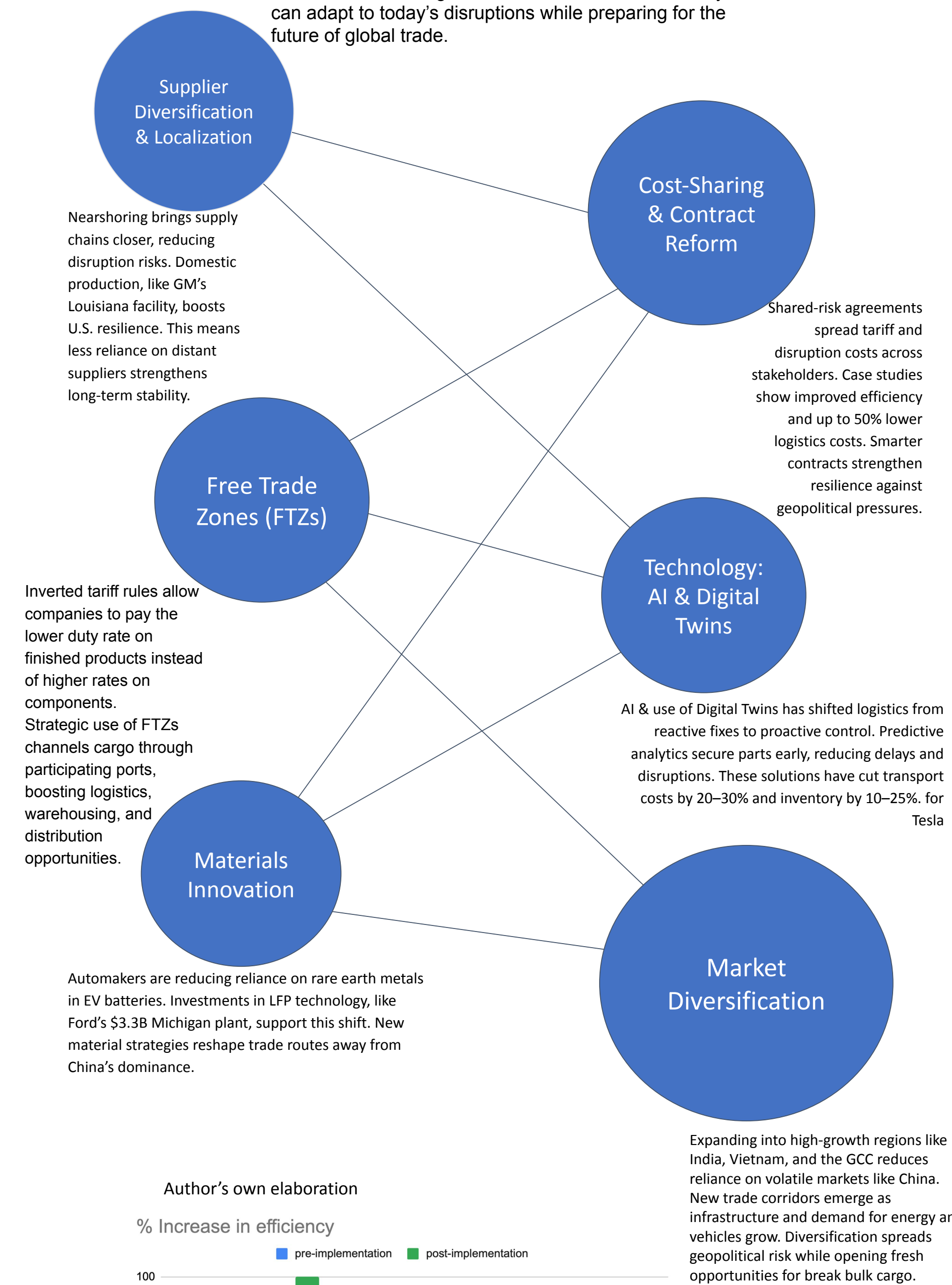
