Assessing the Utility of the ILO Toolkit in Singapore

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Introduction

- ILO Toolkit – simple and practical guidance for SMEs in developing countries
- MOM contributes to Task Force 10: Preventive Technology of the WHO CCs Network Work Plan 2002–2005

MINISTRY OF MANPOWER

SAFE & HEALTHY WORKPLACE

Objectives

- Investigate issues involved in applying the ILO Toolkit
- Evaluate its utility in SMEs in the Singapore context
- Compare ILO Toolkit with the semi-quantitative risk assessment (SQRA) method developed by MOM

Phases

- 1st phase – testing of ILO Toolkit in parallel with the SQRA method

- 2nd phase – SMEs invited to apply the Toolkit method using their own resources

1st Phase

- 17 selected processes from SMEs
- Industries:
  - Metalworking
  - Paint manufacturing
  - Printing
  - Jewellery
  - Dry-cleaning
  - Electronics
  - Chemical

Semi-quantitative Risk Assessment (SQRA) Method

Breakdown of work process

Identification of chemicals for each task

Determination of hazard rating (HR)

Conducting work inspection and interviews

Method 1: Computing exposure index using exposure factors (without air monitoring)

Method 2: Obtaining exposure concentrations from air monitoring

Method 3: Calculating exposure concentrations using empirical and theoretical equations

Determination of exposure rating (ER)

Evaluation of risk i.e. risk level = $\sqrt{(HR \times ER)}$

Taking corrective actions

Record of assessment

Review of assessment

Any changes in production rate and modification of the plant

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Methodology of Comparison

- ILO Toolkit and SQRA method tested independently on the same process by industrial hygiene engineers
- Control Approach of ILO Toolkit *vs* Risk Level of SQRA method
- 2 aspects of comparison
  - theoretical and empirical

Mapping of ILO Toolkit Control Approach and SQRA Risk Level

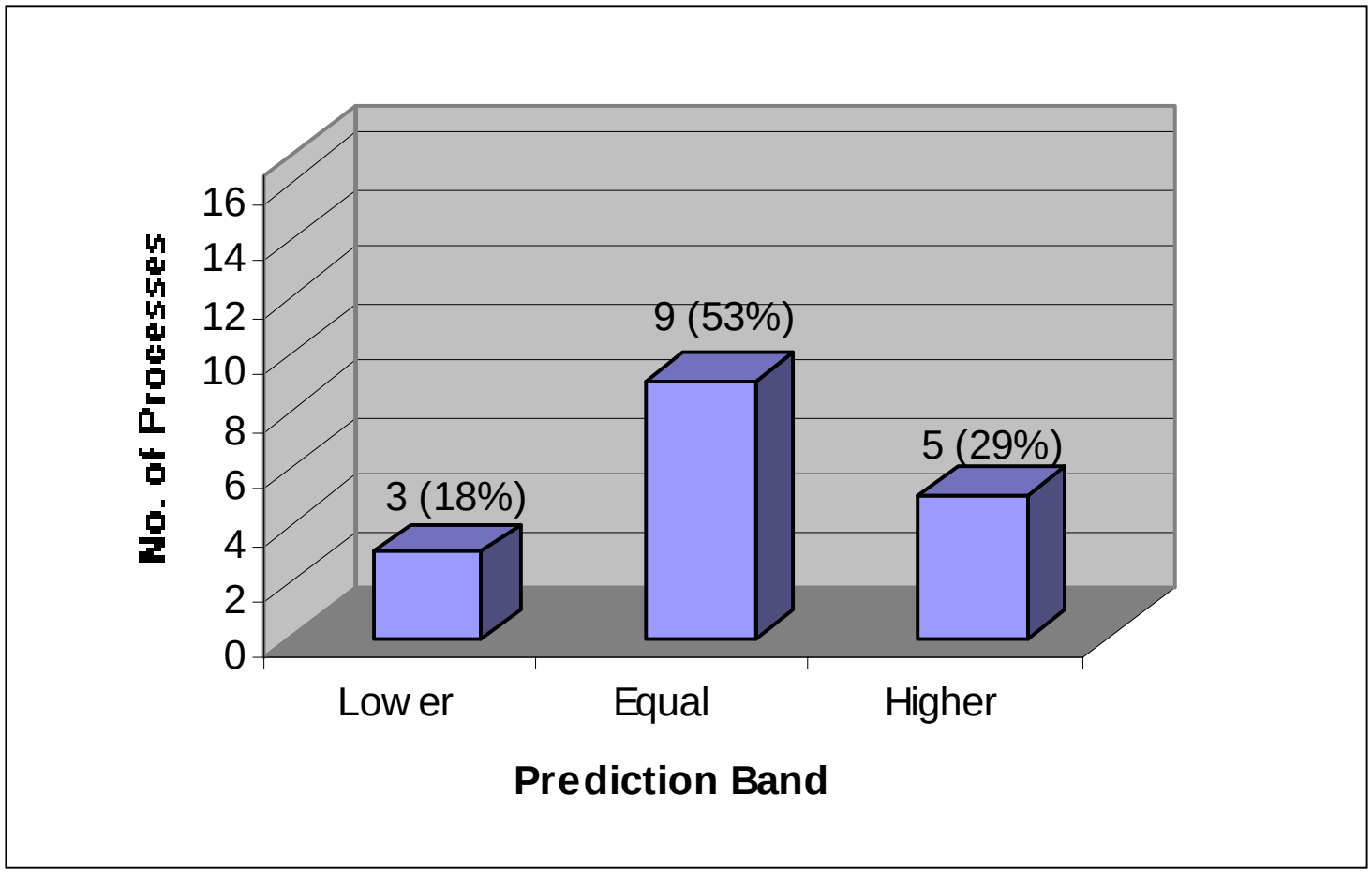
ILO Toolkit Control Approach	MOM Risk Assessment	
	Risk Level	**Control Approach**
1. General ventilation	1. Negligible	- No action required - Review assessment every five years
	2. Low	- Maintain control - Determine if air monitoring is required - Review assessment every four years
2. Engineering control	3. Medium	- Implement and maintain control - Determine if air monitoring is needed - Determine if employee training is needed - Review assessment every three years
3. Containment	4. High	- Implement effective engineering control - Conduct air monitoring - Conduct training for employees - Adopt Respiratory Protection Programme - Provide suitable personal protective equipment - Develop and implement safe and correct work procedures - Establish first-aid and emergency procedures if necessary - Reassess the risk after all the above have been done
4. Special	5. Very high	- Consult specialist for advice - Implement effective engineering control - Conduct air monitoring - Conduct training for employees - Adopt Respiratory Protection Programme - Provide suitable personal protective equipment - Develop and implement safe and correct work procedures - Establish first-aid and emergency procedures if necessary - Reassess the risk (carry out a detailed risk assessment) after all the above have been done

