Safety culture in High-Speed Railways and Importance of top-management decisions

Nikhil Bugalia, *PhD Candidate* ;Yu Maemura, *Assistant Professor* ; Kazumasa Ozawa, *Professor*

Department of Civil Engineering, The University of Tokyo

Spillover effects of High-Speed Rail and Quality of Life

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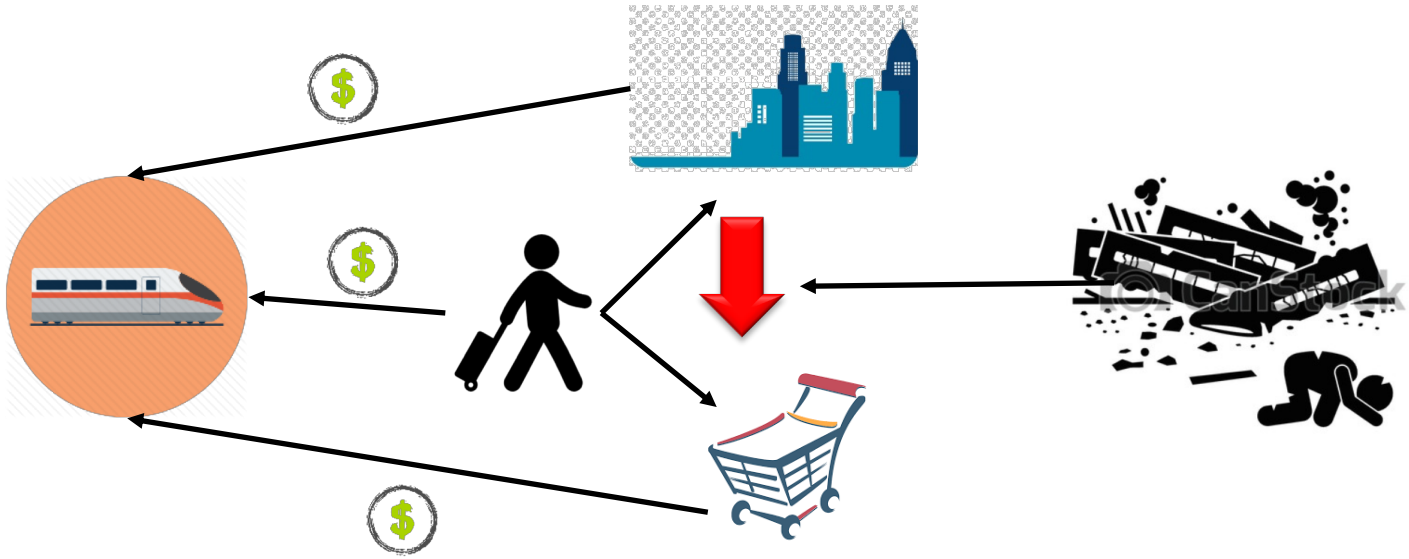
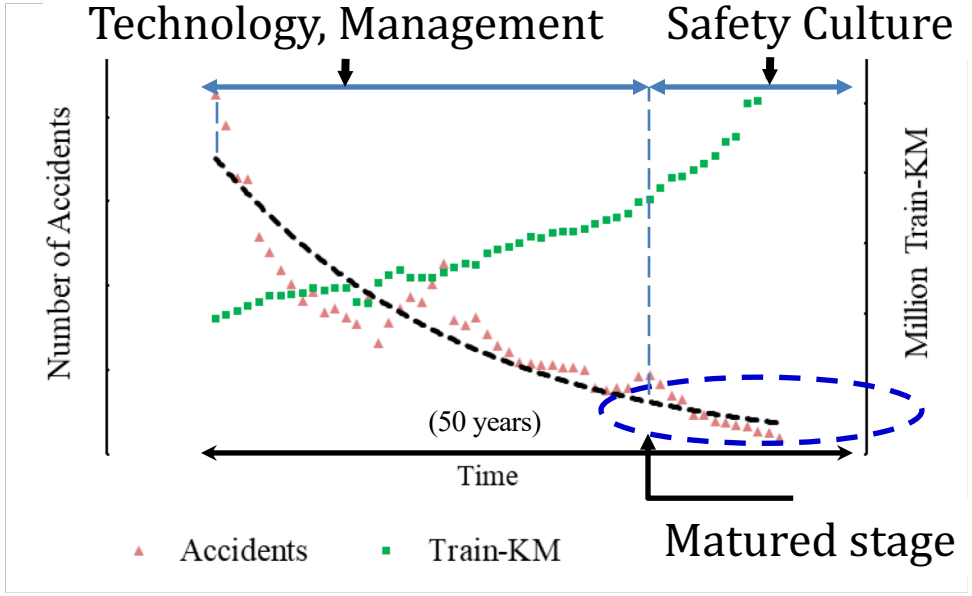


Safety performance can have detrimental impact on spill-over effects of cost-intensive infrastructure such as High-Speed Rail (HSR)

- If railways are seen as threats, they will not be acceptable to society ***UIC (2018)***

Safety culture is especially critical in improving safety performance when a "plateau" has already been achieved (strong impact on Quality of Life)
(James Reason 2000)

Safety Culture – "*beliefs and attitudes that are shared among employees and are expressed in the day-to-day behaviour of the staff*" – ***Clarke (1998)***



Case of upcoming Mumbai-Ahmedabad High-Speed Railway Project in India

Japan

MAHSR

India

Zero fatality in 50 years

Improved safety

A number of pressing issues with safety culture

JR West accident 2005
JR Hokkaido accident 2011
(Atsuji, 2016; Okamoto, 2016)

(Kakodkar, 2012)

