

**Assessing 'Risk Culture' Using  
Risk Management, Risk  
Perception and Safety Climate  
Measures**

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# **What is 'risk culture'?**

- **How risk is perceived (within an organization, group, or community)**
- **How risk is managed**
- **The internal environment (of the organization, group, or community)**
- **The external environment (of the organization, group or community)**

# How can 'risk culture' be measured?

- Content analysing company documents and website material (espoused culture)
- Direct/indirect observation (enacted culture)
- Analysing interview and focus group data
- Content analysing media reports/other external accounts (e.g., accident reports)
- Using psychometrically robust scales
- Etc – desirable to *triangulate* measures

# Research aims

**Develop psychometrically robust scales, meaning that they ....**

- **Form defined constructs (examples follow throughout this presentation)**
- **Have good internal reliability (assessed by Cronbach's alpha –  $\alpha$ )**
- **Can validly be used on different samples**

# **Can make comparisons ...**

- **Of an organization's safety and risk performance over time, or to assess the impact of safety/risk interventions**
- **Between groups within an organization – e.g., to study sub-cultures**
- **Between organizations within a sector – inter/nationally (only option for some organizations – e.g., large airlines)**
- **Across sectors – using valid generic measures**

# **This presentation considers psychometric measures of ...**

- **Risk perception (how management and workers perceive risks)**
- **Risk management (how risks are managed, as seen by management)**
- **Safety climate (an organization's internal safety environment, as seen by workers and management)**

# **Developing risk perception and risk management scales**

**Respondents from three organizations**

- 1. Australia, rail sector (N=101)**
- 2. Hong Kong, rail sector (N=188)**
- 3. Hong Kong, electricity sector (N=173)**

# Risk perception scales

1. 'Valuing staff' (5 items,  $\alpha$  .75)
2. 'External orientation' (4 items,  $\alpha$  .68)
3. 'The way we do things round here'  
(3 items,  $\alpha$  .68)
4. 'Learned helplessness' (2 items,  $\alpha$  .79)



# **Comparing organizations' managers' risk perceptions**

**(English language version of questionnaire)**

- **'Valuing staff' – HK (rail) better than HK (electricity), which was better than Australia (rail)**
- **'External orientation' – no differences**
- **'The way we do things round here' – Australia rail higher than the two HK organizations**
- **'Learned helplessness' – HK (rail) lower than the other two organizations**

# **Comparing English and Chinese language versions of the risk perception scales**

**Hong Kong rail organization**

- 1. 'Valuing staff' – Chinese language version sample rated this higher**
- 2. 'External orientation' – no difference**
- 3. 'The way we do things round here' – Chinese language sample rated higher**
- 4. 'Learned helplessness' – no difference**

# **Comparing English and Chinese language versions of the risk perception scales**

## **Hong Kong electricity organization**

- 1. 'Valuing staff' – no difference**
- 2. 'External orientation' – English language version sample rated higher**
- 3. 'The way we do things round here' – no difference**
- 4. 'Learned helplessness' – no difference**

# Risk management scales

1. **'Strategy & leadership'** (5 items,  $\alpha$  .86)
2. **'External factors'** (4 items,  $\alpha$  .80)
3. **'Leadership & resources'**  
(7 items,  $\alpha$  .91)
4. **'Benchmarking & information'**  
(7 items,  $\alpha$  .90)
5. **'Risk culture'** (4 items,  $\alpha$  .86)

# **Safety climate scales – history**

- **1994** – developed safety climate measure within UK electricity sector (6 scales)
- **2001** – modified for road construction sector in Australia (6 scales)
- **2003** – developed for civil aviation sector in Australia (4 scales) (Evans)
- **2004** – modified for NSW rail organisation (3 scales)
- **2005** – further developed for QLD rail sector (5 scales) (Glendon & Evans)

# **Safety climate scales from NSW rail sample**

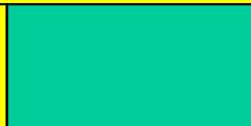
- 1. 'Management commitment to safety'  
(7 items,  $\alpha$  .92)**
- 2. 'Adequacy of equipment'  
(3 items,  $\alpha$  .83)**
- 3. 'Training & procedures'  
(4 items,  $\alpha$  .86)**