Theoretical Comparison

- Risk level of SQRA method derived using exposure factors:
  - Vapour pressure or particle size
  - Ratio of Odour Threshold/Permissible Exposure Level
  - Amount of chemical used per week
  - Duration of work per week
  - Hazard control measure

- Existing exposure control measures not considered in calculation of risk level
- Direct comparison with Toolkit to evaluate consistency of both models

Results – Theoretical Comparison



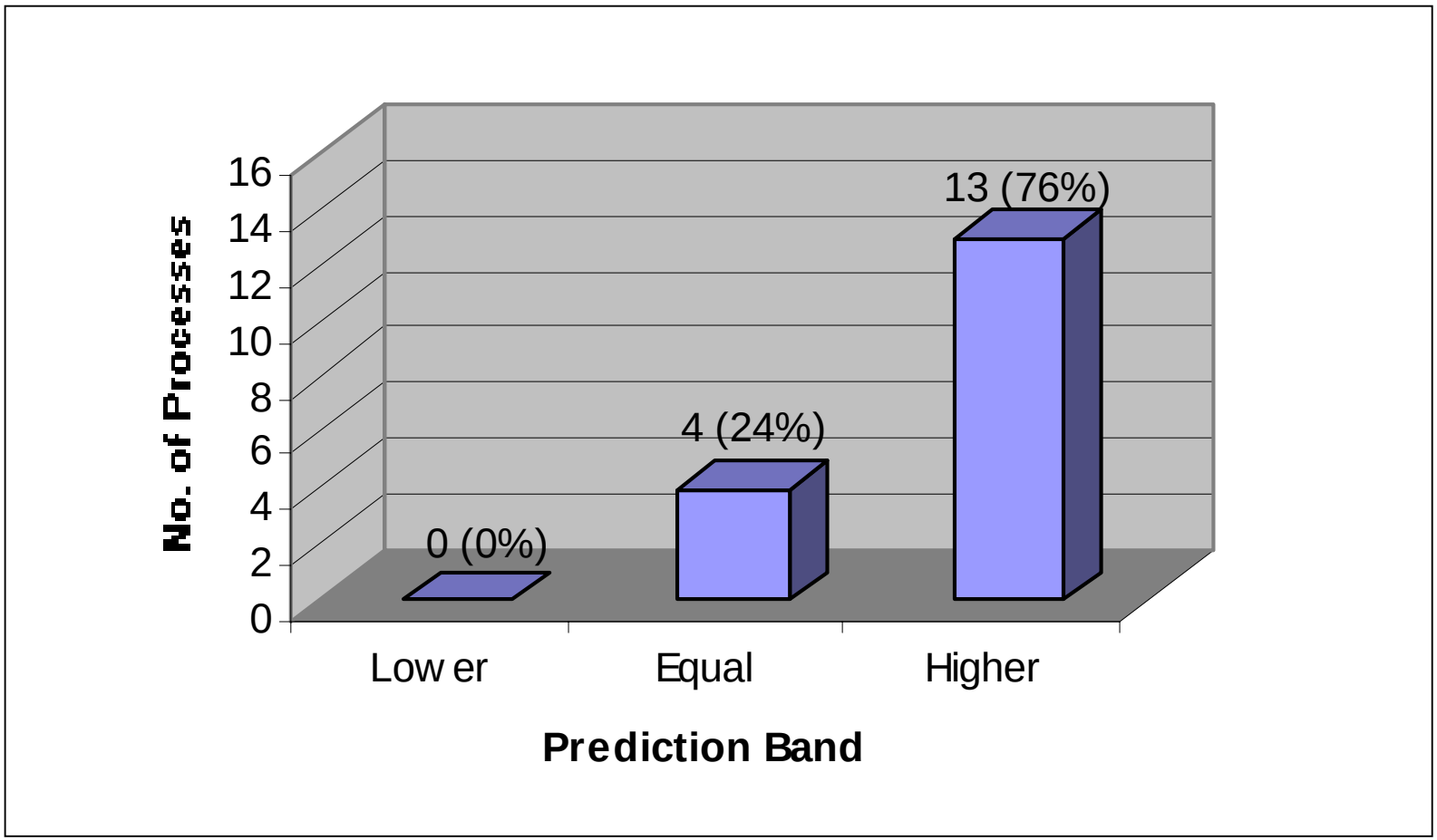
Total no. of processes = 17

Prediction Band	***Description***
Lower	Control approach is in a lower band than risk level
Equal	Control approach is in the same band as risk level
Higher	Control approach is in a higher band than risk level

Empirical Comparison

- Actual exposure data used to derive risk level from SQRA method
- Measurements taken during processes with most data obtained by personal sampling
- Assess suitability of control measures proposed by ILO Toolkit in controlling exposure

Results – Empirical Comparison



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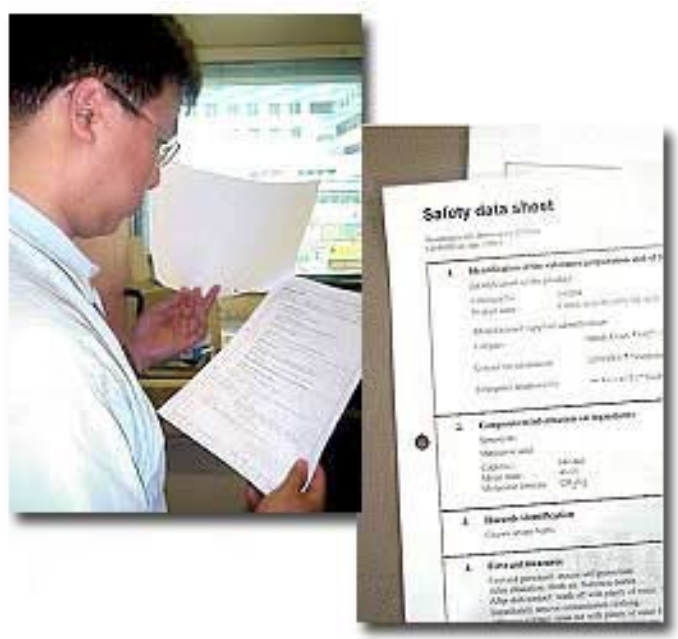
Discussion – Issues encountered

- Availability of risk-phrases for hazard group identification
  - MSDSs prepared by chemical manufacturers and suppliers outside the EU do not contain R-phrases
  - Lack of R-phrases in most MSDSs from local chemical suppliers in Singapore



Availability of R-phrases

- R-phrases obtained from internet sources or from European MSDS of the same chemical
- Suggest to include in Toolkit:
  - Hazard groups of commonly-used chemicals
  - Means of generating hazard groups for mixtures
- Singapore's initiative: the MSDS Knowledge Workbench

Dustiness

- Qualitative classification of dustiness bands:

