

Presentation : Risk assessment Risk assessment as a tool for mobile plant operators for sustainable development: Lessons from the Western Australian Mining industry

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Agenda

The objective of this presentation is to share my research findings and highlights the current gaps that exists in the mining industry with the use of the Risk Management approach

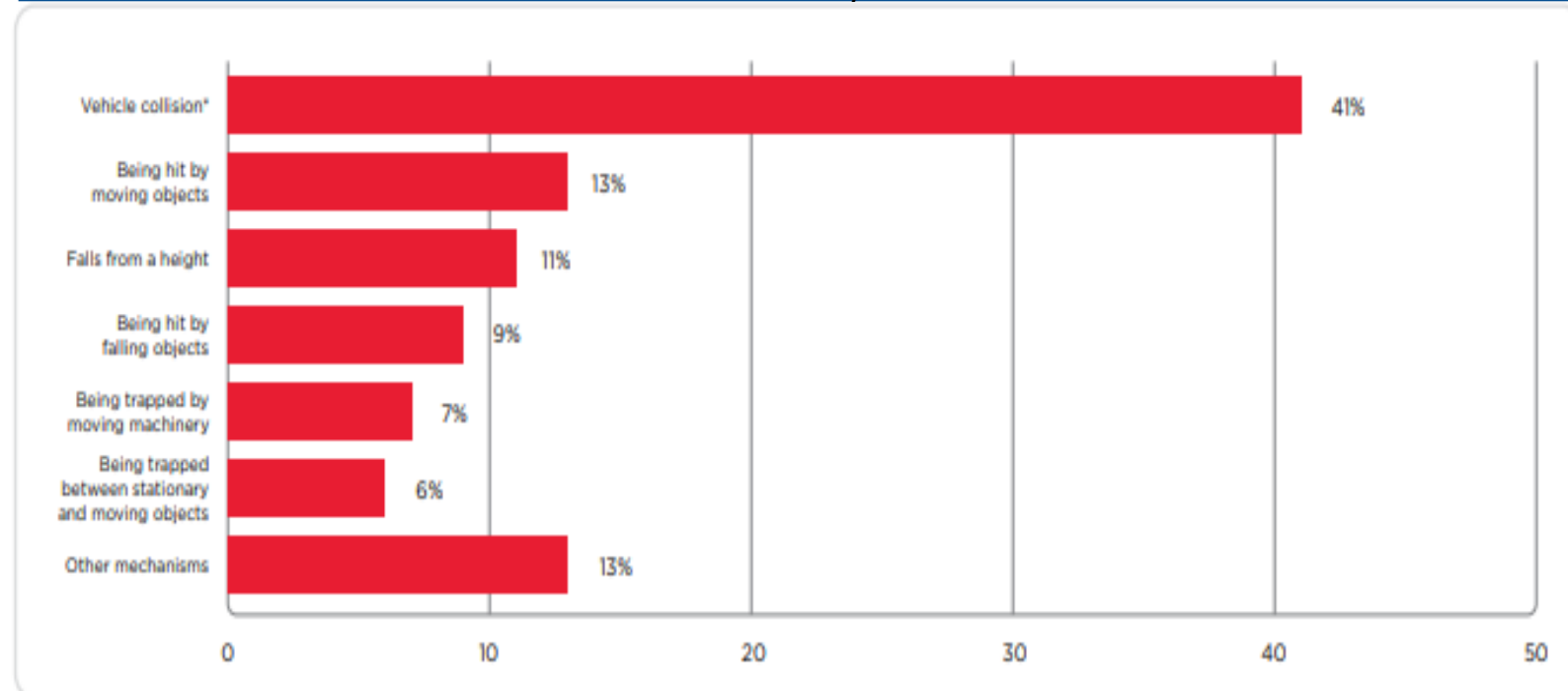
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Research problem

Mobile plant is used extensively in the Western Australian Mining Industry. Number of fatalities is significantly high compare to other work related causes.

- According to Safe Work Australia, Mining comprising the 5th highest total number of fatalities of all industries in Australia
- Struck by vehicle or mobile equipment and vehicle or mobile plant rollover was one of the most common causes of fatal incidents in the last five years (Resources Safety, 2021).

Work fatalities by mechanism of incident ,2020 (Safe work Australia 2021)



Research Aim:

The aim of this research was to improve the safety performance of mobile plant operators in the Western Australia (WA) mining industry by identifying the causes of mobile plant incidents in the past years through qualitative and quantitative data collection and analysis.