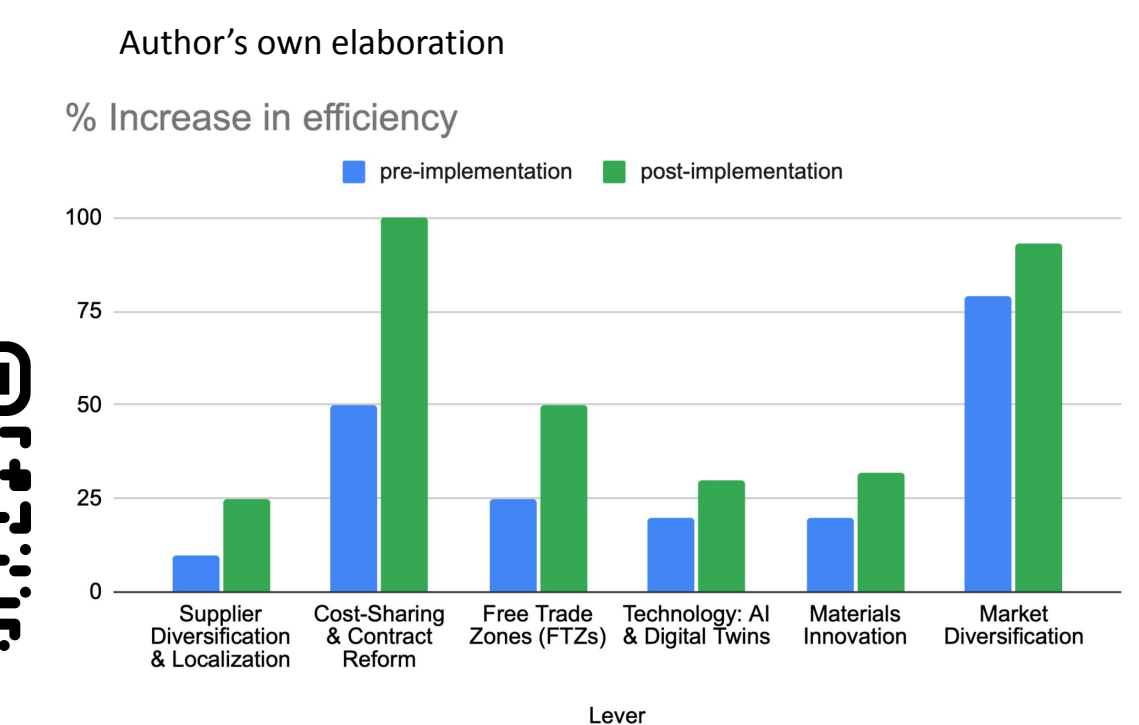


