K. Bradley, who was an executive at DuPont and played a key role in advancing the company's safety culture. Referred from work by Malgorzata Jasiulewicz-Kaczmarek (Behaviour based intervention for occupational safety – case study 2015) The DuPont Bradley Curve is designed to illustrate the different stages of safety culture maturity and the corresponding safety performance within an organization. The DuPont Bradley Curve is designed to encourage organizations to progress through the stages toward higher levels of safety culture maturity. It helps organizations identify where they currently stand in terms of safety culture and provides a roadmap for improvement. Moving along the curve involves leadership commitment, employee engagement, continuous learning, and the integration of safety into all aspects of the organization's operations. It has five stages with different levels of safety culture and safety performance of the organization:

- Stage 1: Reactive - Focused on compliance and incident response.
- Stage 2: Dependent - Beginning to implement proactive safety measures.
- Stage 3: Independent - Emphasizing personal responsibility for safety.
- Stage 4: Interdependent - Safety becomes an integral part of the organizational culture.
- Stage 5: Sustaining - Safety is fully integrated into all aspects of the organization.

Health and Safety Executive (HSE) Safety Culture Model:

The Health and Safety Executive (HSE) Safety Culture Model is a framework developed by the UK's Health and Safety Executive to help organizations assess and improve their safety culture. Reference to "Common Topic 4 Safety Culture – Extract from Inspectors Human Factor Toolkit" from HSE UK. The model provides a structured approach to understanding the factors that influence safety culture within an organization and offers guidance on developing a positive safety culture. This model consists of six core elements, each representing a key aspect of safety culture: Leadership, Worker involvement, Competence, Communication, and Coordination.

METHODOLOGY

A survey has been conducted among the workers of a steel company located in the emirate of Abu Dhabi, UAE. A questionnaire was prepared with questions based on specific elements of the Safety Culture and distributed among employees at different levels. Attendees were required to respond to questions based on Likert scale quantification technique. Likert scale is a commonly used psychological and social research tool used to measure attitudes, opinions, and perceptions of individuals regarding a particular subject or topic. Likert scale consists of a series of statements or questions related to a specific topic, and respondents are asked to rate their level of agreement or disagreement with each statement. The scale usually ranges from 1 to 5. That is

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Attendees select the response option that best reflects their opinion regarding each statement. We can then analyze the aggregated data to understand trends, attitudes or opinions within different level of employees of steel melt shops and steel factories.

Sample Population

Employees working with a steel plant at Abu Dhabi has been chosen to conduct study. A Questionnaire is prepared, distributed and feedbacks were taken among those employees which includes employees from different levels. There were total 30 respondents in the study and were permanent employees of selected plant. Employees were within an age range of 20 years and 55 years with different steel industry work experiences starting from 6 months upto 32 years.

Data Collection Tool

A questionnaire is prepared with two section. First section includes the demography of the respondents and occupational health and safety culture. Second section consists of questions with five point responses based on Linkert Scale which ranges from "Score 1: Strongly Disagree" upto "Score 5: Strongly Agree. Seven elements of occupational health and safety culture were included in the safety culture questionnaire which consists of

- Occupational Health and Safety Management System and Procedures
- Commitment of Management
- Occupational Health and Safety Attitudes
- Co-worker's Influences
- Involvement of Employee
- Knowledge of Health and Safety
- Safety Behavior

Feed backs from the study through questionnaire are compiled and analyzed through a spread sheet.

Data Analysis

Survey Population Analysis

Survey Population Data collected from the survey are mentioned in the table below

Sr. No	Age Group	Respondents	Percentage
1	20-30	11	36.66 %
2	31-40	16	53.33 %
3	41-50	3	10 %

Sr. No	Educational Qualifications	Respondents	Percentage
1	Secondary School / Higher Secondary	9	30 %
2	Diploma / Technically Skilled	7	23.33%
3	Graduates	10	33.33 %
4	Masters and Above	4	13.33 %

Sr. No	Years of Experience in Steel Manufacturing Industry	Respondents	Percentage
1	5 Years or below	11	36.67 %
2	6 to 10 Years	9	30 %
3	11 to 20 Years	8	26.667%
4	21 Years and above	2	6.67 %

Above demographic data regarding age group provide an insight to the outcome of study conducted to analysis the Occupational Health and Safety Culture of Steel Company and the impacts over the operations and business of the organization. It is evident that the majority of survey population lays in the age range of 31 to 40 years which is 53.33% of the survey population, which is considered to be young and well as adequately experienced as per best industrial practices. This is followed by the age group of 20 to 30 years consists of 36.66% and the age group of 41 to 50 years which consists of 10% .

