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 – α)**
- **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, α .75)**
2. **‘External orientation’ (4 items, α .68)**
3. **‘The way we do things round here’ (3 items, α .68)**
4. **‘Learned helplessness’ (2 items, α .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, α .86)**
2. **'External factors' (4 items, α .80)**
3. **'Leadership & resources' (7 items, α .91)**
4. **'Benchmarking & information' (7 items, α .90)**
5. **'Risk culture' (4 items, α .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, α .92)

2. ‘Adequacy of equipment’ (3 items, α .83)

3. ‘Training & procedures’ (4 items, α .86)

Extent of agreement on Scale 1: ‘Management commitment to safety’

Group	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’

Group	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’

Group	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, α .90)
2. ‘Rosters & shifts’ (6 items, α .91)
3. ‘Signalling equipment’ (2 items, α .80)
4. ‘Equipment & maintenance’ (5 items, α .80)
5. ‘Management commitment to safety’ (4 items, α. 87)

Group comparisons (QLD rail)

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

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

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Questions?

问题?