Research Objectives:

1- To analyse the Resources Safety notifiable incident data base to determine the causes of mobile plant accidents in the Western Australian mining industry between 2007 and 2016. Further permission was obtained from Resource Safety to add in the three years from 2017 to 2020 and notifiable incidents from that period were added in and analysed.

2- To observe mobile plant in use in mining workplaces to identify what strategies were in place to promote mobile plant safety and any safety barriers.

3-To conduct focus group interviews with mobile plant operators to identify their opinions on safety and risk control factors related to the use of mobile plant in their workplace.

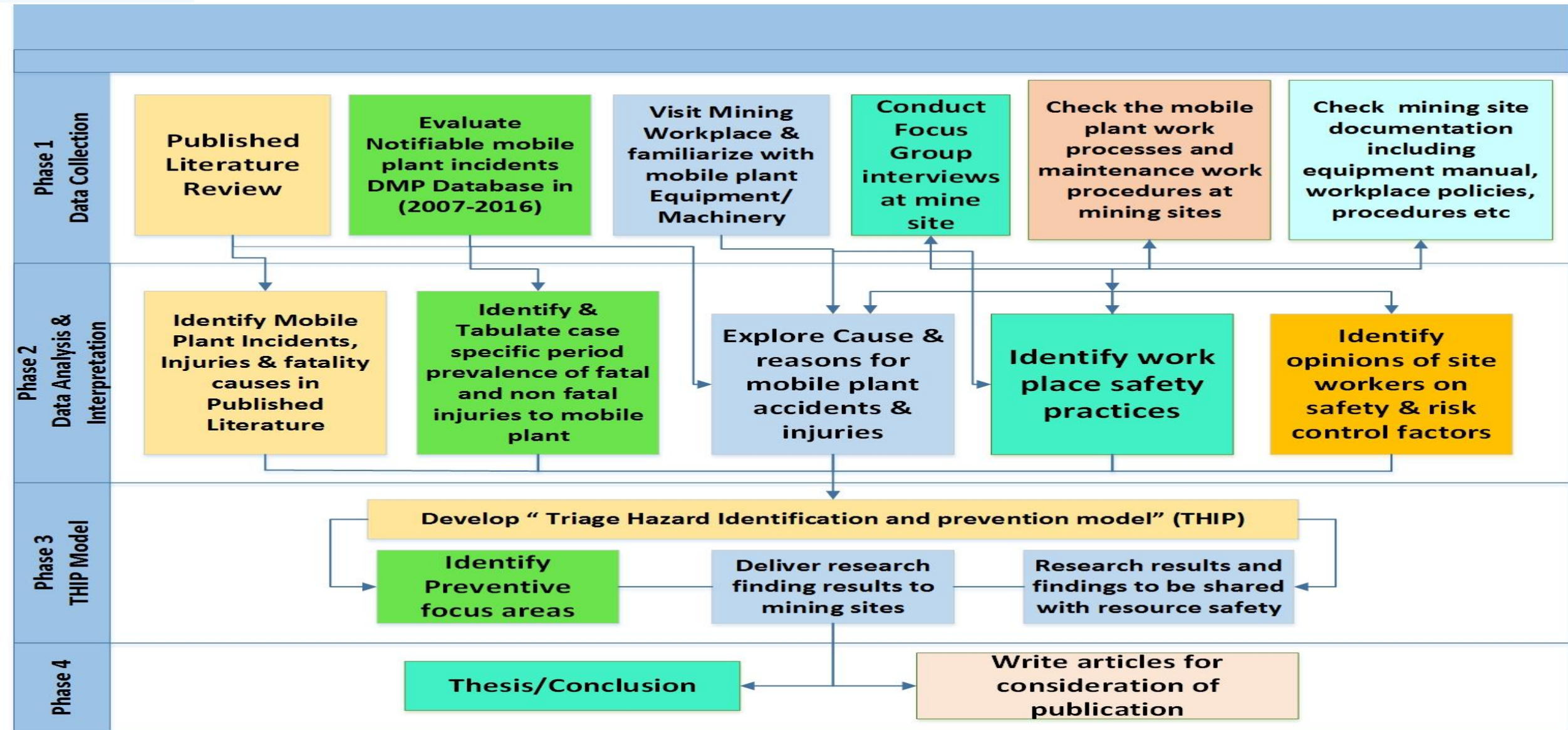
4-To develop a "Triage Hazard Identification and Prevention Model" (THIP) to improve hazard awareness and risk control selection for prevention of workplace incidents associated with mobile plants to contribute to preventing low frequency severe consequence injuries related to mobile plants.

