The Relationship between Safety Culture and Safety Performance in the South African Railways

Sethunya Matsie
Railway Safety Regulator

INTRODUCTION

- Safety culture is a concept that is difficult to define due to its complexity and subjective nature.
    - highly complex industrial systems could create a certain level of systemic unpredictability
    - This level of unpredictability could be more pronounced if the complex industrial system comprised of numerous sets of components with complex relationships
- The degree of complexity and subjectivity of safety culture has resulted in there being no universally accepted definition of the term.

RAILWAY SAFETY REGULATOR

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INTRODUCTION

- Safety culture definitions together seem to suggest that:
  - It is shaped by specific learned cultural traits
  - The cultural traits that shape it have a direct impact on the safety functionality of an organisation
  - Occurs within an explicit setting
- Cultural traits are thought to formulate specific attitudes and behaviours which determine how the people in that setting interact with and in an organisational environment.

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INTRODUCTION

- Safety performance often refers to:
  - To the quality of safety work
  - Various types of safety outcomes
- Usually measured indirectly through measuring and monitoring safety outcomes often referred to as safety performance indicators.
- In safety culture studies, safety performance indicators are usually used as dependent variables.

METHODS

- The RSR published the Safety Management System (SMS) Determination in 2018
- Safety culture is one of the mandatory sub-elements in the SMS Determination
- An organisation with a positive safety culture is characerised in the SMS Determination by:
  a) communication founded on mutual trust,
  b) shared perceptions of the importance of safety, and
  c) confidence in the efficacy of preventive measures.
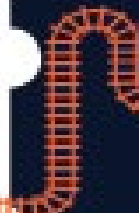
METHODS

- Key elements of a positive safety culture according to the SMS Determination are:
    1) Committed leadership
    2) Informed staff
    3) High levels of vigilance
    4) Promoting a "just culture" environment

METHODS

Data Collection:

- Assessing the extent to which railway operators in South Africa complied to the SMS Determination Safety Culture sub-element requirements
  - Evidence submitted by the operators
  - Safety performance of the railway operators
    - railway operational occurrence data, and safety management system reports

RESULTS

Summary of Safety Culture Evaluation

OPERATOR	1	2	3
Committed leadership	YES	NO	YES
Informed staff	YES	YES	YES
High levels of vigilance	YES	YES	YES
Promoting a "just culture" environment	YES	YES	NO
Promoting organisational flexibility	YES	YES	YES
Encouraging willingness to learn	YES	YES	YES

- Operator 2 & Operator 2 did not fully demonstrate compliance.
  - due to high vacancy rates across several departments for Operator 2 and the absence of information showing how the operator promoted a just culture environment.
- Operator 1 had a safety culture approach that was explicitly outlined and integrated with their safety management system.
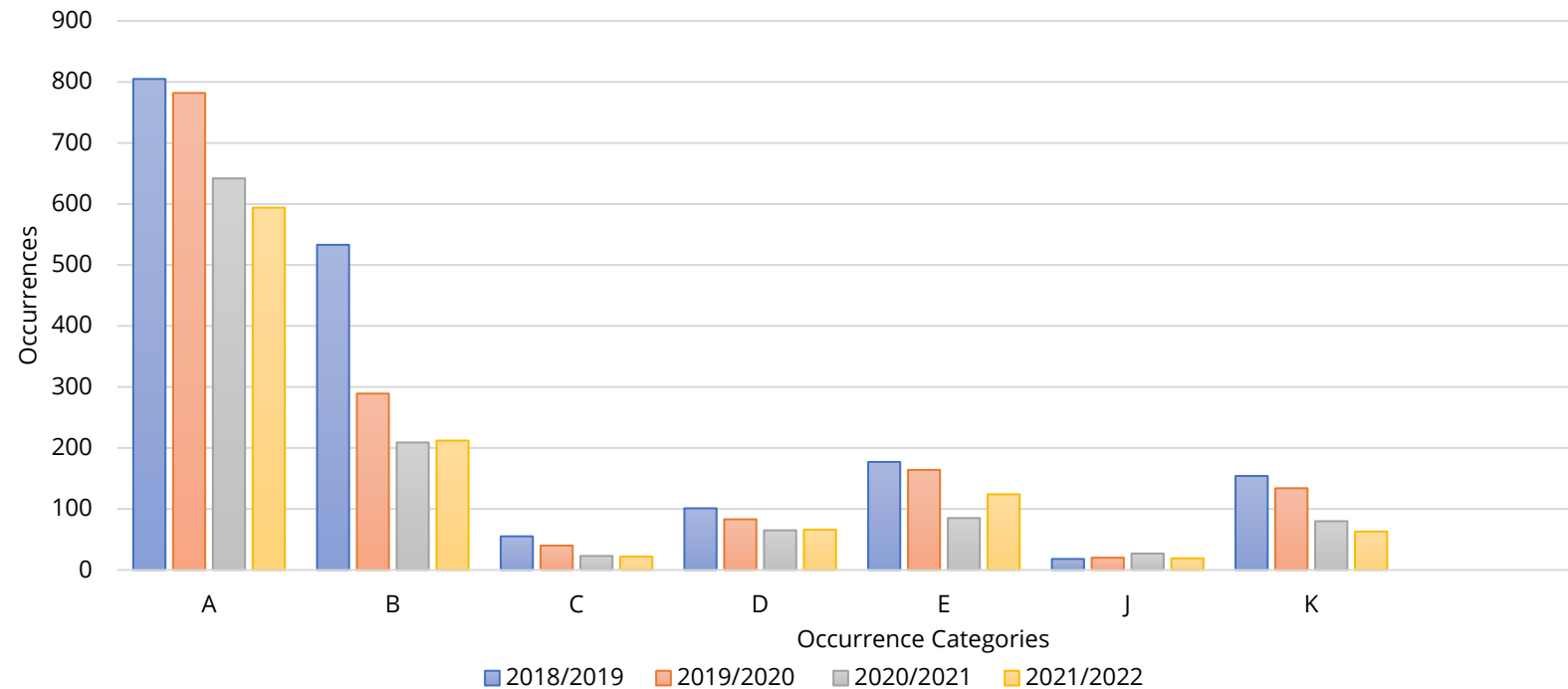
RESULTS