When we analyze the educational qualifications of survey population it can be seen that majority of the respondents falls in the category of Graduation which is 33.33% of the survey population. That is followed by Secondary School / Higher Secondary at 30%, Diploma/Technically Skilled qualification of 23.33 and Masters of above 13.33% of survey population. This gives a clear indication that the respondents are with sufficient technical knowledge and skills to evaluate the prevailing safety culture within organization for our study.

Analysis of experience shows that the majority of respondents are of an experience range of 5 years or below in the steel manufacturing industry consists of 36.67% of survey population. This includes service with selected steel company

and previous employers with similar scope of operations. Employees with a steel manufacturing industry experience of 6 to 10 years falls just below the earlier mentioned category with a representation of 30%, followed by experience group of 11 to 20 years with 26.67% and 21 years or above with representation of 6.67%.

Occupational Health and Safety Culture Survey Analysis (Likert Scale)

Second section of survey questionnaire consists of attendees’ response to the occupational health and safety culture of selected steel company. It has been recorded in a five point Likert Scale mechanism and outcomes are compiled and analyzed with the help of a spread sheet.

A) Occupational Health and Safety Management System and Procedures

In this element questions with regards to the existing occupational health and safety management systems and procedures (OSHMS) are included. This includes five vital questions as below

- 1) Do you agree that employees are aware of the company's occupational health and safety policies and procedures?
- 2) Do you agree that employees are familiar with the process for reporting workplace incidents, accidents, or near misses?
- 3) Do you agree that safety signs, labels, and warnings clearly visible and understandable in the workplace?
- 4) Do you agree that employees are consulted and involved in the development and improvement of safety procedures and policies?
- 5) Do you agree that there are mechanisms in place to monitor and measure the effectiveness of safety procedures, and are improvements implemented based on these assessments?

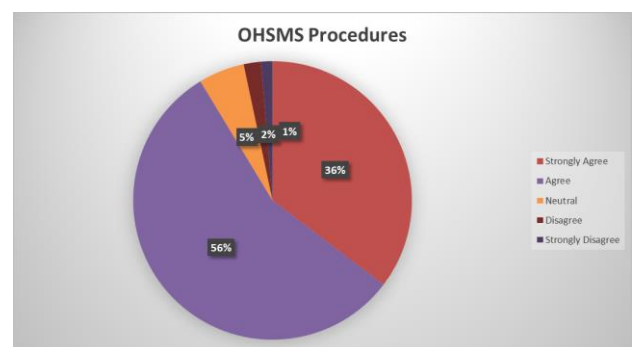


Figure 1 – Safety Management System and Procedures

Figure 1 gives us a clarity that majority of attendees (92%) agree with the efficiency and adaptability of occupational health and safety management system and procedure of selected steel company, while 5% responds as neutral while 3% disagree with the efficiency of OHSMS and procedures. Local legal guidelines seems making a positive impact on developing and implementing system.

B) Commitment of Management

The second element in the survey questionnaire consists of five questions related to the employee outlook with regards to Management Commitment towards Occupational health and safety standards within the organization. That consists of questions such as

- 1) Do you agree that management actively promoting and communicating their commitment to safety?
- 2) Do you agree that adequate resources (financial, personnel, equipment) are allocated to support health and safety initiatives by the Management of company?
- 3) Do you agree that employees are encouraged to participate in safety committees or initiatives by the Management?
- 4) Do you agree that members of the management team consistently adhere to safety policies and procedures themselves?
- 5) Do you agree that there is an active and timely response of management to safety incidents by implementing changes to prevent future occurrences?