Abstract

The challenges facing global breakbulk — from tariffs and canal disruptions to material shortages and shifting demand — require more than isolated fixes. True resilience comes from a combination of strategies that strengthen supply chains, reduce vulnerabilities, and create new opportunities for growth. The following solutions, when integrated, showcase how the industry can adapt to today's disruptions while preparing for the future of global trade.



Sources:



This graph highlights the potential increase in efficiency that implementing these aforementioned processes can have on a business who undertakes them.

1. Supplier Diversification & Localization

Trade routes are moving closer to the U.S. because raw materials are sourced from countries closer to the U.S. and final products are being produced in the U.S.



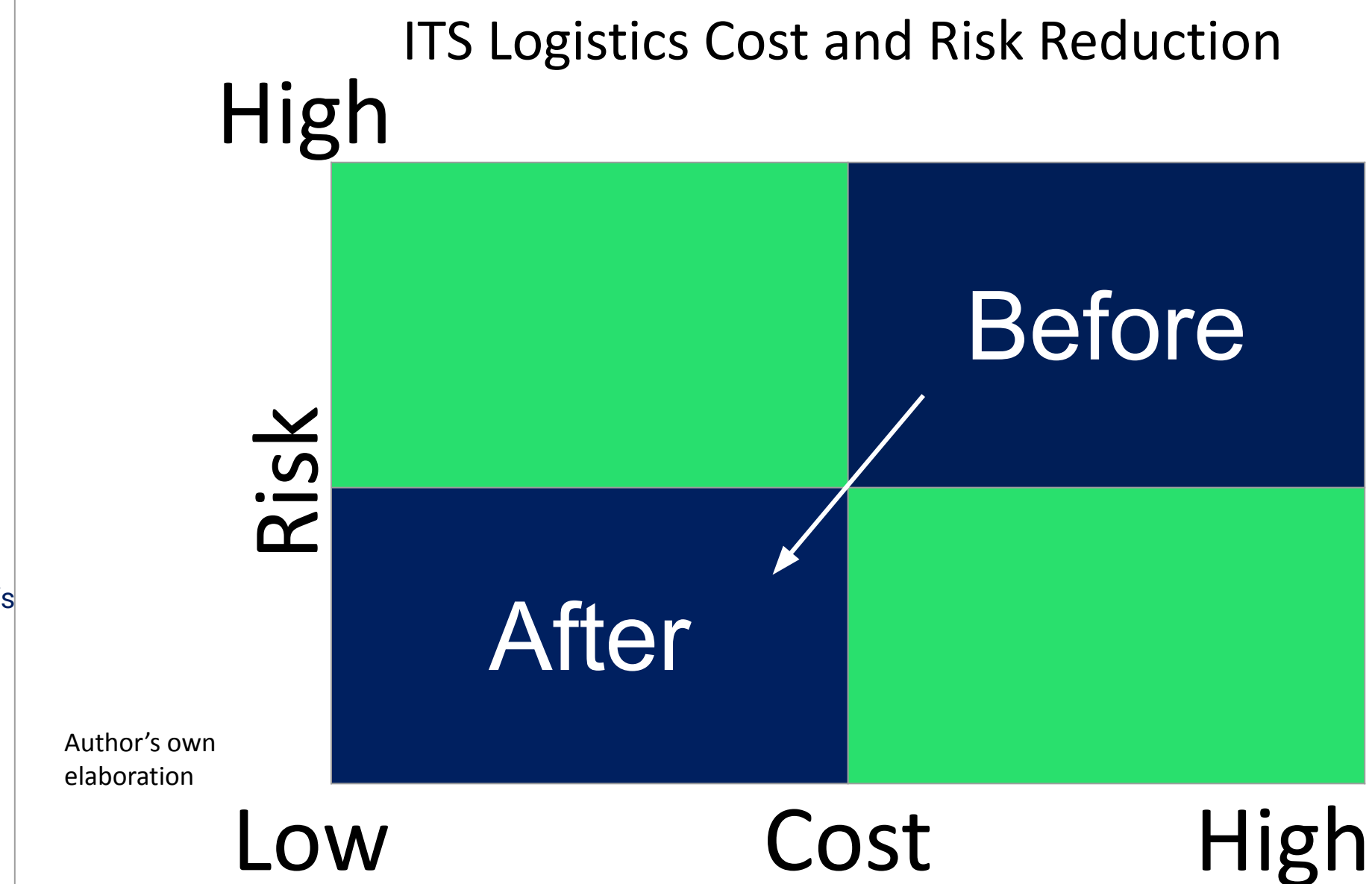
4. Technology: AI & Digital Twins

Studies by McKinsey & Company show that programs using AI & Digital Twins have the potential to cut transport costs 20–30% and inventory costs 10–25% — as seen in Tesla's strategy and summarized below as Forecast → Optimize → Save.