Research Implementation :

The research was implemented in three phases and a mixed methods research approach was used for data collection .

S.No.	Research Phases	Description
1	Data Collection	<ul style="list-style-type: none">• Extensive literature review was conducted. 307 publication were analysed to identify risk assessment techniques and causes of mobile plant accidents in Western Australian mining industries.• Analysis of DMIRS incident database provided by Resources Safety for mobile plants injuries and fatalities (2007 -2020).• Focus group interviews at four mining sites with mobile plant operators, supervisors and maintenance workers to assess and identify best practices and opportunities for improvements related to the use and maintenance of mobile plant equipment.
2	Data Analysis & Interpretation	<ul style="list-style-type: none">• Quantitative data analysis – 5767 notifiable incidents b/w 2007 to 2020 were examined from the DMIRS Database to identify causes of mobile plants incidents in WA.• Qualitative data analysis – Inputs from 44 participants (6 focus group- 17 participants and 27 one-to-one interviews) from four Mine sites visits were analysed using Nvivo 12 software to identify emerging themes, challenges and improvement suggestions.
3	THIP Model	<ul style="list-style-type: none">• “Triage Hazard Identification and Prevention Model” (THIP) was developed - To improve hazard awareness and control selection for prevention of workplace incidents associated with mobile plants to contribute to preventing low frequency severe consequence injuries related to mobile plants
4	Conclusion	<ul style="list-style-type: none">• Research concluded with the identification of safety barriers and challenges.• Initiatives have been recommended to improve the safety of mobile plant workers at mining sites.

Overall Research Project



Research Significance

This research was the first study to investigate and explore the current causes of mobile plant operator incidents, injuries and fatalities in the Western Australian mining industry.

- 1 It was anticipated that implementation of the research findings, model and recommendations would be of significant benefit for the Regulator, the mining industry generally, and that relevant companies could obtain maximum benefit by implementing the Triage Hazard Identification and Prevention Model to reduce the occurrence of low frequency high consequences injuries and improve mining industry workers' productivity and industry profits
- 2 The findings would assist Resources Safety, mining companies and industry to tailor policies that prevent injuries and improve the employment, lifestyle as well as the health of mobile plant operators and other workers.
- 3 This model "THIP" provides investigators and risk assessment leads research-based information concerning known incidents and injuries related to mobile plant in the mining industry.

Gaps in knowledge Identified while conducting literature review for research :

This research was conducted through an analysis of 307 relevant publications, information related to the risk assessment techniques being used in the Western Australian mining industry and causes of mobile plant accidents in Western Australian mining industries. In the literature review, comparisons of Mining Legislative Framework in Australian States and Territories jurisdictions related to risk assessment, safety management system and principal hazard and management system were included. A major gap identified was that there were no specific regulations or a code of practice for mining industry mobile plant, with the exception of autonomous trucks, currently present in Australia.