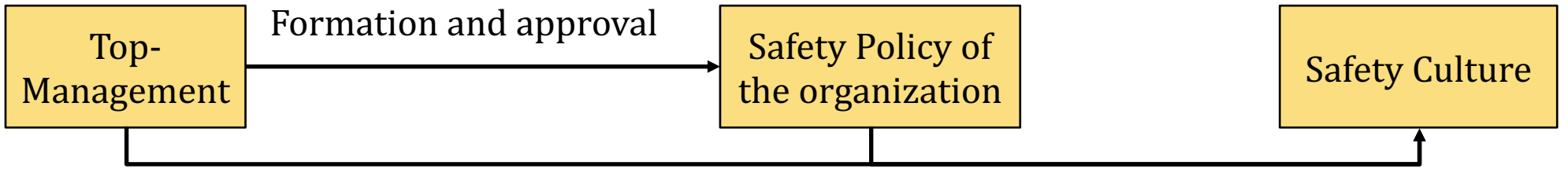
Objectives

1. Assess the current state of the safety culture in Japan and India through case studies of ***JR East*** (***HSR operator in Japan*** giving technology to India) and ***Indian Railway***

2. Identifying the challenges faced by top-management in improving the safety culture at a railway company

Relevant for

- Management officials and policy makers from countries planning to introduce HSR systems



(Schubert et al. 2010)

Paradigm shifts in railway safety management (Ages of Safety) *Hale (2000)*

First age of safety
(Technology)

More Complexity
Unpredictable in emergency

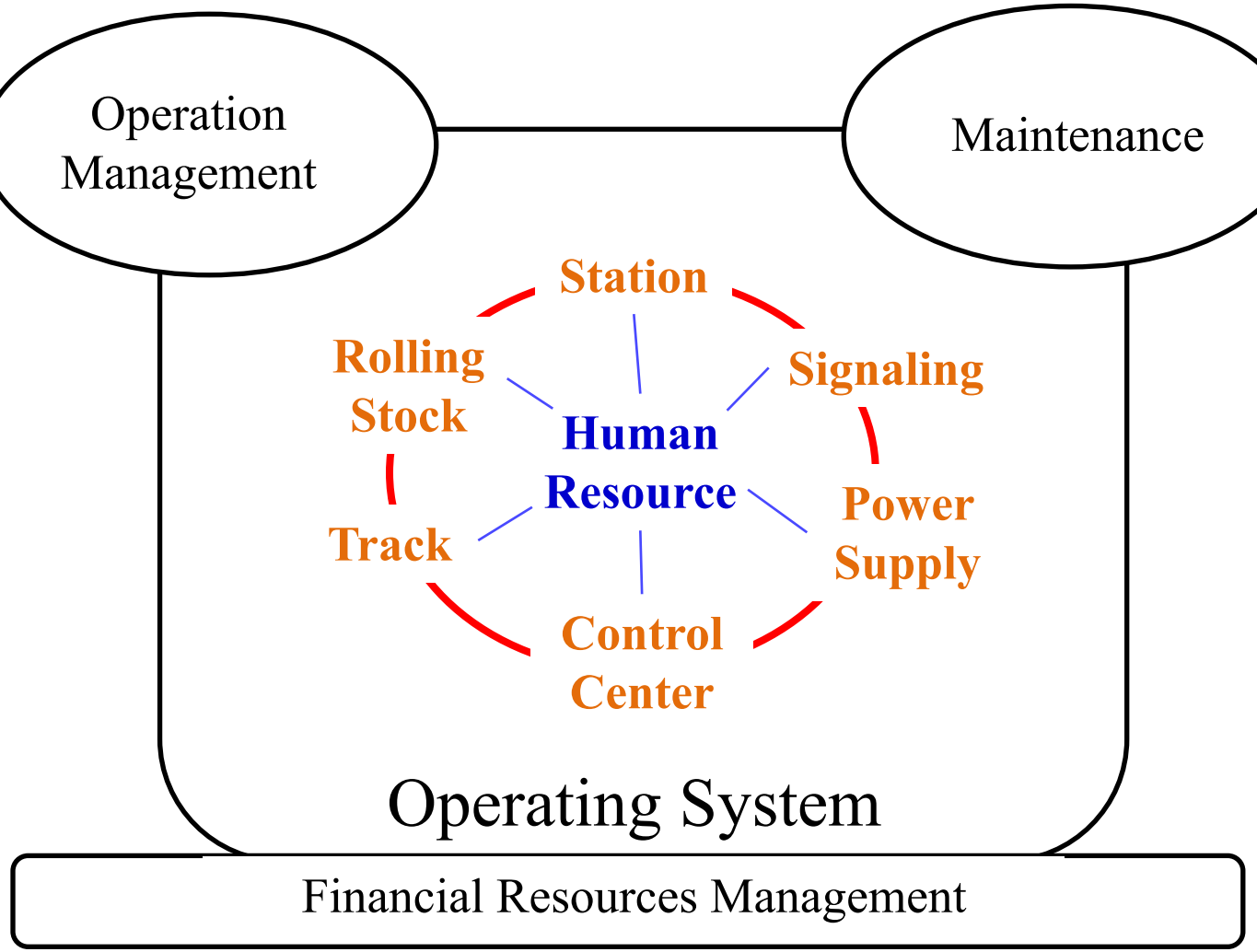
Second age of safety
(Human)

(Bainbridge, 1983; Hale, 2000; UGAJIN, 1999, Wilson et al., 2007, Wilson and Norris, 2006, and 2005)

Role of management
Integrated Risk management

Third age of safety
(System Thinking)

Doi, 2016; Kawakami, 2014; Rajabalinejad and Dongen, 2018; Santos-Reyes and Beard, 2003; Sussman et al., 2007; Wang et al., 2017*



System Thinking – Interaction between technical, human, and management components *Sussman et al., 2007*

The fourth age of safety?

