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## Introduction

The semiconductor industry depends on complex, multi-stage manufacturing processes that create significant exposure to raw-material risks. Such vulnerabilities can lead to material shortages, production delays, extended lead times, and missed customer commitments.

To address these challenges, this project develops an end-to-end supply chain mapping framework that traces material flows across the value chain and highlights upstream dependencies. The accompanying dashboard integrates human-rights, environmental, financial, and sourcing and business-continuity risks, providing a comprehensive view of supplier and country-level vulnerabilities.

Ultimately, the goal is to enhance visibility, strengthen supplier resilience, and support more reliable and sustainable semiconductor manufacturing operations.

## Mitigation Opportunities

### Financial

- Add alternative or backup suppliers for those with low Z-Scores, weak F-Scores, high leverage, or low liquidity.
- Keep higher safety stock for suppliers with low inventory turnover.

### Sourcing & Business Continuity

- Reduce concentration risk by signing long-term offtake agreements with floor/ceiling prices.
- Prefer suppliers listed on the London Metal Exchange.

### Human Rights

- Use primary aluminum certified under the Aluminium Stewardship Initiative (ASI) Chain-of-Custody (CoC) standard

### Environmental

- Prioritize sourcing from countries with lower emissions and stronger water & sanitation investment.

## Conclusions

- The integrated risk-mapping framework increases visibility across human-rights, environmental, financial, and sourcing risks in the semiconductor supply chain.
- Dashboards help identify high-risk countries and suppliers early, enabling targeted monitoring and mitigation.
- Findings highlight key vulnerabilities such as sourcing concentration, inconsistent child-rights protections, environmental pressure, and financial instability in certain regions.
- The framework supports more resilient sourcing strategies by guiding diversification, supplier selection, and long-term risk management.

## Overview & Key Metrics

### Overview

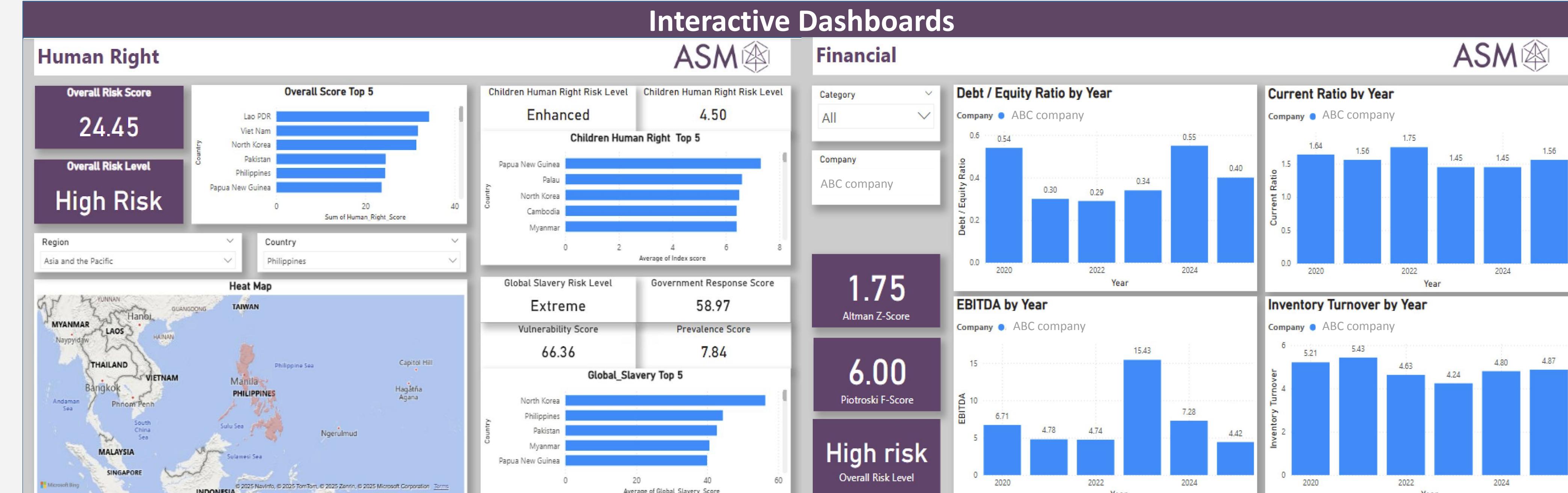
The dashboard highlights Human Rights Risk by combining the Global Slavery Index and the Children Human Rights Index into one score, helping identify countries that require greater caution in sourcing.

### Overall Risk Level

Higher scores reflect greater exposure to modern slavery, weaker child protections, and higher due-diligence needs.

### For Example

The Philippines has an **Overall Score of 24.45**, placing it in the **High Risk** category. Its high vulnerability and prevalence levels signal strong exploitation risk, while a **Government Response Score of 58.97** and a **Children Human Rights score of 4.50** indicate inconsistent protections, resulting in a high-risk assessment.