# Extent of agreement on Scale 1: 'Management commitment to safety'

<i>Group</i>	Guard	Sign	Maint	Stat'n	Mgmt	New
Drivers						
Guards	-					
Signals Staff	-	-				
Maintenance	-	-	-			
Station Staff	-	-	-	-		
Management	-	-	-	-	-	

Key

Agree



Differ



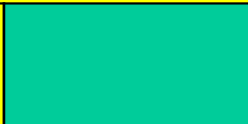
NSW rail sample

# Extent of agreement on Scale 2: 'Adequacy of equipment'

<i>Group</i>	Guard	Sign	Maint	Stat'n	Mgmt	New
Drivers						
Guards	-					
Signals Staff	-	-				
Maintenance	-	-	-			
Station Staff	-	-	-	-		
Management	-	-	-	-	-	

Key

Agree



Differ



NSW rail sample



# Extent of agreement on Scale 3: 'Training & procedures'

<i>Group</i>	Guard	Sign	Maint	Stat'n	Mgmt	New
Drivers						
Guards	-					
Signals Staff	-	-				
Maintenance	-	-	-			
Station Staff	-	-	-	-		
Management	-	-	-	-	-	

Key

Agree



Differ



NSW rail sample

# **Safety climate scales from QLD rail sample**

- 1. 'Communication & safety information' (11 items,  $\alpha$  .90)**
- 2. 'Rosters & shifts' (6 items,  $\alpha$  .91)**
- 3. 'Signalling equipment' (2 items,  $\alpha$  .80)**
- 4. 'Equipment & maintenance' (5 items,  $\alpha$  .80)**
- 5. 'Management commitment to safety' (4 items,  $\alpha$  .87)**

# Group comparisons (QLD rail)

<b>Group</b>	<b>Scale</b>	<b>1</b>	<b>2</b>	<b>4</b>	<b>5</b>
<b>Train drivers</b>		<b>2.85</b>	<b>2.24</b>	<b>1.84</b>	<b>2.96</b>
<b>Train guards</b>		<b>2.81</b>	<b>2.32</b>	<b>2.49</b>	<b>2.54</b>
<b>Station staff</b>		<b>2.64</b>	<b>2.49</b>	<b>2.01</b>	<b>2.97</b>
<b>Trackside</b>		<b>3.04</b>	<b>3.26</b>	<b>2.18</b>	<b>3.32</b>
<b>RS maintenance</b>		<b>3.05</b>	<b>3.17</b>	<b>2.28</b>	<b>3.20</b>
<b>Management</b>		<b>3.31</b>	<b>3.37</b>	<b>2.34</b>	<b>3.67</b>
<b>Administration</b>		<b>3.32</b>	<b>3.26</b>	<b>2.97</b>	<b>3.08</b>

Colours represent significant group mean differences by scale

# Conclusions

- 1. It is possible to develop robust scales to measure a number of *risk culture* components, including risk perceptions, risk management, and safety climate**
- 2. Risk perception scales can be used to compare organizations in the *same sector in different countries***

# Conclusions

- 3. Risk perception scales can be used to compare organizations in *different sectors* and in *different national cultures***
- 4. Safety climate scales can be used to compare occupational groups *within* an organization**
- 5. Cultural differences in how items are answered may be revealed by *different language versions* of the same scales**

# Next steps

- 1. Compare NSW rail organization's safety climate in early 2004 with late 2005 (larger sample)**
- 2. Determine the nature of any association between safety climate scale scores and workplace injuries for different occupational groups**
- 3. Further explore risk management scales – e.g., comparing three organizations**

# Further work

- **Extend testing of risk perception, risk management and safety climate scales to other sectors and in other countries/cultures**
- **Extend risk culture methodology – e.g., to include observation, interviews and focus groups, and documentary analysis**

**Thank you**

**谢谢**

**Questions?**

**问题?**