Source: Japan Times, 2018

JR-West accident in 2005

- Some recent accidents have highlighted the importance of Safety Culture in safety management *Atsuji et al., 2016*

  e.g. **Nikkin Kyoiku system in JR West**

- Safety culture aspects are rarely integrated within the system thinking framework *Reiman and Rollenhagen (2014)*

Challenge in assessment of safety culture

- Culture varies within the organization
- Is multi-dimensional concept
- Is likely to change over time

(Parker et al., 2006; Zohar, 2000; Zohar, 1980, Itoh et al., 2004, Westrum, 1996)

Multi-dimensional dynamic safety culture assessment tool

Parker et al., 2006

Safety culture assessment tool utilized in this study ***Parker et al., 2006***

Safety culture related aspects (11 Tangible, 7 Intangible)

Tangible Aspects	Intangible Aspects
Trend analysis; Audits and review; Incident/accident reporting, investigation, and analysis; Hazard and unsafe act reports; Work planning; Contractor management; Workers interest in competency training; Work-site Job safety; Daily safety responsibility; Size of the safety department; Rewards for good safety performance	Who causes the accident in the eyes of the management; What happens after an accident?; How do safety meeting feel; Balance between safety and Profitability; Is management interested in communicating safety issues with the workforce?; Commitment level of workforce and level of care for a colleague; What is the purpose of procedure;

Categorized into 5 levels

Safety level	Description
Pathological	Who cares about safety as long as we are not caught?
Reactive	Safety is important; we do a lot every time we have an accident
Calculative	We have systems in place to manage all hazards
Proactive	We try to anticipate safety problems before they arise
Generative	Safety is how we do business here

Applicability confirmation for Railways

- Uses both tangible and intangible aspects
- Can demonstrate how an organization can shift to higher level of safety
- Can capture the intra-organizational variation

Reiman and Rollenhagen (2014), Itoh et al (2004), Hale (2000)

Application in present study

Step 1- **Interviews** with management officials at IR and JR East (1 each)

Step 2- **Summarize** the description for each of the 18 aspects

Step 3- **Classification** in 5 safety levels as described in *Parker et al., 2006*

Example of current state of safety culture Training System

- Training serves as reminder of safety rules
- Is periodic and is designed top-down
- Some on-the-job training exists

Safety training system at IR can be categorized as being Calculative

Calculative	We have systems in place to manage all hazards
Proactive	We try to anticipate safety problems before they arise

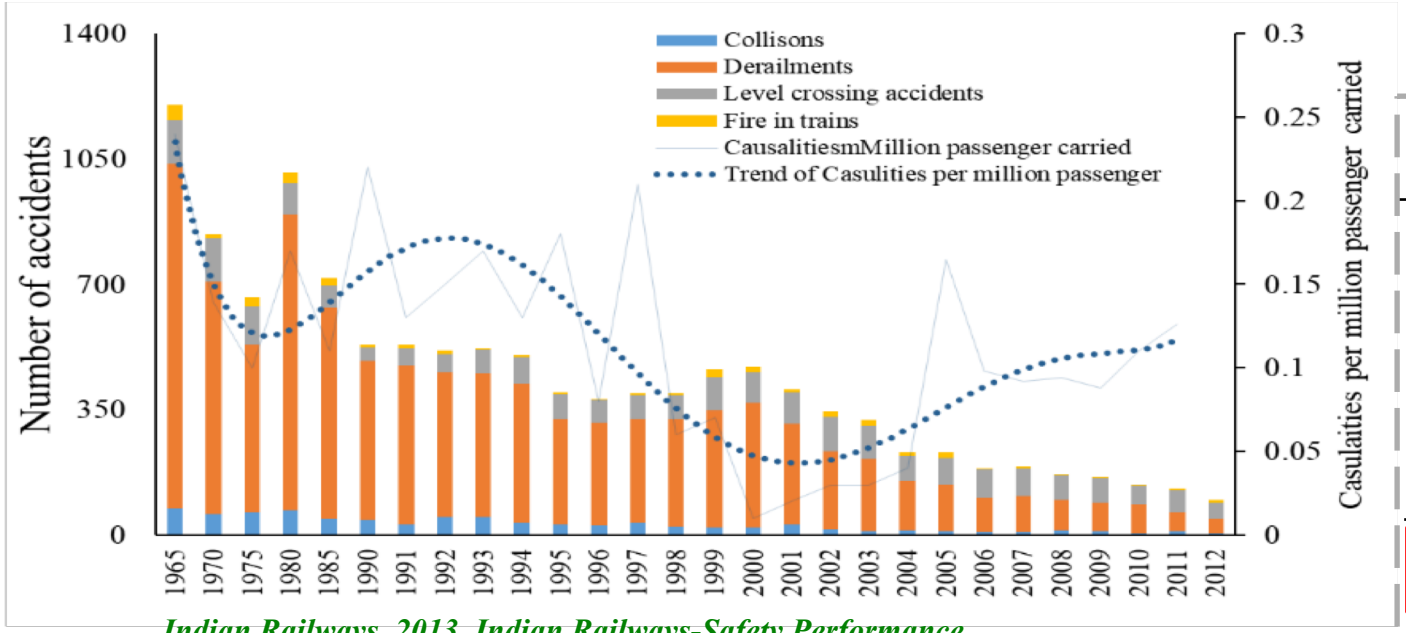
Step 4- **Safety culture profiles** for each organization

Role of Top-Management

Temporal Profile for safety culture - Repeat the previous steps for different points in time (highlight the challenges faced by the top-management in improving)

Comparative study across organization- Highlight the key differences in the present system, provide a glimpse of advanced safety culture, what can be done to improve?

