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APPLICATION OF MINTZBERG STRATEGIC MODEL IN INDUSTRIAL JOB HAZARD ANALYSIS

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Introduction

Health Safety and Environment (HSE) is a key performance indicator in almost all industries and corporates. According to National safety council (NSC) of USA, every 7 seconds a worker is injured in job and 1.04E8 man-hours lost due to work related injuries during the year 2016 (1). Especially in oil and gas industries, HSE related incidents, its investigations, maintenance and compliances are given very high importance. HSE policy, standards, procedures and compliance requirements are strictly followed in all stages right from the basic design. Job Hazard Analysis (JHA) is an important action as work place safety. As per industrial practice, JHA is performed as part of Permit to Work (PTW) procedure. OSHA 3071 (2) defines "*JHA is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment".* As per procedure, JHA conducted by a team consist of operating authority, safety, permit controller along with performing authority and operating authority leads the team. Industries adopt their own methodology, elements and format to perform JHA based on the teams past experience. The ET Energy World reported that during the three financial years 2014-15, 2015-16 and 2016-17, 309 accidents occurred in the oil and gas PSUs resulting in 81 fatalities and injury to 193 persons in India. Table (1) summarizes the major on-site accidents in India's oil and gas sector from financial year 2014-2015 to 2016-2017 provided by standing committee on petroleum and natural gas. Hence, there is definite need for further improvement in control measures to reduce industrial accidents. As a scope of improvement, this paper describe a new approach for JHA using famous management theory called Henry Mintzberg (3) strategic thinking.

Company	Accidents	Fatalities	Injured
HPCL	149	20	61
ONGC	85	15	39
GAIL	5	25	22
IOC	40	18	36
BPCL	11	2	17
OIL India	19	1	18
Total	309	81	193

Table (1) Number of Major accidents in Indias Oil & Gas sector from the financial year 2014-2015 to 2016-2017
Source: Standing committee of petroleum and Natural **Gas.**

Mintzberg strategic model

Mintzberg's concept of "strategy" or "strategic thinking" as "seeing" illustrated by seven key elements. The pictorial representation of Mintsberg strategic thinking is provided in Figure (1).

1. Seeing ahead: planning ahead.
2. Seeing behind: drawing lessons from the past;
3. Seeing above: seeing the big picture;
4. Seeing below: finding and understanding the root causes;
5. Seeing beside: thinking laterally;
6. Seeing beyond: expecting better futures with long range projections;
7. Seeing through: following up and following through the vision.

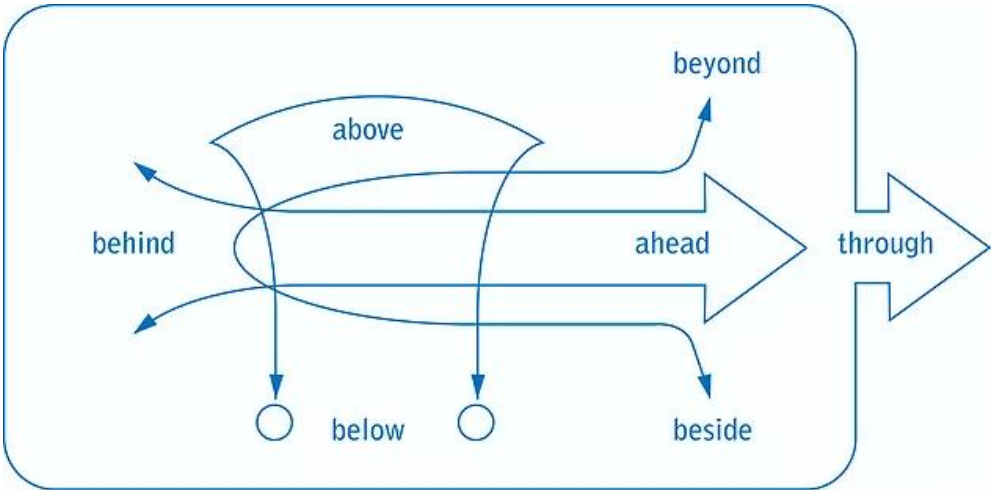

Figure (1) Mintzberg strategic thinking pictorial representation

In general strategic thinking means seeing head, but it is fact that to **see head** we need to **see behind**. Good vision of the feature has to be routed from past experience. **Seeing above** is getting "big picture". The strategic thinking is also inductive thinking: seeing above must be inferred from **seeing below**. An innovative idea or observation not only come from helicopter view, it is also constructed from the details that they dig up on each and every elements of business process. Lateral thinking is called seeing beside. **Seeing beyond** is different from **seeing ahead**. Seeing ahead foresees an expected future by constructing a framework out of the past whereas **seeing beyond** is the constructed feature (3).

