

Nanomaterial Safety Management in Practice: Stakeholder Perspectives on Implementation Challenges and Organizational Approaches in Singapore



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Mr. Sriram Prasath
Dr. Kavitha Palaniappan
Prof. Sally Chan

Abstract

This study investigates nanomaterial safety management through semi-structured interviews with 14 experts across industry, research, and regulatory domains in Singapore's nanotechnology sector.

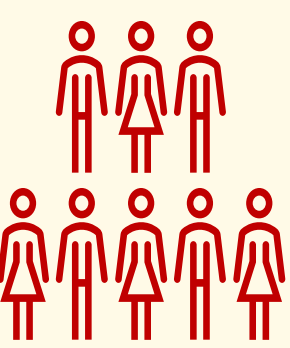
Key findings reveal a critical **operational divide** between **advanced manufacturing** environments with **robust engineering controls** and **downstream implementation** contexts with limited resources.

Technical challenges in exposure measurement and characterization emerged as significant barriers across contexts.

Results highlight the need for ***tailored safety approaches*** addressing diverse organizational contexts.

Methodology

Inclusion criteria: Minimum 5 years experience in nanotechnology sector



Participants: 14 subject matter experts across industry, research, and regulatory domains



Sampling: Purposive sampling supplemented with snowball recruiting



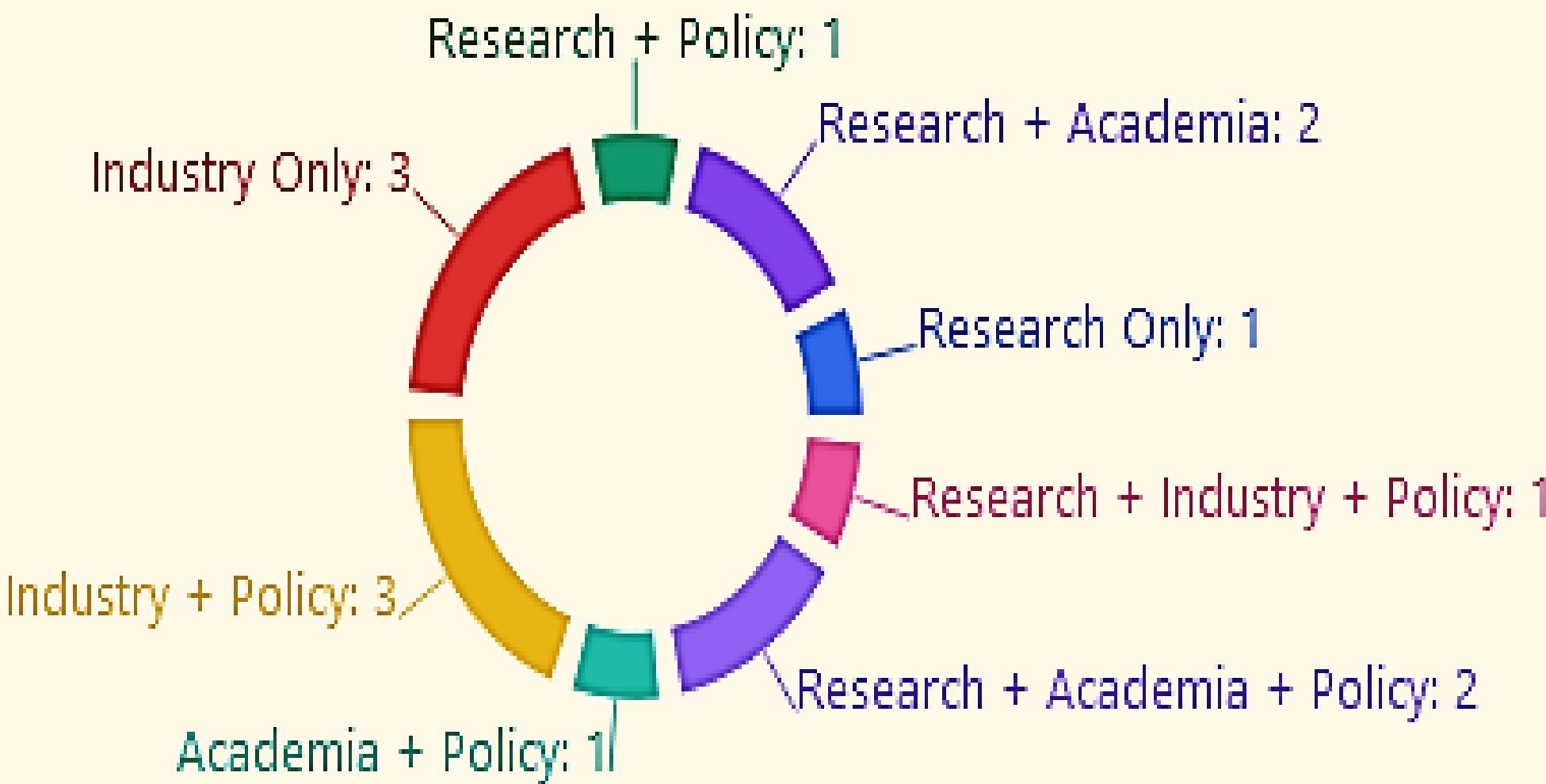
Data Collection: Semi-structured interviews conducted virtually (26-64 min) based on NTRC questionnaire