Increasing passenger casualties led to increasing focus on safety culture



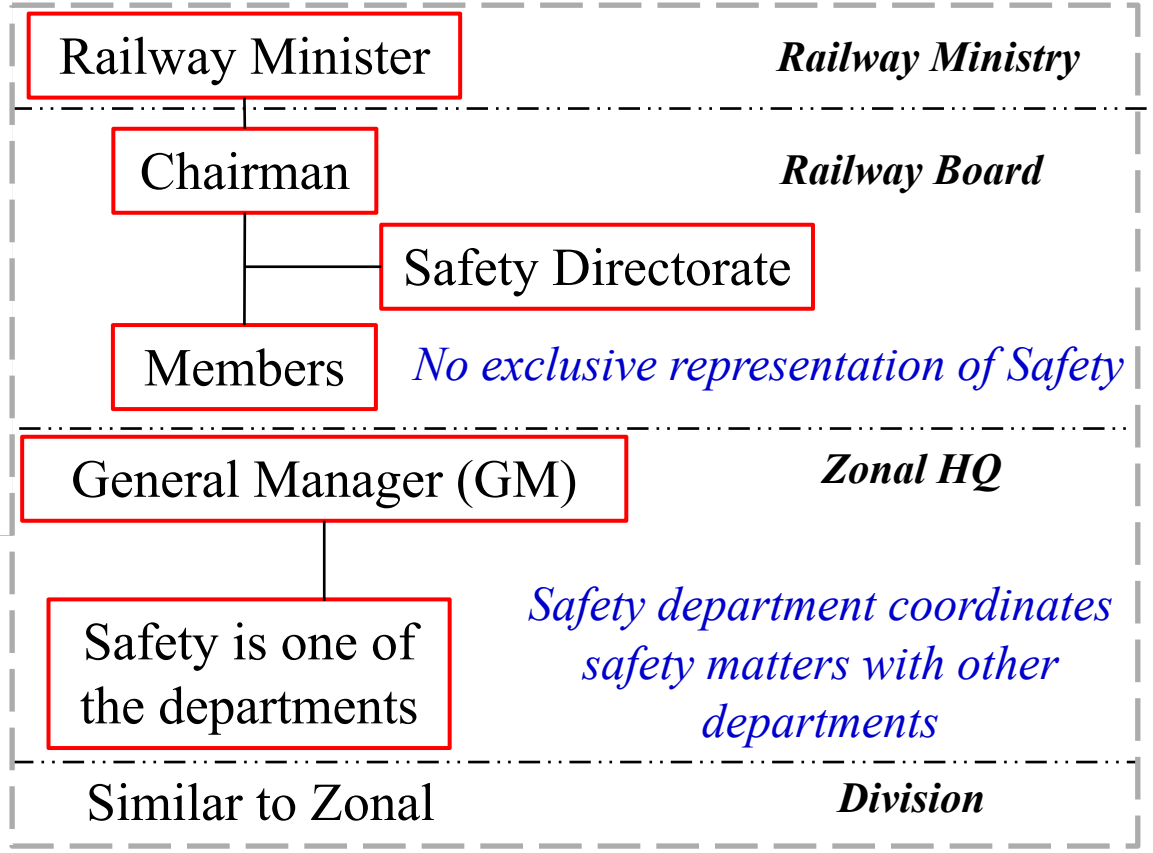
Indian Railways, 2013. Indian Railways-Safety Performance.

Responsibilities of the Safety Department

- Cross-audits, Trend analysis
- Emergency Response
- Safety seminars
- Accident analysis

Safety-1, Safety organization at IR, 2013

Safety Organization at IR



Safety-1, Safety organization at IR, 2013

Increasing focus on safety culture at JR East (Focus areas of Safety Plans)

- "Safety Plan 21" (1999 to 2003)
  (Prevention of major accidents and improvement of transport quality)
- "Safety Plan 2008" (2004 to 2008)
  (Go back to the root and review the safety)
- "Safety Vision 2013" (2009 to 2013)
  (Think and act by yourself to achieve safety)
- "JR East Group Safety Plan 2018" (2014 to 2018)
  (Extend skills of each individual employee and improve safety through teamwork)

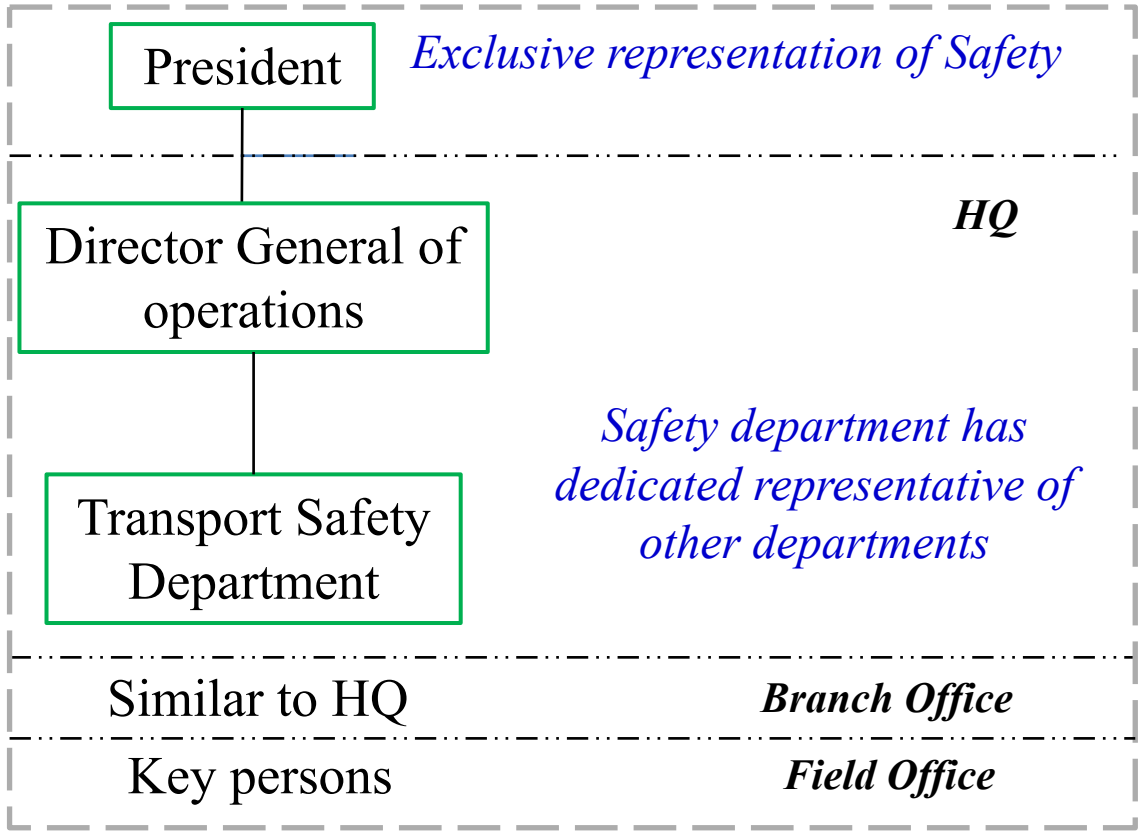
**Materials obtained during Interview with JR East*