Dashboard 1. Human Right.

## Interactive Dashboards

## Overview & Key Metrics

### Overview

The dashboard evaluates supplier financial stability to identify potential bankruptcy or liquidity risks.

### Overall Risk Level

The risk level is based on the Altman Z-Score, which summarizes a company's financial health. Higher Z-Scores indicate lower risk, while lower Z-Scores signal higher distress.

### For Example

ABC company shows moderate leverage with a **Debt-to-Equity Ratio of 0.29–0.55** and stable liquidity with a **Current Ratio of 1.45–1.75**. EBITDA fluctuates widely (4.7–15.4), and **Inventory Turnover (4.2–5.4)** reflects steady but slightly weakening efficiency. Its **Altman Z-Score of 1.75** places the company in a higher-risk zone, and a **Piotroski F-Score of 6** indicates average fundamentals. Overall, ABC company maintains reasonable operations but still carries elevated solvency risk, leading to a **high-risk classification**.

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### Overview

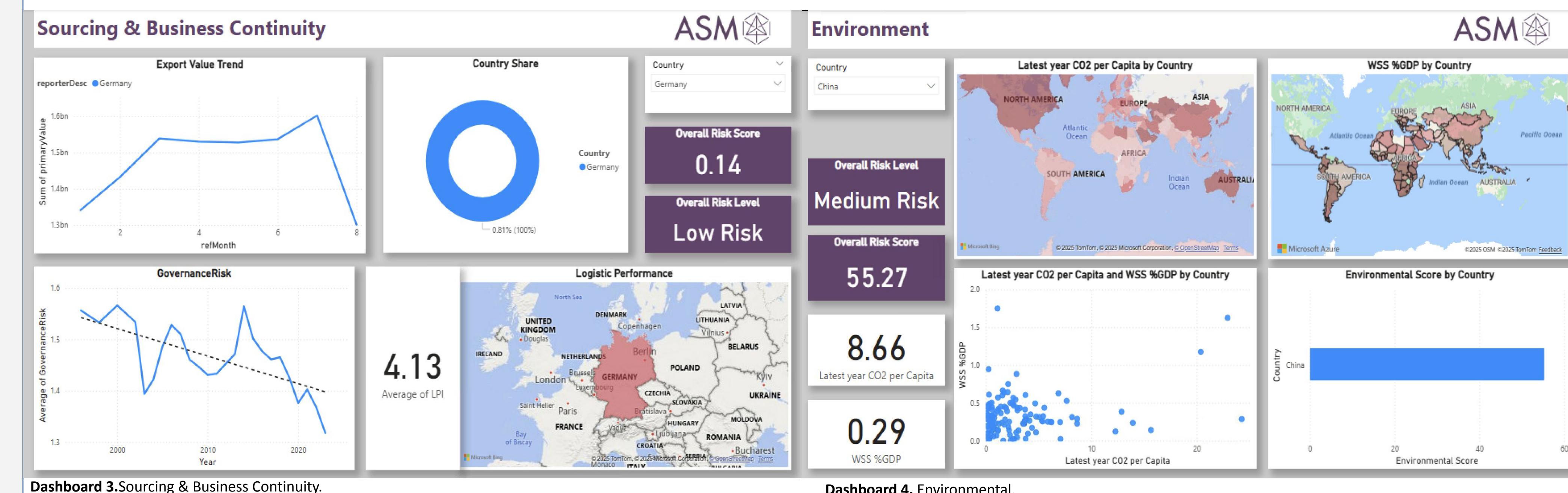
This dashboard evaluates sourcing stability by combining trade, governance, and logistics indicators to highlight regions that may impact ASM's supply chain resilience and continuity.

### Overall Risk Level

Lower scores reflect stronger sourcing environments, while higher scores indicate geopolitical exposure, weaker logistics, or elevated supply-concentration risk.

### For Example

Germany shows strong overall performance with stable exports, solid governance, and an excellent **LPI score of 4.13**. Although generally low-risk, a **100% sourcing share** signals dependency concerns, and the Month-8 export drop suggests a disruption worth monitoring.



Dashboard 3. Sourcing & Business Continuity.

## Environment

## Overview & Key Metrics

### Overview

This dashboard highlights environmental risk by combining CO<sub>2</sub> per Capita and WSS %GDP into a single Environmental Score, helping identify countries that may require greater sustainability caution.

### Overall Risk Level

Higher CO<sub>2</sub> and lower water-system investment indicate greater environmental pressure.

### For Example

China's environmental profile shows **CO<sub>2</sub> per Capita of 8.66** and **WSS %GDP of 0.29%**, placing the country in the **Medium Risk** category. The dashboard visuals highlight high emission levels with only modest investment in water and sanitation. Overall, China carries noticeable environmental risk—primarily driven by pollution—and should be monitored closely in sourcing decisions.