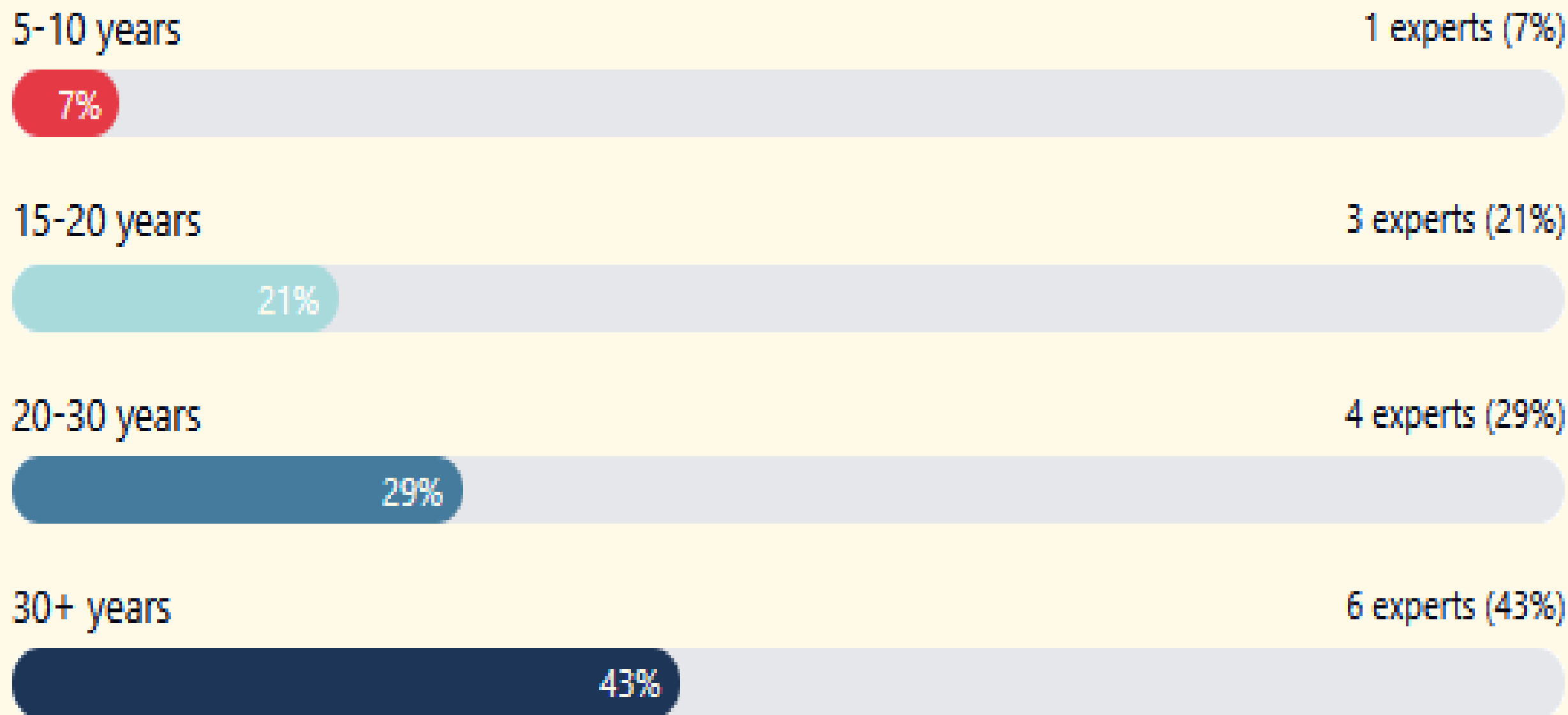
Analysis: Thematic analysis using MAXQDA with combined deductive/inductive coding