Responsibilities of the Safety Department

- Investment Planning
- Safety system development
- Accident analysis
- Improving safety culture

Materials obtained from Interviews

Safety Organization at JR East



Annual Report, JR East, 2017

Overview of Safety Culture at IR and JR East

	Tangible Aspects (Total 11)	*Intangible Aspects (Total 7)*
Indian Railway		
Generative	-	1
Proactive	5	1
Calculative	6	5
Insufficient Information	-	-
JR East		
Generative	6	5
Proactive	1	1
Calculative	-	-
Insufficient Information	4	1

Generally calculative, moving towards proactive

- Trend analysis, safety audits and incident reporting system, etc. for anticipating safety problems – categorized as ***Proactive***
- System exists with inefficiencies e.g. in follow up for reports, contractor safety appraisal, training system, work planning, etc. - ***Calculative***

Generally generative

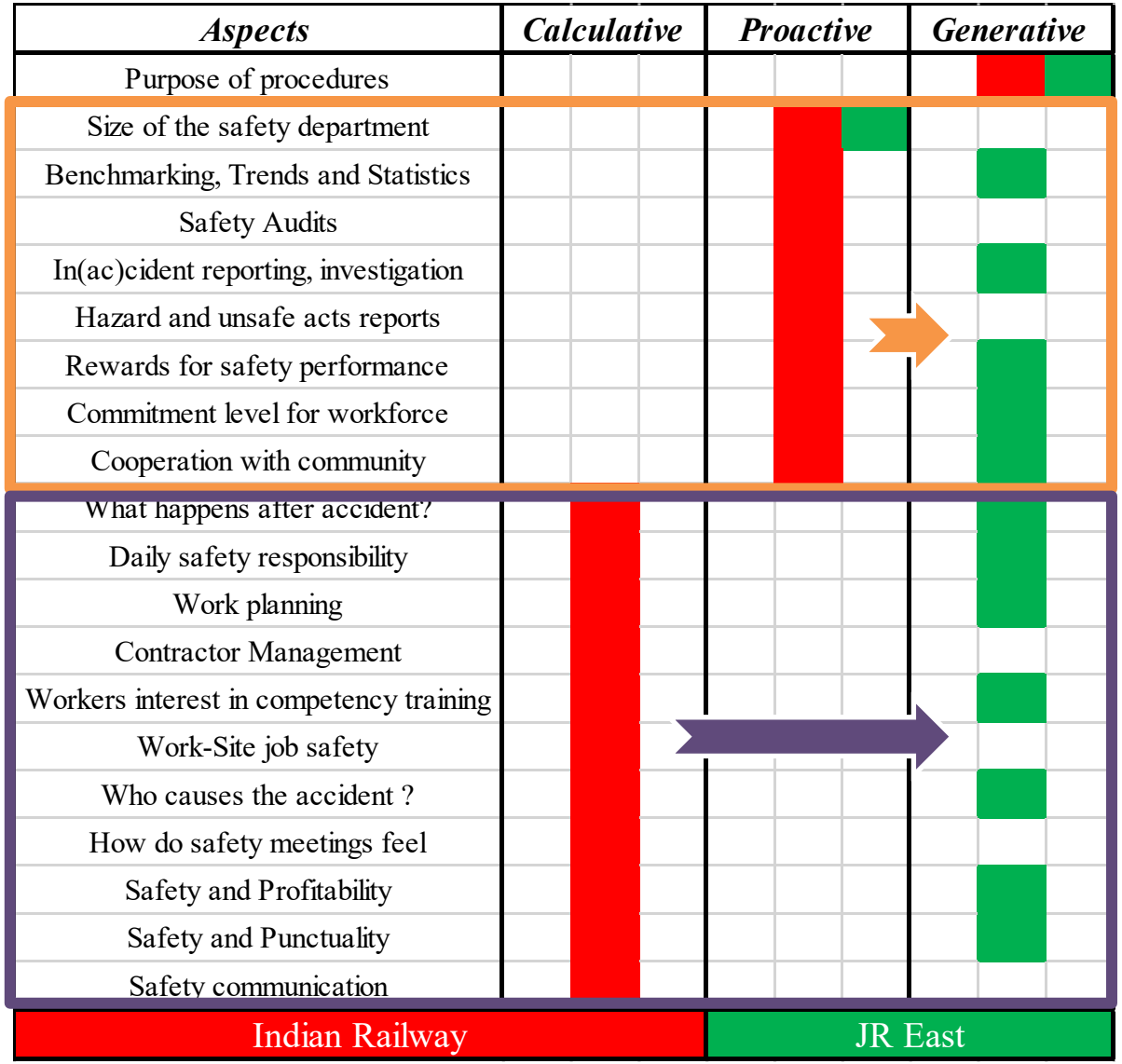
- Safety is among core values for trend analysis including management issues, systematic follow up in incident reporting, extensive training system, etc. - ***Generative***