Figure 2 – Management Commitment towards Health and Safety

Figure 2 illustrates the perception of employees towards the Commitment of Management towards health and safety. Majority of employees (46%) disagrees with the management commitment towards occupational health and safety, while 42% of employees agrees with management commitment and 12% remains neutral. It has been noticed that lack of resources provided by management to achieve OSHMS procedures seems a major concern from respondents responses.

C) Occupational Health and Safety Attitudes

Third element in questionnaire consists of questions related to safety attitudes among employees. These questions can help us to gauge the attitudes of employees towards occupational health and safety in the workplace. Below are questions for this element

- 1) On a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree, how would you rate the overall safety culture in organization?

- 2) Do you agree that each employee has a personal responsibility to ensure their own safety and the safety of their colleagues in the workplace?
- 3) Do you agree that employees are not hesitated to report a safety concern or incidents without worries of potential repercussions?
- 4) Do you agree that the safety measures and policies in place are sufficient to protect employees?
- 5) Do you agree that you have received adequate training and information regarding safety procedures and hazard identification in your role?

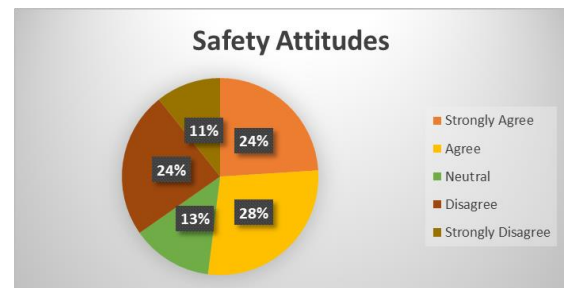


Figure 3 – Safety Attitudes

Figure 3 shows the outlook of employees towards safety attitude in the prevailing safety culture within company. Thirty five percentage of the survey population disagrees with the safety attitude within the organization, while 13% stays neutral and 52% employees agrees of positive safety attitudes within organization. It was noticed that few employees disagree with the concern of reporting incidents to higher levels due to possible repercussions. This shows that at certain cases atleast incident reporting and investigations leads as a fault finding tools and to identify the defaulter, more than root cause analysis and system revision.

D) Co-worker's Influences

Fourth element which we addressed in the survey questionnaire among employees of selected organization was influence of co-workers within the organization. These questions can help us to assess the role of coworkers in influencing safety behaviors and practices within the organization. It's important to understand the dynamics of peer influence, both positive and negative, to evaluate its impacts over company's safety culture. This includes vital questions like

- 1) Do you agree that your coworkers follow safety procedures and practices at work?
- 2) Do you agree that you feels comfortable to discuss safety concerns with your coworker?
- 3) Do you agree that there is no pressure from coworkers to bypass safety protocols or take risks at work?
- 4) Do you agree that your coworkers have moral as well as physical impact on safety incidents or near misses are reported?

- Do you agree that you and your coworkers have collaborated to improve safety in your work area?

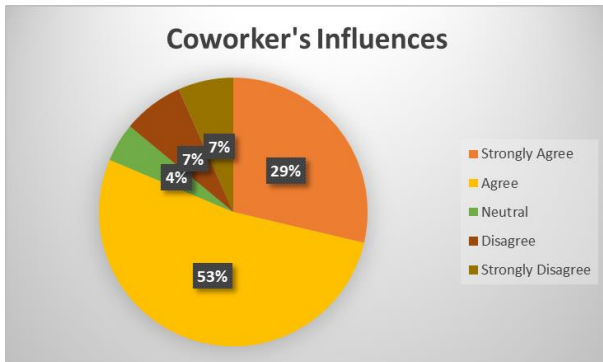


Figure 4 – Coworker’s Influences

Figure 4 clearly states the employees’ perception of influence by their workmates. Majority (82%) believes and agrees with the questions, while 4% remains neutral and 14% disagrees with the questions over coworkers influences. It shows that there is significant positive impact by workmate’s influences over the safety culture within the organization.