Results

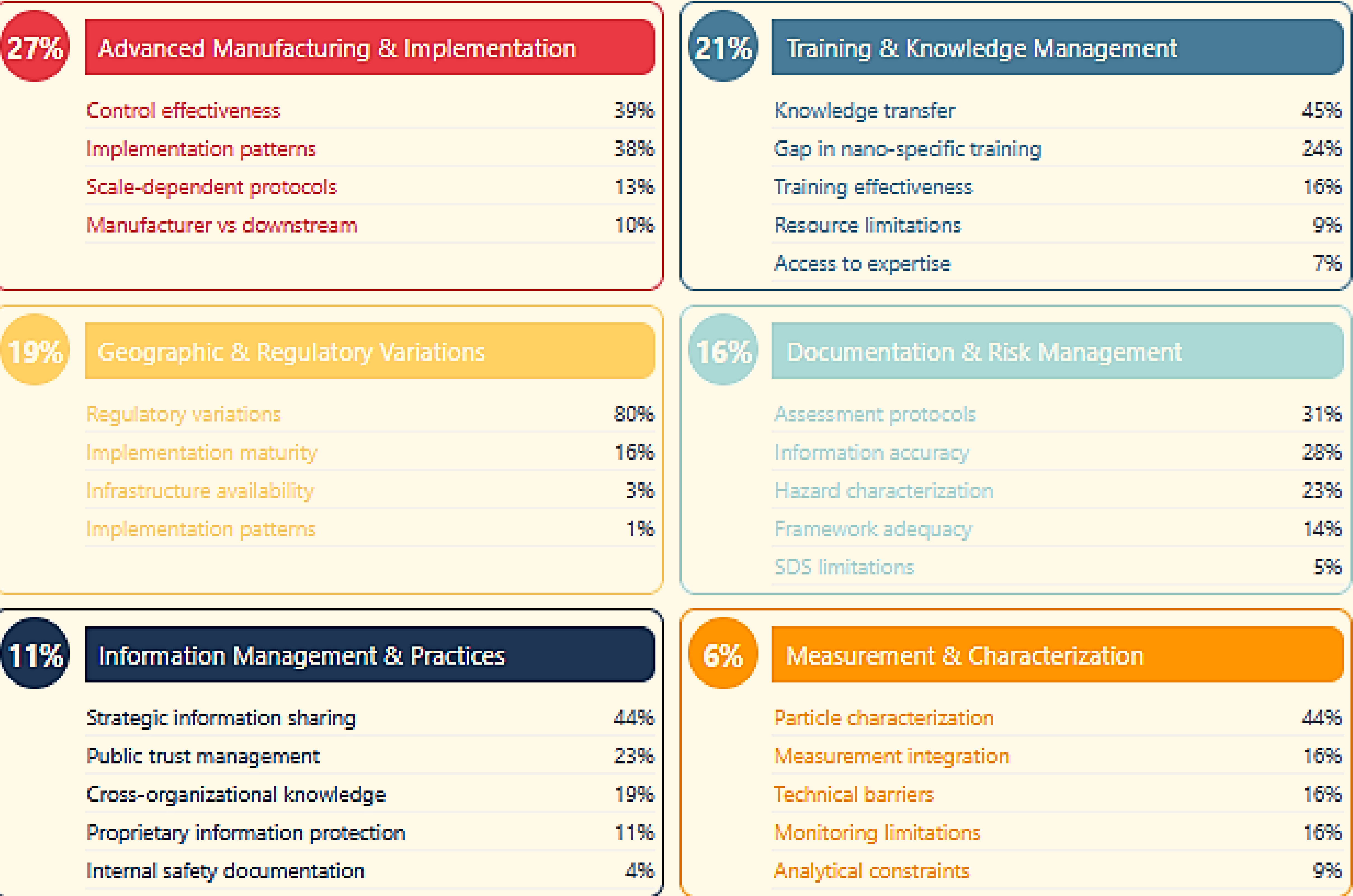
Participant Expertise



Participants Years of Experience (n =14)