Role of Top-Management in improving the Safety Culture

There is no single management strategy that is sufficient for improving the level of an organization's safety culture

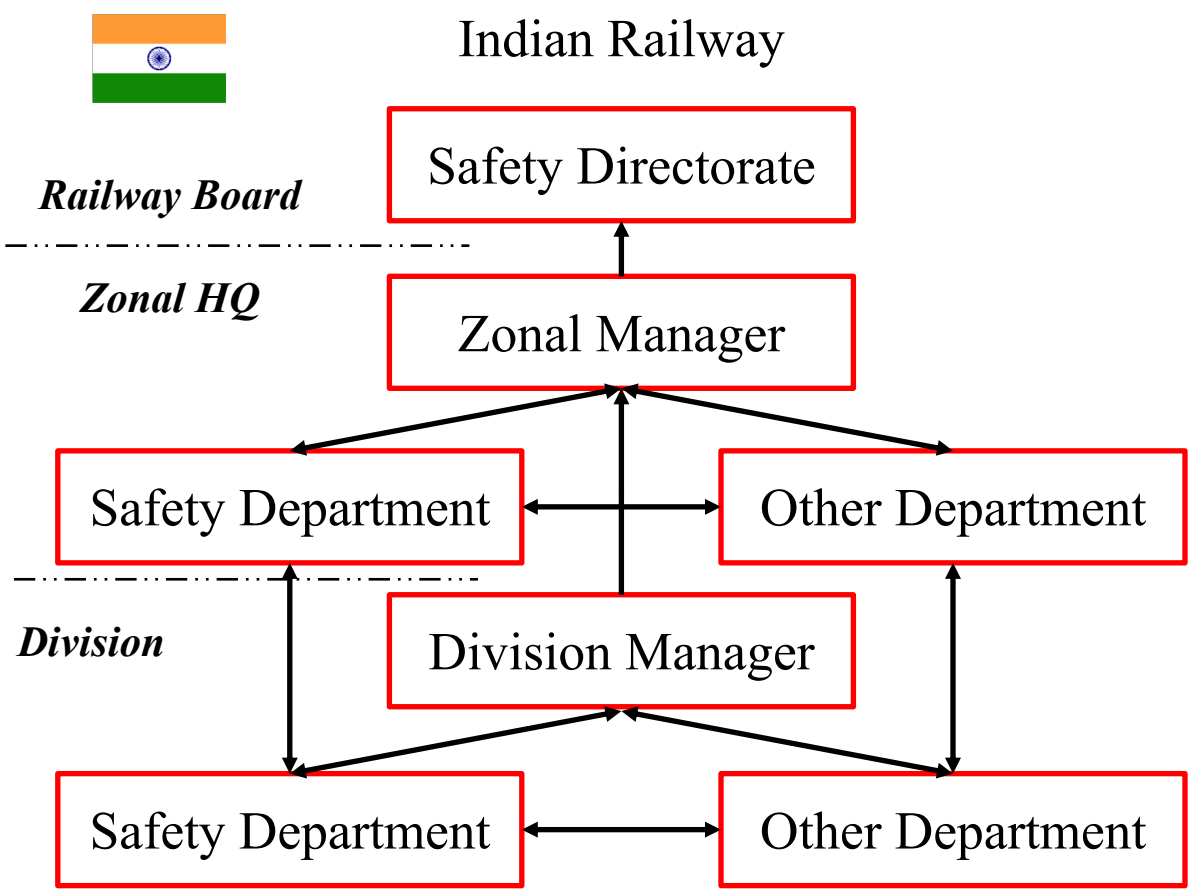
Overt and active involvement from Top-management me prove significant in improving the safety culture

Modifications in organizational structures or redefining roles and responsibilities may be beneficial in improving safety culture