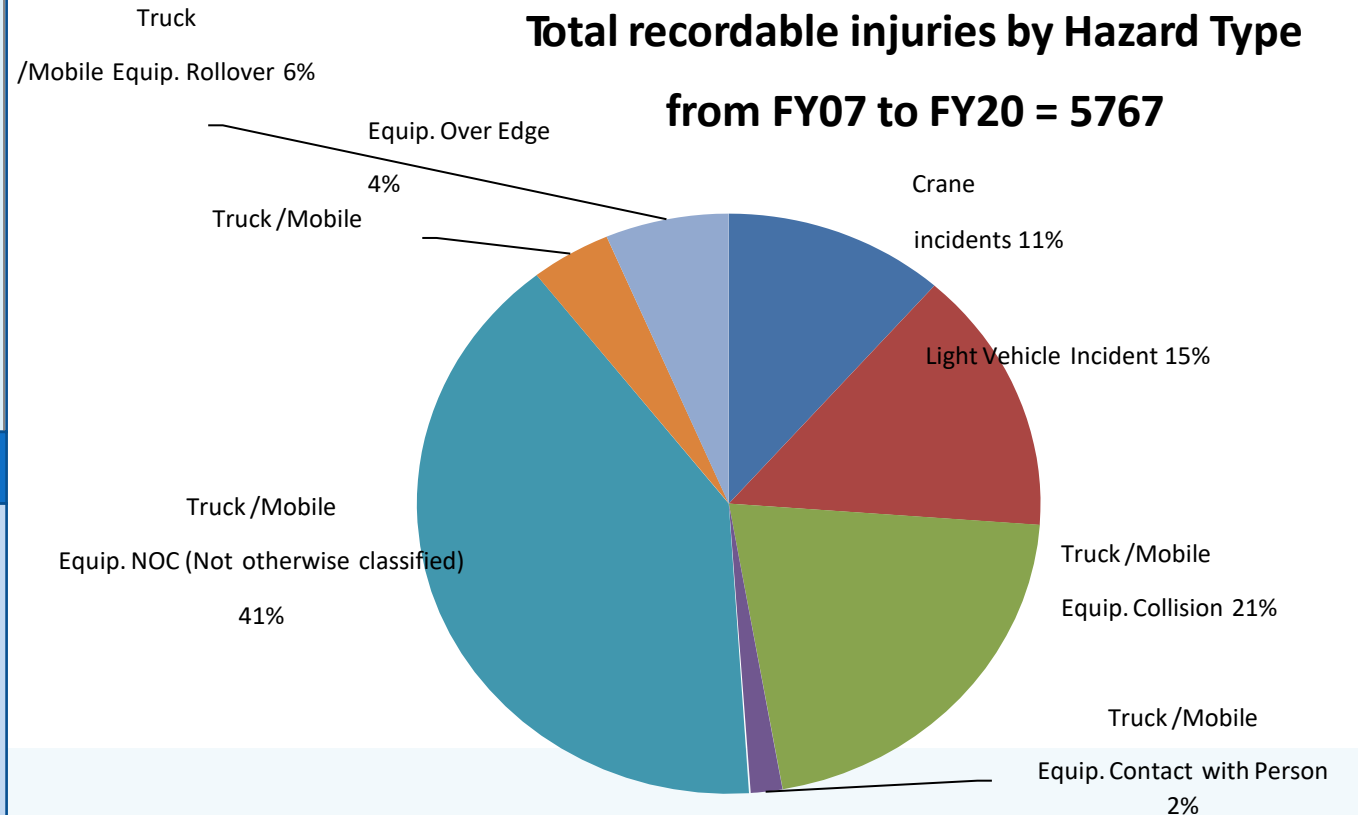
Research Findings

The following results related to mobile plant incidents in the Western Australian mining industry were extracted from the Resource Safety Database (2007 -2020) that was further used by the researcher to perform an in-depth analysis and graphical representation of the analysis findings. These results were that :

- Total number of mobile plant incidents in the span of 14 years from 2007 to 2020 were 5,767.
- Out of 5,767 mobile plant incidents there were 5,100 surface mining incidents with 13 fatal incidents and 667 underground mining incidents with 3 fatal incidents.
- Highest number of injuries recorded were in the sub-category Truck/Mobile Equipment and that was 2,404.
- 16 fatalities were reported to Resource Safety in Western Australia due to mobile plant incidents between 1-1-2007 and 31-12-2020.

Causes of Major Fatal incidents

- vehicle collision;
- vehicle over-edge;
- vehicle rollover and vehicle runaway;
- maintenance procedure deficiency;
- machinery movement – crush;
- underground (UG) rock fall; tyres; suspended load



Research Findings (cont)- Key themes from the focus group interviews at mine sites surveys

Importance of Safety (How important is safety to you)

- Clear vision and focus of every individual
 - Safety is priority and goal of everyday life
 - Life ,Family, Rules & Procedures
 - First & most , Number one, critical
-

Dealing with Hazardous situation at work (Did you meet any hazardous situation during your job and how did you respond to them?)

- Faulty machinery
 - Priority rules breaches (crushes, uncontrolled movements, breakdowns, working at height)
 - Lack of positive communication
-

Ways of handling stress and pressure at work (How do you handle stress and pressure)

- Set priority and targets
 - Time is the best teacher
 - Participate in recreational activities, good communication, good work sleep balance
-

Challenges faced at work (What are the challenges you face in your job?)

- Dynamic risk environment –(Equipment isolation, procedure signoff)
- Working away from home and family
- Speaking out
- People management ,Green operators
- Fatigue management

Research Findings (cont) - What heard during mine site visits- challenges

Mobile Plant Operators

“ Safety is very important. I have been in industry for long time and have seen unavoidable incidents, so please follow rules. ”

“ Weather is big challenge, dusty and windy, soft material and sand .”