Categorisation description of the operational occurrence types

| Category	Description
A	Collisions during movement of rolling stock
B	Derailments during movement of rolling stock
C	Unauthorised movements
D	Level crossing occurrences
E	People struck by trains during movement of rolling stock
F	People-related occurrences: trains outside station platform areas or in section
G	Passenger-related occurrences: travelling outside designated area of train
H	People-related occurrences: platform-train interchange
I	People-related occurrences: station infrastructure
J	Electric shock
K	Spillage/leakage, explosion or loss of dangerous goods
L	Fires

RESULTS

Summary of Safety Culture Evaluation

- General reduction in occurrences from 2018/2019 to 2019/2020 except for electric shock incidents which had a slight increase between those years.
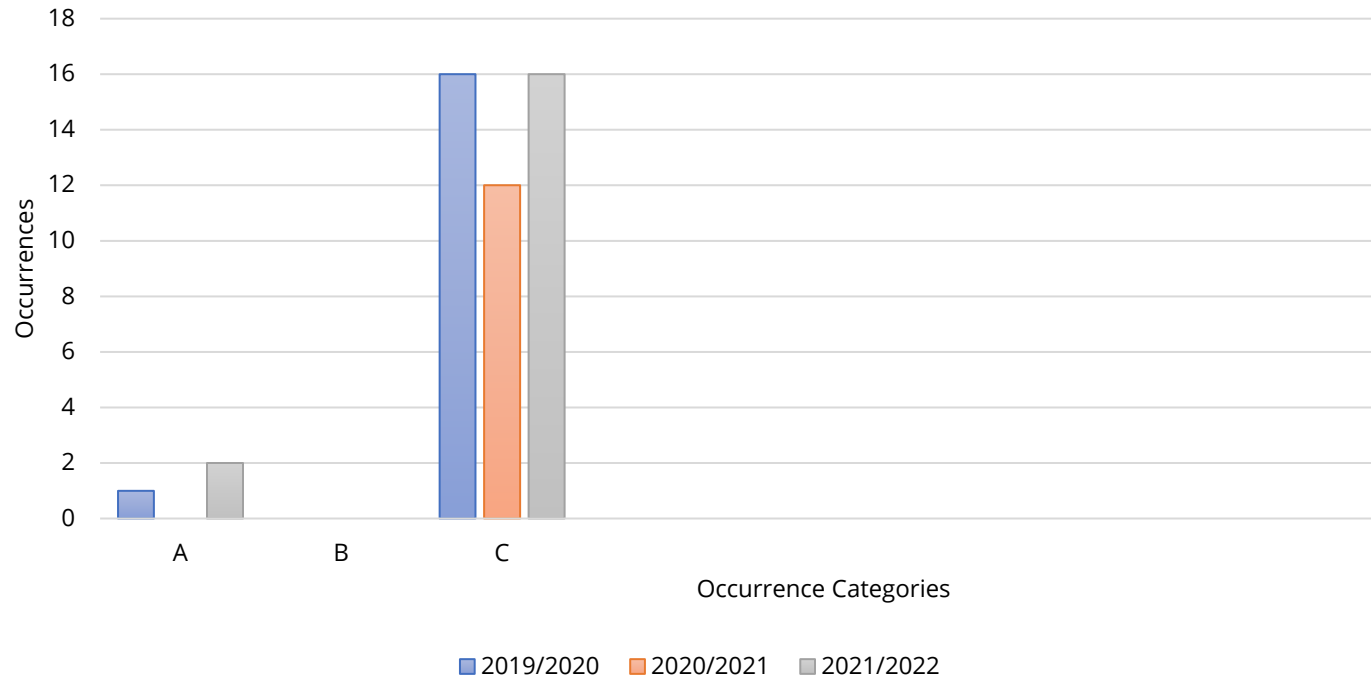
RESULTS