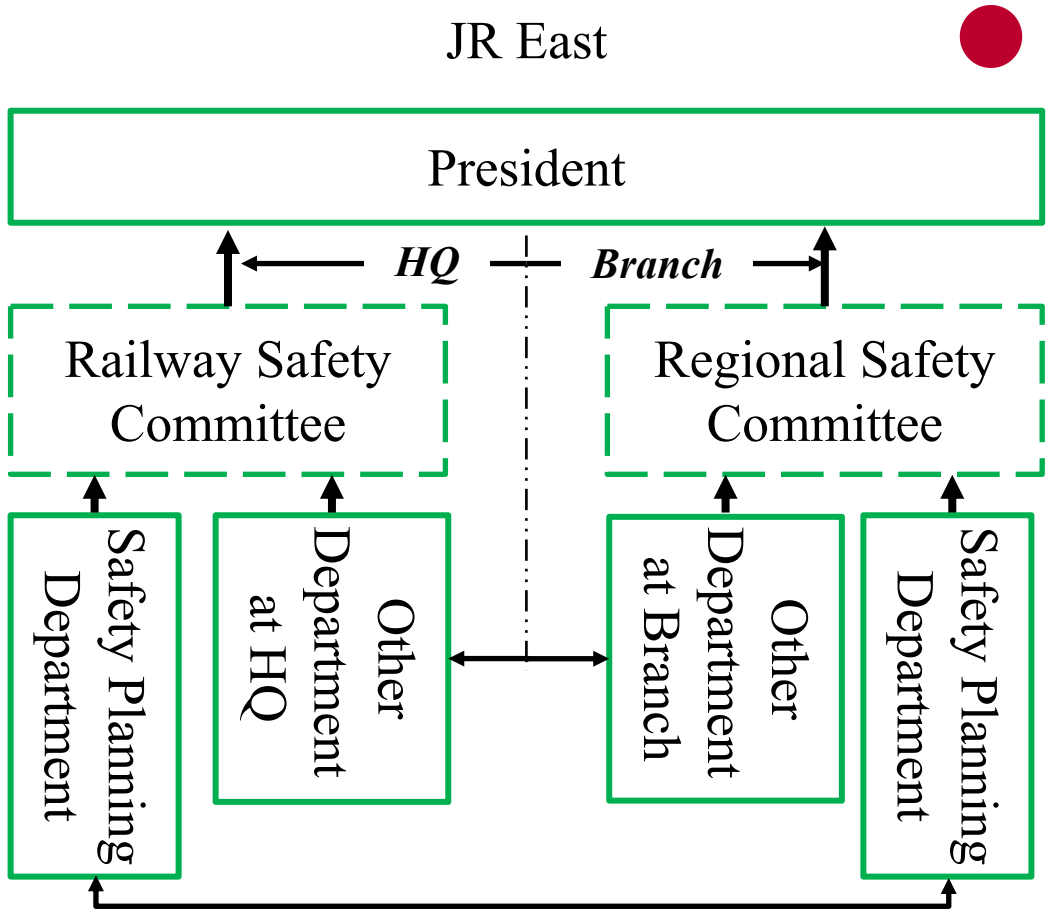


Safety coordination scheme (for trend analysis)

⟷ Represents Coordination



Proactive



Generative

Active involvement from top-management streamlines coordination and strengthen the safety culture

Training System

Calculative

Higher reporting authority

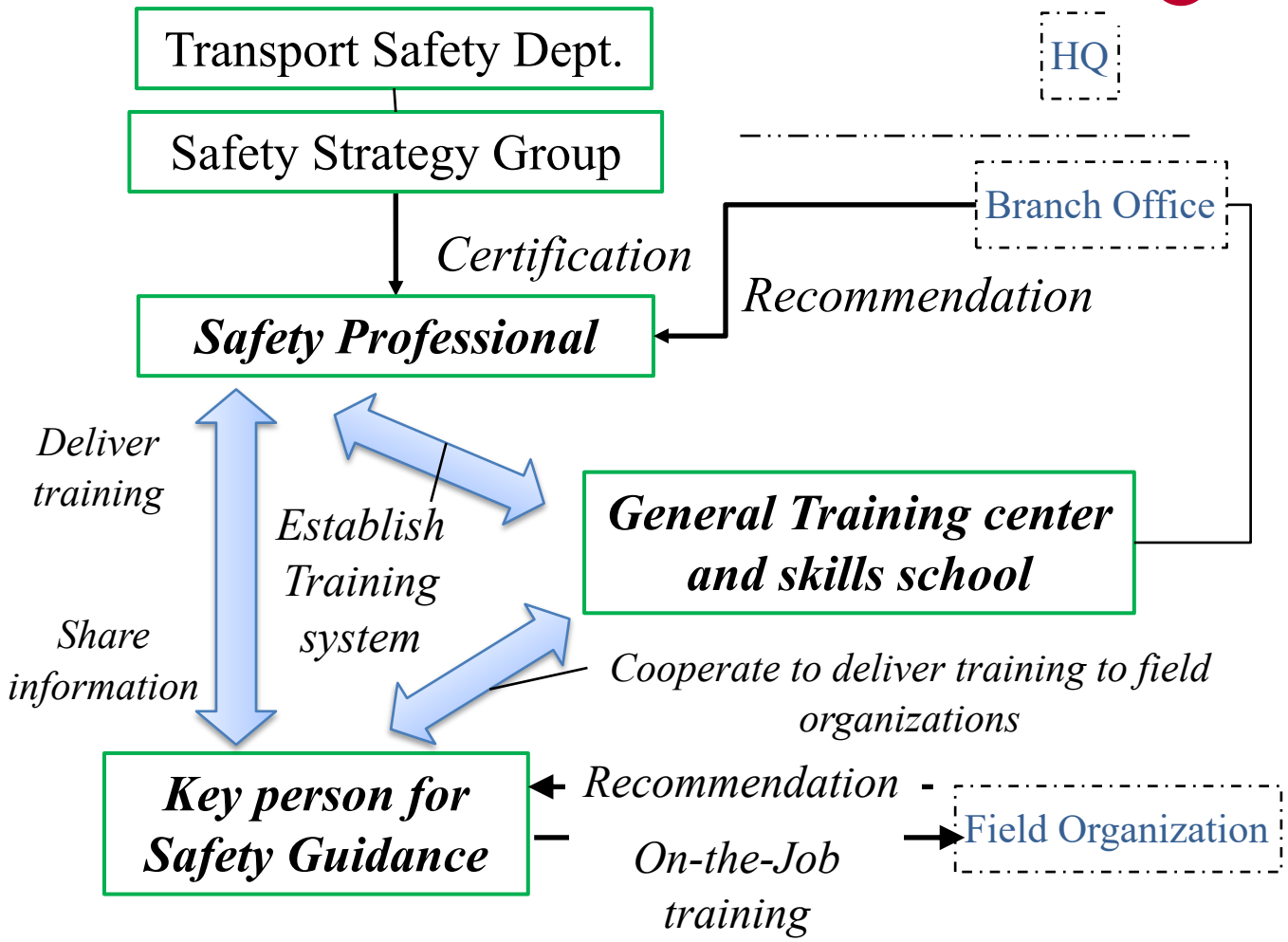
Certification are not enforced

Training Personnel → ***Training centers at Various levels***

Training

Employees

Generative



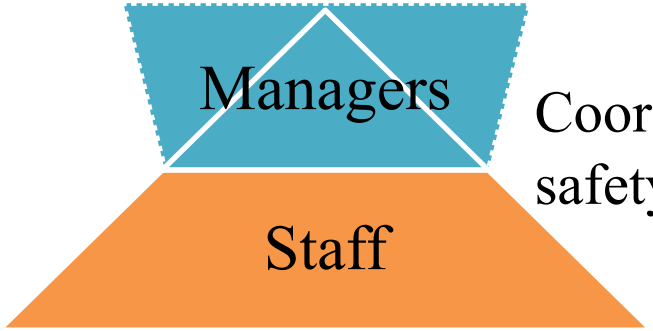
Top-management should enforce trainer certification, and ensure coordination to improve training methods