“ I guess it's very tedious so stay away from fatigue is big challenge. Interaction with other vehicles, long working hours. It is continuous between 12 hours underground in day and night shifts. ”

“ Big challenge is family. You are not home for birthdays, and it is hard ”

Mobile Plant Supervisors

“ Green operators are new to mining and from background of hairdressing, labouring and all of sudden want to jump in truck and previous history is not very good. We try to drive safety culture as this site has history of incidents . ”

“ The most biggest challenge is getting good quality of people, maintain those people and maintain their motivation ”

“ Parts are the biggest one especially the biggest parts availability. We are 3000 kms away from Perth so part delivery is a big challenge ”

Mobile Plant Maintenance workers

“ We are in middle of some job and air con breakdown. It's middles of day on excavator ,heat is 60 C. It is probable the worst thing to do with last summer we had 20 breakdown when it quite hot. Downtime for job is from quick to a 2 or more day job ”

“ The biggest challenge is proper isolation of machinery and to sign off the isolation procedure with all of the people concerned ”

“ The biggest challenge is working away from family, waiting for machines to show up in the workshop and availability of machine parts ”

Research Findings (cont)- Mine site survey results – Improvement Suggestions

S.No.	Improvement Suggestions	No
1	Improvement in Rosters	11
2	Opportunity to speak and get acknowledged and not get penalized or in trouble	10
3	Improvement in mobile communication reception at site	6
4	Positive communication between line managers and workers	6
5	Increase in Artificial Intelligence to make operation of mobile plant safer	4
6	Mandatory work hour breaks	3
7	Availability of frequently used parts in workshop	3
8	Mentoring for newcomers at mining site	3
9	Program in which family can visit and meet the onsite workers to increase motivation	2
10	Improvement in food	2
11	More accountability and penalties towards repetition of similar incident by same people	2
12	Resource for supervisors to reduce administrative burden in order to spend more time in the field with the team	2

Research Findings (cont)- Safety Barriers identified

The major safety barriers identified as part of achieving research objective-2 (Observe mobile plant in use in mining workplaces to identify what strategies are in place to promote mobile plant safety and any safety barriers) are:



Recruitment of mobile plant operators with no previous background in mining or mobile plant specific training



Low focus on refresher training.



Fatigue due to FIFO rosters in some mining companies.



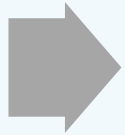
Research Outcome-New knowledge generated



The Triage Hazard Identification and Prevention Model – THIP developed as an outcome of this research is innovative and can be a valuable tool for risk management at mining sites as it provides a single platform for the user for performing all relevant checks required with regards to risk assessment and the process is explained simply in a flow chart format