E) Involvement of Employees

Fifth element of the safety culture questionnaire was with regards to the employee involvement. These questions can help us to understand and assess the level of employee involvement in safety-related activities and initiatives, which will make crucial impact over culture of safety in the workplace. That includes question like

- Do you agree that employees are interested and given opportunity of being a member of a safety committee without any prejudice or favors?
- Do you agree that you feel comfortable reporting safety concerns or hazards to your immediate supervisor or safety professional?
- Do you agree that employees are given equal opportunity to become attendees of safety training programs or part of safety campaigns without any favoritism?
- Do you agree that you were able to suggest safety improvements or innovations; without any repercussions; in your activities/processes?
- Do you agree that you were able to gain useful insights and knowledge from the trainings, drills, campaigns etc with regards to safety at work?

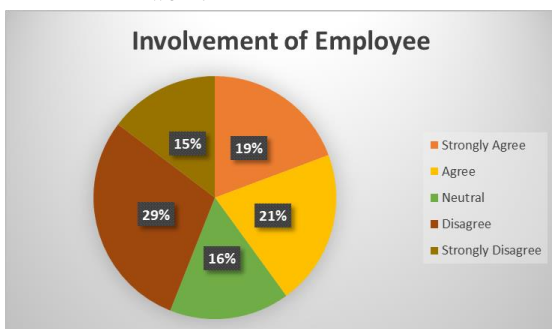


Figure 5 – Involvement of Employees

Figure 5 illustrates response of employees towards their involvement in the development of safety culture in company. Forty-four percentage of respondents believes that involvement of employees in safety concerns are not appreciable due to the safety culture while 40% believe that there is a positive involvement from employees in health and safety matters. 16% respondents stayed neutral. This will be interconnected with Management Commitment towards health and safety, as it is the major vision in implementing and maintaining health and safety standards at field level.

F) Knowledge of Health and Safety

Sixth element of questionnaire consists of questions with regards to the knowledge of employees in health and safety. These questions support us in the study to gauge the safety knowledge and awareness of employees. Questions recorded in this element to respondents are

- Do you agree that you are familiar with the company's safety policies and procedures?
- Do you agree that you are confident in your ability to identify potential safety hazards in your work environment?
- Do you agree that you are aware of proper procedures to follow in case of a workplace emergency, such as a fire, chemical spill, or medical incident?
- Do you agree that you have received safety training relevant to your job role?
- Do you agree that you have received sufficient knowledge and effectiveness of the safety training you've received from company?

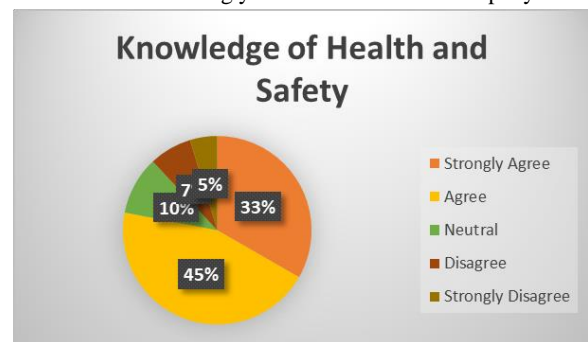


Figure 6 – Knowledge of Health and Safety

Figure 6 gives us a clear picture of knowledge among employees regards to Occupational Health and Safety and its impacts over safety culture within the organization. 78% of respondents believes that the knowledge imparted and gained among work force with regards to safety at work is worthy and they are largely impacting the safety within the organization. 10% remains neutral while 12% disagrees with the level of knowledge obtained will working in the prevailing health and safety culture.

G) Safety Behavior

The last element of questionnaire consists of questions on Safety Behavior of employees within the organization. These questions can help us to assess the safety behaviors of employees and their willingness to actively participate in

creating a safer work environment within the organization. This includes questions like

- 1) How do you agree that you adhere to safety procedures and guidelines in your daily work?
- 2) Do you agree that you were comfortable in officially reporting safety incidents, near misses, or hazards in your service with the company?
- 3) Do you agree that you consistently use the required safety equipment and personal protective gear while performing your job tasks?
- 4) Do you agree that you have intervened or spoken up when you observed a coworker engaging in unsafe behavior, in your service with the company?
- 5) Do you agree that safety should be an ongoing effort for improvement rather than just compliance with rules?