Challenges in improving safety culture and need for an integrated framework

Safety culture is not independent of the system itself

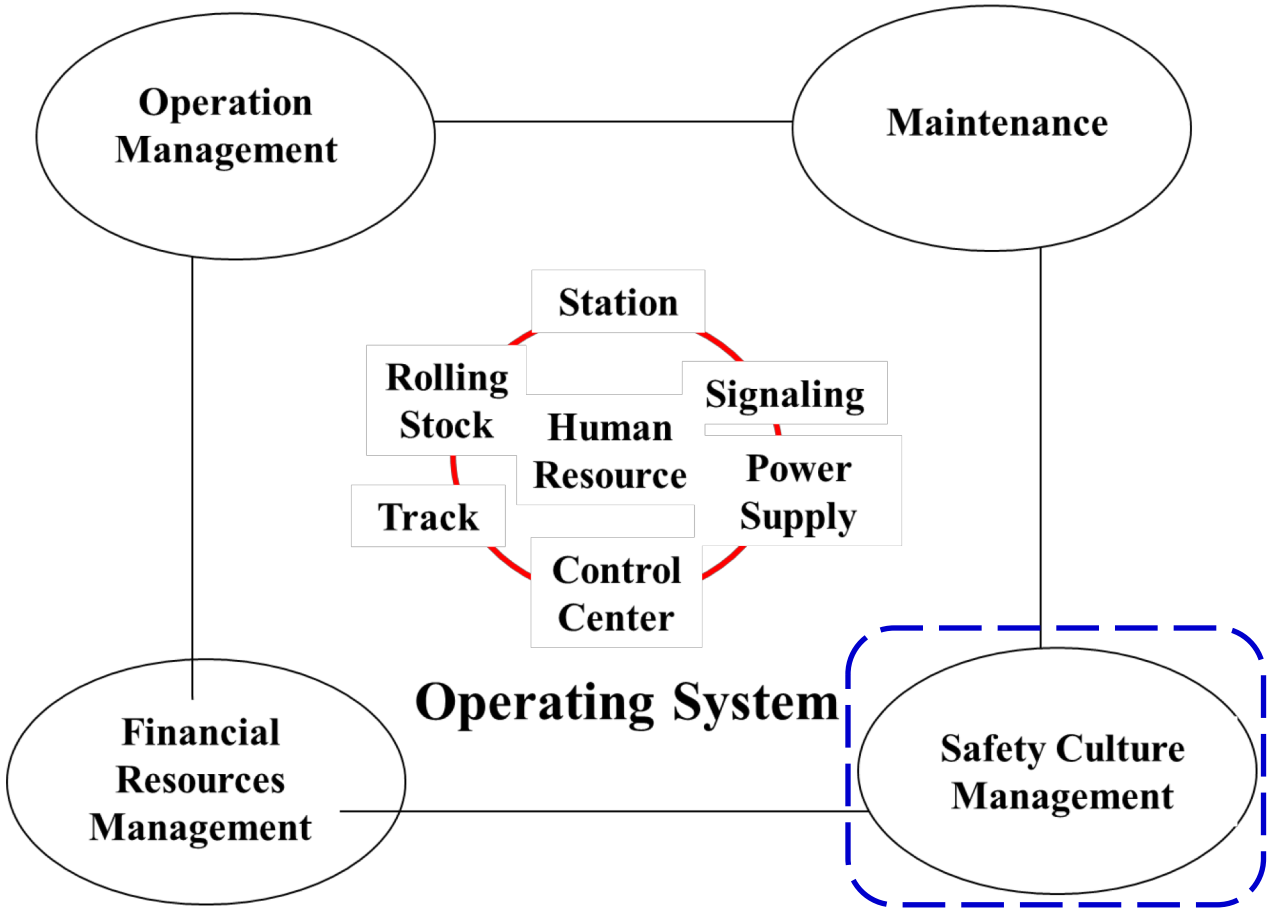
Effect of recruitment and appraisal process on safety culture *(Kakodkar, 2012)*

Top-Heavy



Coordination issues in safety management

Top-management must understand the complex interactions within the railway system



1. A ***multi-dimensional framework*** suitable to highlight the dynamics of the safety-culture was adopted and modified for application to the railway industry. Cases of IR and JR East

2. Authors found the present methodology suitable for developing and comparing temporal profiles of safety culture within organizations. However, more interviews must be conducted to reach convergence in the responses.

3. It was illustrated that a ***multi-pronged approach*** is necessary for the top-management to steer safety cultures across multiple dimensions

4. The paper argues that ***safety-culture*** and its dynamics cannot be considered in isolation but must be ***integrated with the system-thinking framework***.

Limitations and future improvements

1. Need to conduct more interviews to reach a convergence in the response
2. Needs to incorporate quantitative assessment and modelling
3. A temporal profile of safety culture needs to be created for one particular organization
    - A temporal profile could reveal insights on the challenges faced by one organization in improving the safety culture

Thank You