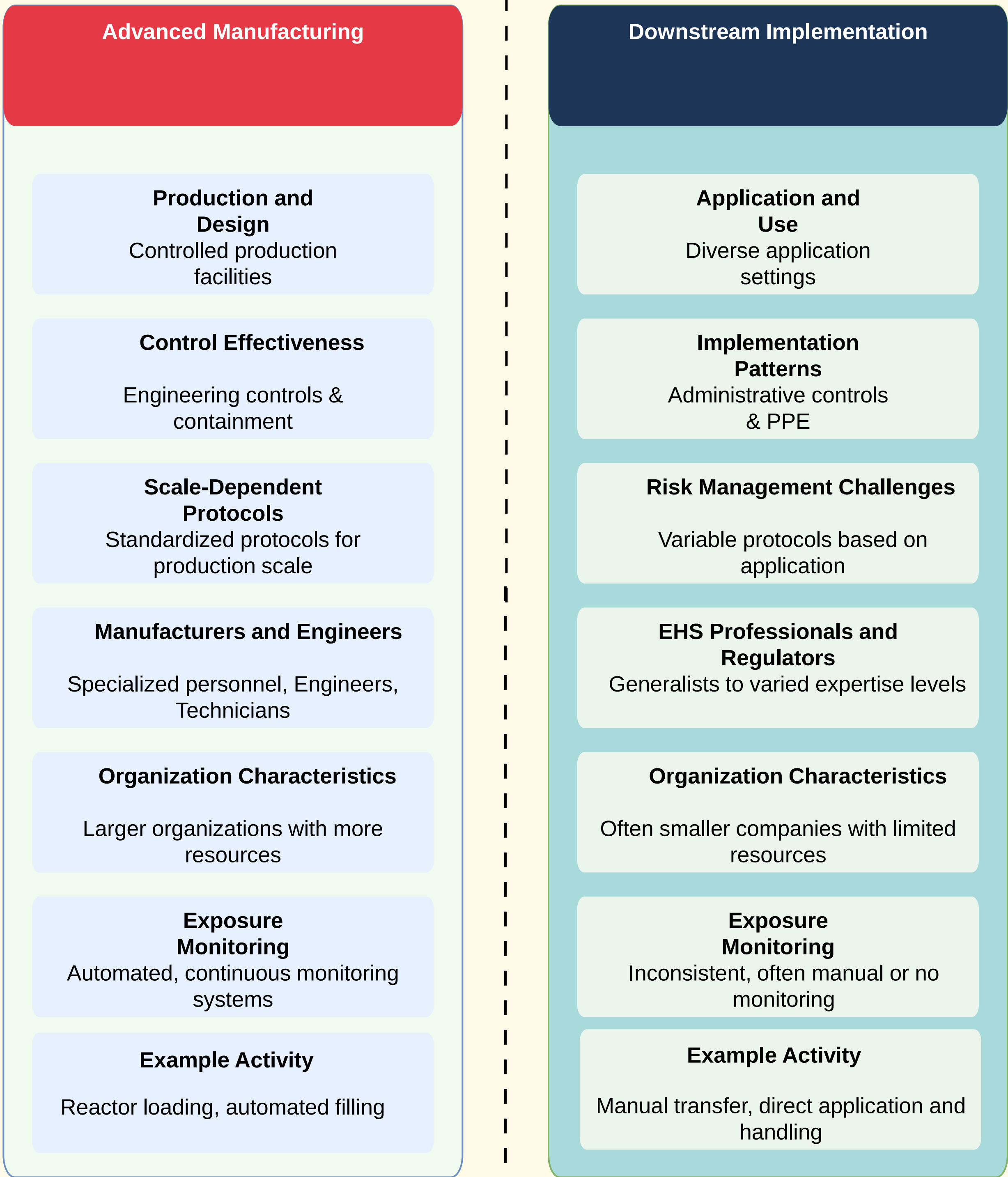


Thematic Analysis of Nanomaterial Safety Management

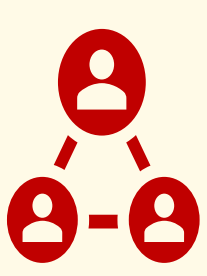


Analysis of 14 expert interviews across industry, research, and regulatory domains (n=501 coded segments)

Operational Divide in Nanomaterial Safety Management



Discussion and Conclusion



Implementation Gap: Significant disconnect between theoretical guidelines and practical implementation across organizational contexts



Resource Disparity: Two-tiered system: large organizations with robust systems vs. smaller entities relying on PPE.



Regional Adaptation: Singapore's "reference-based" approach adapts established frameworks to local capabilities and requirements



Future Directions: Need for standardized training, knowledge sharing, and tailored guidelines for smaller organizations