  Low - pellet like solids that don't break up. Little dust is seen during use e.g. PVC pellets, waxed flakes.

  Medium - crystalline, granular solids. When used, dust is seen, but settles out quickly. Dust is left on surfaces after use e.g. soap powder.

  High - fine, light powders. When used, dust clouds can be seen to form and remain in the air for several minutes e.g. cement, carbon black, chalk dust.

- Difficulty in distinction between medium and high dustiness
- Observation of dust clouds subjective
- Suggest to use a more quantitative approach for dustiness evaluation

Scale of Use

- Ambiguity in classification

Quantity	Solid		Liquid	
	Weight	**Typically received in**	**Volume**	**Typically received in**
Small	Grams	Packets or bottles	Millilitres	Bottles
Medium	Kilograms	Kegs or drums	Litres	Drums
Large	Tonnes	Bulk	Cubic metres	Bulk

- E.g. lead oxide powder packed in bags (small or medium?)
- Suggest to include the range of the batch sizes in each scale-of-use band

  E.g. Small: < 1 kg for solids or 1 L for liquids
- Classification based only on quantity used instead of both quantity and packaging

Training of Users

- Basic knowledge of chemical hazards identification, evaluation and control required
- Use of Toolkit e.g. identification of the hazard group using R-phrases may not be straightforward
- Short training program in basic chemical hazards management & on the practical use of the Toolkit

Conclusion

- Theoretical comparison: ILO Toolkit and SQRA method are fairly consistent
- Empirical comparison: more precautionary control approaches derived from ILO Toolkit in majority of cases
- Main issues in the application include quality of MSDS and training of users
- Further field tests to be conducted to assess utility

Thank You