Application of Mintzberg concept in Job Hazard Analysis (JHA).

One of the effective way of controlling work place incidents and accidents is by a systematic workplace operation through standard operating procedure (SOP), work instructions and training. To avoid accidents, it is mandatory to have a safe work procedure and reviewed by JHA. It is conducted for all the jobs performed under permit to work (PTW) with high importance to the jobs listed below (6).

- Having high incident and accident history.
- Non routine
- Complex jobs which require method statement
- Associated with hazard where simple operator error could lead to incident.
- Potential to cause injury, toxicity, loss of containment, equipment damage, incident and accident.
- Process change or management of change (MOC)
- Process integration

JHA procedure

The procedure followed in Job Hazard Analysis listed are listed below

a) The team leader usually operation supervisor/superintend forms **team of professionals** from operations, safety, permit controller and performing authority. The team reviews the task, analyses and record the identified hazards and mitigation control methods.

b) **Past experience and Incident history**: The team reviews the past incidents reported related to the similar task. The summary analysis with root causes are reviewed and identifies the hazards and mitigation methods (5). The operations and safety share the information on the past experience, challenges faced and teams takes these into JHA.

c) Review on scope and method statement: The method statement of the job clearly defines the scope, the total task is divided into sequence of steps. The necessary documents such as marked plot plan, PFD, P&ID, equipment data and distribution diagram. Check the condition of equipment and plant for possible impact. The team to conduct site visit and checks the housekeeping, positive isolation, blind position, re-routing, site fire and safety devices, OWS system, emergency access, heavy equipment parking location and operator awareness.

d) **Hazard Identification:** Once the step wise execution procedure, method statement and site visit conducted. The associated hazards and potential to cause hazard must be identified at each step along site observation. Hazard identification focus on

job scope, method statement, past accident, SOC and experience. To identify potential hazards, the team to have check list with basic questions such as (7)

i) What can go wrong?
ii) What went wrong? Root cause of past incidents.
iii) What are possible consequences?
iv) What are the potential emergencies can raise during the job?
v) What are the potential external impact from nearby source?
vi) What safe guards available?
vii) What are the vendor safety recommendations?

Hazard Control Measures
The identified hazards for each step to be reviewed with existing controls and safeguards. Based on consequences and risk control measures to be identified for each hazard (6). Before starting the job, all the recommended control measures to be implimented. The hazards and its control measures to be updated to all including the site execution team. Irrespective of type of hazard, the control measure should be given equal importance. The control measure could be operational, technical, engineering, maintenance and safety related.

Mintzberg strategic thinking in hazard identification:
Mintzberg strategy has seven key elements such as ahead, behind, above, below, beside, through and beyond. These elements can be used to identify the hazards during JHA. The diagram indicating Mintzberg concept in hazard identification provided in Figure (2).