Summary of Safety Culture Evaluation
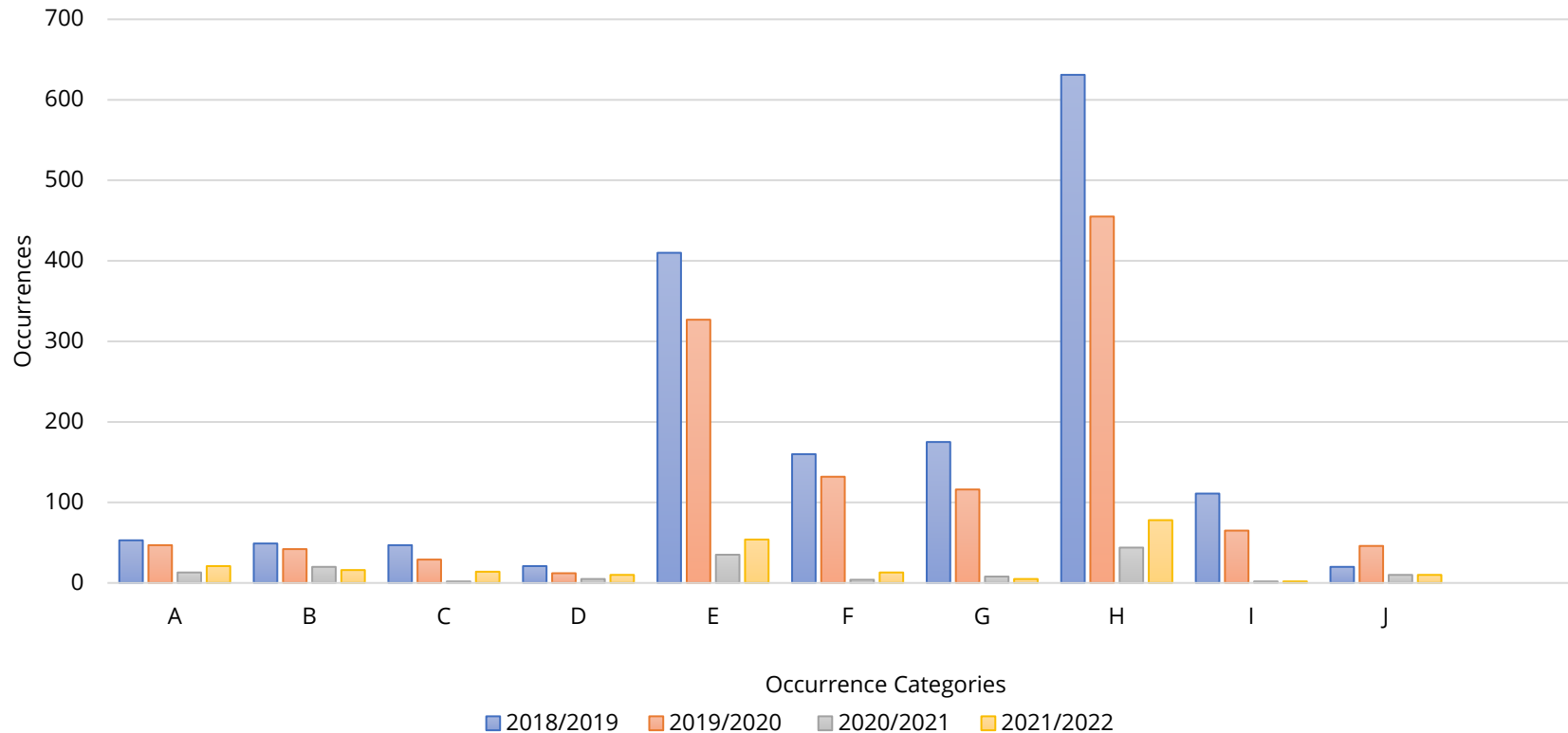
- General decrease in the number of occurrences reported from 2018/2019 to 2021/2022 for all categories except for category J (electric shock).

RESULTS

Summary of Safety Culture Evaluation

- Occurrence of collisions between 2019/2020 and 2021/2022.
- Number of unauthorised movements reduced in 2020/2021 then increased in 2021/2022.

DISCUSSION

- There was a lot of variability in the results of the data collected
  - Variability tends to emerge depending on how safety culture is measured and the specific safety performance measures used
- Improvement in safety performance for Operator 1.
  - The only operator with a discernible and specified safety culture.
  - General consistent decreases in occurrences observed.
- Operator 2 did not comply 100%
  - Managed to improve their safety performance approximately on an annual basis.

DISCUSSION

- Less consistent and general improvements in safety performance noted for Operator 3.
    - did not provide sufficient evidence to show the implementation or existence of a just culture environment
- The safety performance improvements appear to align to their relatively positive safety culture.
- May be determined that a positive safety culture can be associated with improved safety performance.
    - The data collected appears to link a positive safety culture to a positive safety performance with improvements in the former possibly able to lead to improvements in the latter.

CONCLUSION

- Safety culture within the dominant railway operators in South Africa appears to be positively correlated to safety performance.
    - Safety culture may have tremendous sway in safety functionality of operators and should therefore be measured and managed.
- Safety culture may indeed have a certain predictive ability and effect on safety performance appear to align to their relatively positive safety culture.

Thank You