Figure 7 – Safety Behavior

Figure 7 illustrates level of agreement towards the safety behavior prevailing in existing safety culture. Majority of respondents (78%) believe that the safety behavior prevailing within the culture is worthy while 10% remains neutral and 12% of respondents does not agree with level of safety behavior within company.

Conclusion

Analysis of Safety Culture and its Impacts on the Operational Performance of the Steel Manufacturing Industry in UAE has been done as a case study by selecting a steel Meltshop situated in the emirate of Abu Dhabi, United Arab Emirates. Objective was to investigate how the prevailing safety culture within the selected organisation impacts its operations and businesses. The conclusions mentioned here are based on a questionnaire prepared based on seven main elements of occupational health and safety culture in the manufacturing industry. Those elements are Occupational Health and Safety Management System and Procedures, Commitment of Management, Occupational Health and Safety Attitudes, Co-worker's Influences, Involvement of Employees, Knowledge of Health and Safety among Employees and Safety Behavior of employees.

Based on the outcomes received from the study through surveys it shows that the respondents perception is generally

appreciable and positive in terms of Occupational Health and Safety Management System and Procedures, Co-worker's Influences, Occupational Health and Safety Attitudes, Knowledge of Health and Safety among Employees and Safety Behavior of employees. Outcomes from the elements such as Commitment of Management and Involvement of Employees within the organization seems to be negative. This gives us a picture that the management commitment of the organization still needs to be improved as this gives the perception and confidence of leading as examples being management. As an after effect, employee involvement also seems to be negatively impacted, which reduce of limit of their role in positively contributing to the betterment of occupational health and safety culture of the organization.

Recommendations

Outcomes of the study conducted on the selected organization, provides light to the areas management needs to focus for the betterment of occupational health and safety culture. Active involvement of management in health and safety concerns will improve the situation. Management can involve as leading by example and improve the resources provided for ensuring a safer workplace. This will enhance the morale of employees as well as will increase their involvement in identifying and highlighting safety concerns throughout operations.

Management can prepare an action plan for immediate measures as well as long term to increase their involvement in health and safety concerns. Measures such as forming an efficient employee committee to discuss health and safety concerns, conducting events to improve team work among employees on the topic of health and safety all will help. Such committees will help employees to raise the safety issues faced by them at work and they can propose measures from their operational experience with selected companies, as well as their previous experiences. Consider bringing in external safety experts or consultants to provide fresh perspectives and recommendations. For eg : DuPont Safety Consultants. Compare safety performance with steel manufacturing industry benchmarks to identify areas where improvements are needed. Allocate sufficient resources including budget, time and dedicated staff to prioritize safety initiatives. Encourage managers and leaders to periodically walk the shop floor, talk to employees about safety concerns and offer support and guidance to ensure them with commitment of management as well as to improve employee involvement.

For improving employee involvement towards occupational health and safety, Management can initiate an appreciation system for safety performance by employees. Appreciations like Safety awards and safest employee of the month etc. Offering comprehensive safety training programs for all employees will ensure their involvement and that they understand the importance of safety and are aware of the specific hazards in the steel manufacturing process. Implementation of an easy-to-use system for employees to report safety concerns, near-misses, or hazards and ensure that these reports are reviewed promptly and appropriate actions are taken. Involve employees in incident investigations to gain

their perspective on what went wrong and how similar incidents can be prevented in the future. Involve employees in the development of job safety analyses and risk assessment procedures, as employees are the ones with practical experience and can provide valuable insights into potential hazards and safe work procedures. It is required to establish open lines of communication between management and employees regarding safety matters and regularly share safety updates, incident reports and safety goals with all employees. Set up a suggestion box where employees can anonymously submit safety improvement ideas. Celebrate safety milestones such as the achievement of a certain days of “Lost Time Injury Free Manhours” as a way to recognize and reinforce the importance of safety. Consider including safety performance as a component of employee performance evaluations.

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