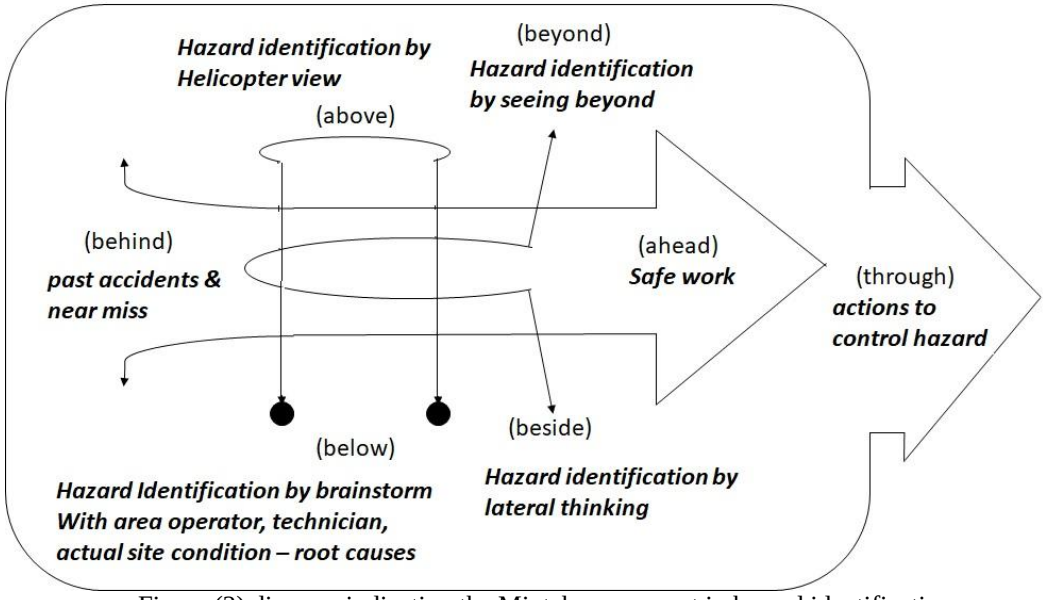

Figure (2) diagram indicating the Mintzberg concept in hazard identification.

Hazard Identification by seeing "behind".
Industries record all the incidents and near misses and do detailed investigation, identify root causes and come out with actions items or recommendation to avoid recurrence. Most of the industries incident reporting, analysis and actions are followed regularly and monitoring as key performance indicator (KPI). Here, hazard identification by "seeing behind" means hazards due to past accidents and near miss. It means, while performing the JHA, the team should consider the incidents reported related to job scope and ensure that sufficient control measures are provided.

Hazard Identification by seeing "above"
Seeing above means seeing the total job scope in **helicopter view**. The overall picture of the activity including as total plot plan, nearby units, inter connecting lines, activities by other sections, other parallel site activities and logistics to be taken into account during JHA. Generally permits are issued specific to the unit mentioning the related unit and equipment number. But under seeing "above" tt is recommended to see the overall picture of the activity considering the not only the equipment but also the adjacent plant, inter connecting piping, activates by other sections and logistics. So that unexpected events could be minimized.

Hazard Identification by seeing "below"

Seeing "below" means to identify the hazard at execution level, right "under the carpet". It means, hazards associated with each and every contributor at execution level such as helper, rigger, technician, logistic team, area operator and the site foreman have to be reviewed and listed. The review including completeness, fitness, PPE, awareness, consequences, emergency actions, awareness procedures, communication and skill.

Hazard Identification by seeing "beside and beyond"

The JHA team to review the scope and method statement **beside** the usual or past experience. A lateral thinking of the scope or step may reduce or eliminate the hazards and potential hazards. On some occasions, an alternative approach may change the scope which is simple, safe and cost effective. The JHA team to confirm by review that alternative methods.

Seeing **beyond** the scope is an important review for safe job. As incident under the scope of activity could cause a major damage or impact to the total business process, neighboring units and reputation. The JHA team leader to coordinate with other sections, maintenance, process, HSE, facilities and planning to arrive at possible consequences. Such hazards, cause and effects to be captured by the JHA team and develop a control measures.

The JHA team to consolidate the identified hazards under each execution steps. The control measures to be identified and listed against each and every hazard. The activity would pass **through safely** as planned by implementing the control measures. Typical JHA format with key elements are provided in Figure (3).

Job Hazard Analysis						
Date		**JHA Reference No**				
Area			Equipment No			
Unit No			Permit No			
Task/SOW						
Task steps	**Element**	**Hazards**	**Existing control**	**Recommendation**		through
Step-1	behind					
	above					
	below					
	beside					
	ahead					

Figure (3) Typical JHA format with key elements

Benefits of using Mintzberg concept in JHA

Mintzberg strategic thinking would provide a systematic and structured way of conducting hazard identification in JHA. This approach ensures that the JHA team identifies hazard in each every aspect from micro level to overall the business process. By adopting this practice, the incidents or near miss due to overlooking or neglecting the key issues would be eliminated. In addition to that the confirmation on recommended actions under "through" column in the format ensures that the control measures are implemented before executing the job or before issuing the work permit.

Glossary

OSHA : Occupational Safety Health Association
PFD : Process Flow Diagram
P&ID : Piping Instrumentation Diagram
OWS : Oily Water System
HSE : Health Safety & Environment
SOC : Safety observation card

Reference

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