

Reduction of Occupational Accidents: Evidence-based Prevention and the Prevention Index (PI_{TOP})

¹Martin Arning, ²Frank Bochmann, ²Yi Sun, ^{1,2}Thomas Heitmann, ¹Jutta Börger

¹German Social Accident Insurance Institution for the Woodworking and Metalworking Industries (BGHM), Germany

²Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA), Germany

Objective

PI_{TOP} is a practical measurement tool which is currently used by the German Social Accident Insurance Institution for the Woodworking and Metalworking Industries to monitor injury prevention activities at workplaces. This 12-item scoring system has 3 subscales, referring to Technical, Organisational and Personnel aspects (Tab. 1) and has a rating value ranging from 1–9 (Tab. 1). The reliability and validity of this instrument were evaluated in a cross-sectional survey.

Methods

- The inter-rater-reliability was examined by 2 trained supervisors in 128 companies. The agreement was quantified by interclass correlation coefficient (ICC)
- Content validity was evaluated by quantifying the association between PI_{TOP}-values and 5-years injury rates of 30,000 companies (Poisson regression analysis)
- Construct validity was analyzed by factor analysis (principal component analysis)

Subscales	Items	Agreement [%]	ICC
Technics	Appropriate work and protective equipment	76.2	0.67
	Ergonomic workplaces	74.6	
	Safe handling and storage activities	81.2	
	Minimization of physical, biological and chemical noxas	77.9	
Organization	Organization is appropriate for work tasks and personnel	74.6	0.74
	Good risk assessment with initiation of appropriate activities	81.2	
	Employer's attitude towards occupational safety is positive	72.1	
	Company is well prepared for predictable disturbances and emergencies	77.1	
Personnel	Qualifications of employees match the work tasks	78.7	0.64
	Everyone knows and accepts its role for occupational safety	75.4	
	Communication is good	72.1	
	Employees work safety-conscious	79.5	

Table 1: PI_{TOP} – a 12-item scoring system and Results of inter-rater-reliability assessment

Items	Factor Loading		
	Factor 1	Factor 2	Factor 3
T1	0.80	0.39	0.40
T2	0.82	0.38	0.39
T3	0.81	0.38	0.39
T4	0.80	0.40	0.38
O1	0.39	0.80	0.40
O2	0.38	0.80	0.35
O3	0.37	0.78	0.41
O4	0.40	0.79	0.40
P1	0.41	0.41	0.79
P2	0.40	0.42	0.78
P3	0.38	0.39	0.80
P4	0.43	0.40	0.78

Table 2: Results of factor analysis

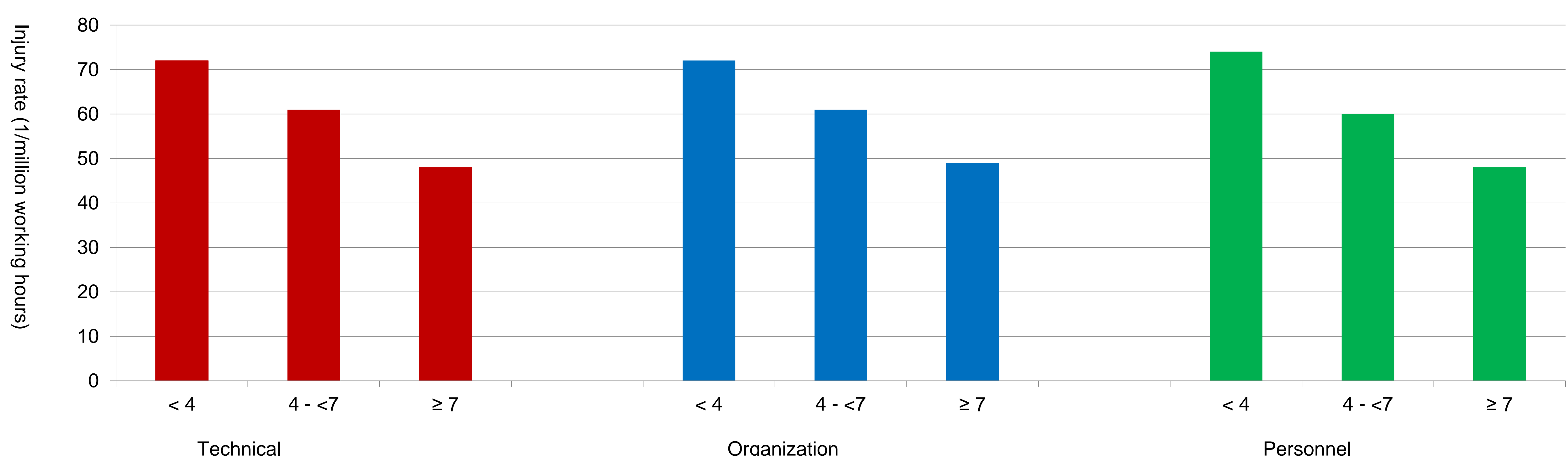


Figure 1: Association between PI_{TOP}-values and 5-year average injury rates

Results

- The analysis demonstrates a good inter-rater-reliability
- Factor analysis identified three component subscales which meet exactly the structural measure theory behind the score.
- The Poisson regression analysis demonstrates a significant association between PI_{TOP}-values and 5-years injury rates.

Conclusion

This analysis indicates that PI_{TOP} is a valid and reliable instrument, it will be used to monitor safety conditions at workplaces in a longitudinal practical approach.