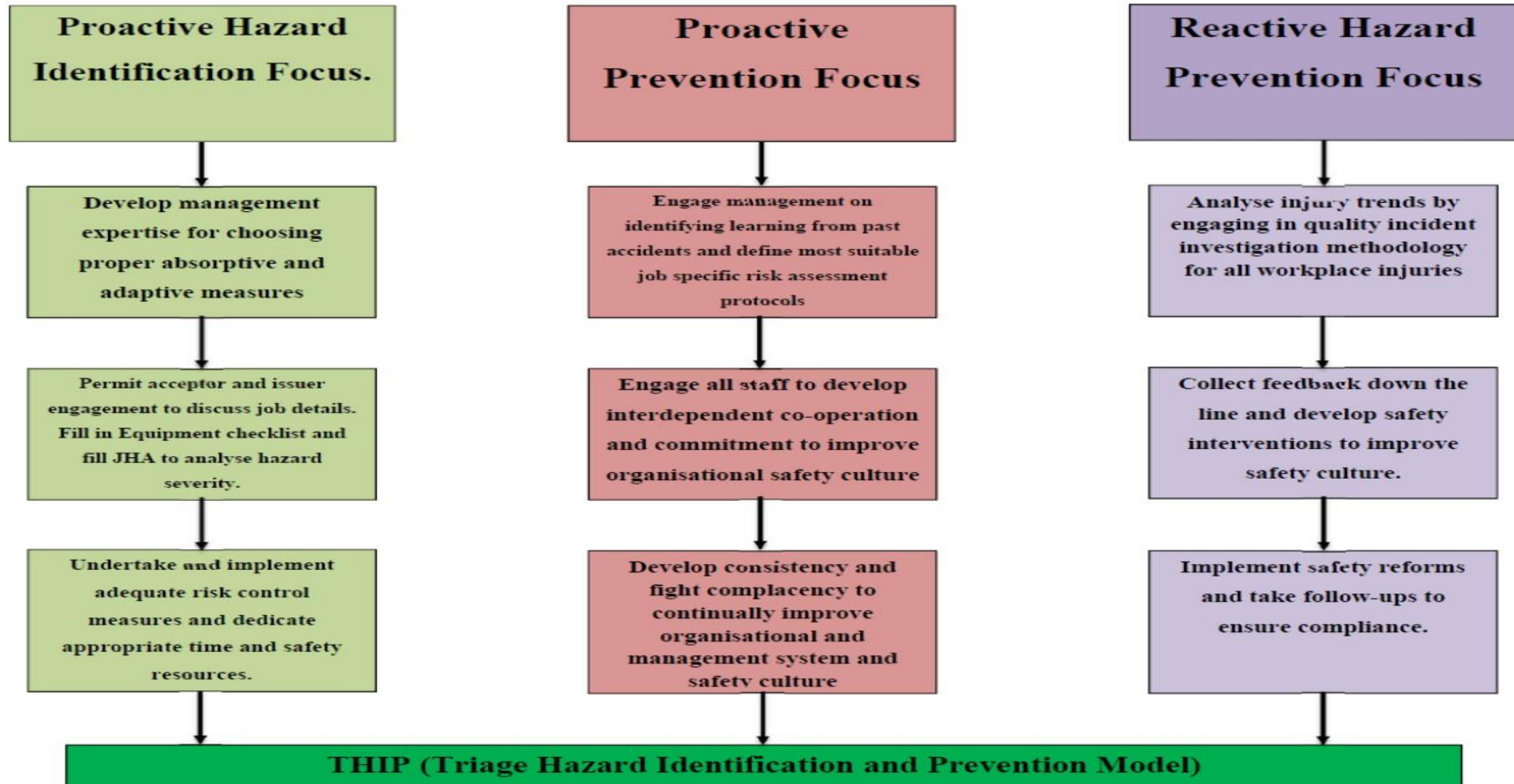
This Triage Hazard Identification and Prevention model was developed for use by the Western Australian mining industry with the intent of enabling the pro-active identification of hazards and preventing workplace injuries and fatalities and it works with the core idea of connecting proactive and reactive approaches



The model has been developed as a flow chart and is comprised of the following areas that are each complementary to one another:

- 1.Proactive Hazard Identification Focus.
- 2.Proactive Prevention Focus.
- 3.Reactive Hazard Prevention Focus.

Research Outcome-New knowledge generated contd..



Triage Hazard Identification and Prevention (THIP) model benefits for mining companies

The Triage Hazard Identification and Prevention (THIP) model can be used as a baseline model and single platform for the hazard identification and risk management process for a company.

During mining companies' visits, it was observed that although all companies have their relevant documentation in place with regards to safety and risk management, there was no centralized model or framework which was linked with documents specifically required either for operators, maintenance workers, contractors and team leaders. Therefore, the researcher felt the need for a framework which provides a baseline for all relevant people at site and with a single click they can access the checklist and documents required:

- To understand the context and initiating the risk process
- To identify hazard and risk scenarios for the task
- To evaluate risk and assigned ownership
- On how to manage risks through implementation of existing and further controls
- Required documentation, communication and reporting of hazard and risk information
- Updating hazard and risk information on a periodic basis.

Triage Hazard Identification and Prevention (THIP) model

Proposed implementation plan for mining companies

Proactive Hazard
Identification
Focus



All relevant risk level assessment and identification documents to be linked with the first part of the THIP model to give all end users easy to navigate relevant procedures/templates.

Proactive
Prevention Focus



Learning from
the past



- Regular awareness sessions to engage management and relevant stakeholders.
- Potential incidents identification register for GREEN operators.
- Introduction of reward system for mobile plant operators who voluntarily take part in the physical demonstration of the potential and near miss incidents

Reactive Hazard
Prevention Focus



Lead by "Research
and Development
(R&D)" team



- R&D team to develop "Quality Incident investigation process" and engage all relevant teams by scheduling regular sessions.
- Communication sessions to be planned by R&D team to raise awareness specially for the GREEN operators and workers.
- Assign cross team audits and monitor feedback for the implementation of Safety reforms and Improvement plan.



Implementation of customized THIP models will help companies to provide a single stop place for all documents related to hazard identification, risk control and prevention and most hazard-prone operations, which in turn will help to develop mitigation and improvement plans to treat and prevent unacceptable consequences timely and effectively.

With successful implementation of the most suitable approach, a safe and nearly zero accident workplace can be developed, which will be a milestone in the history of safety for the company

Thanks you !

- ◆ - Q&A