2. Cost-Sharing & Contract Reform

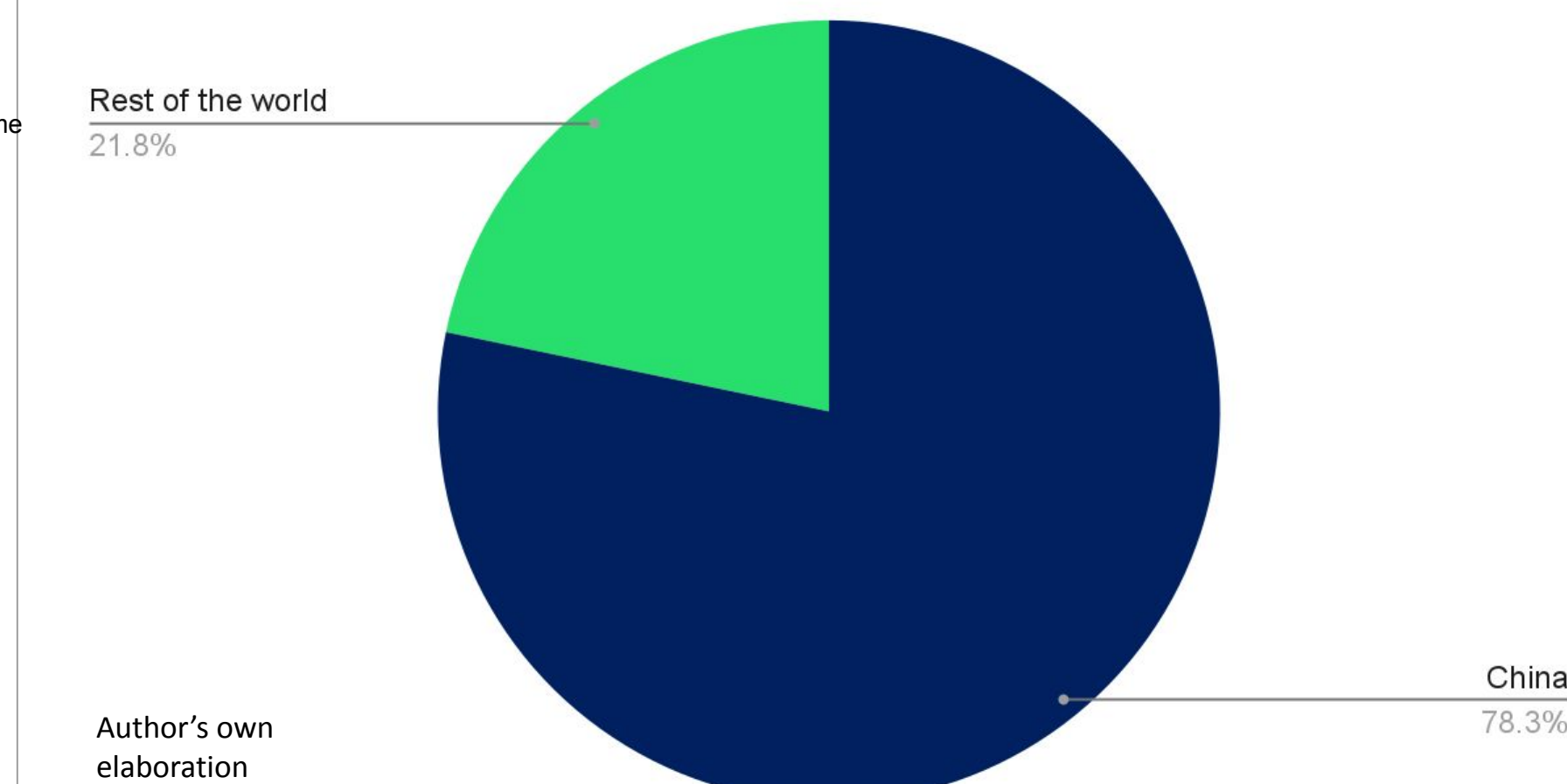
ITS Logistics struggled to take control of its demurrage processing due to existing ocean liner contracts that restricted control. This resulted in excessive demurrage fees. To mitigate this, ITS used one main demurrage provider, which created greater efficiencies and drove down transportation costs by 50%. (ITS Logistics)



5. Materials Innovation

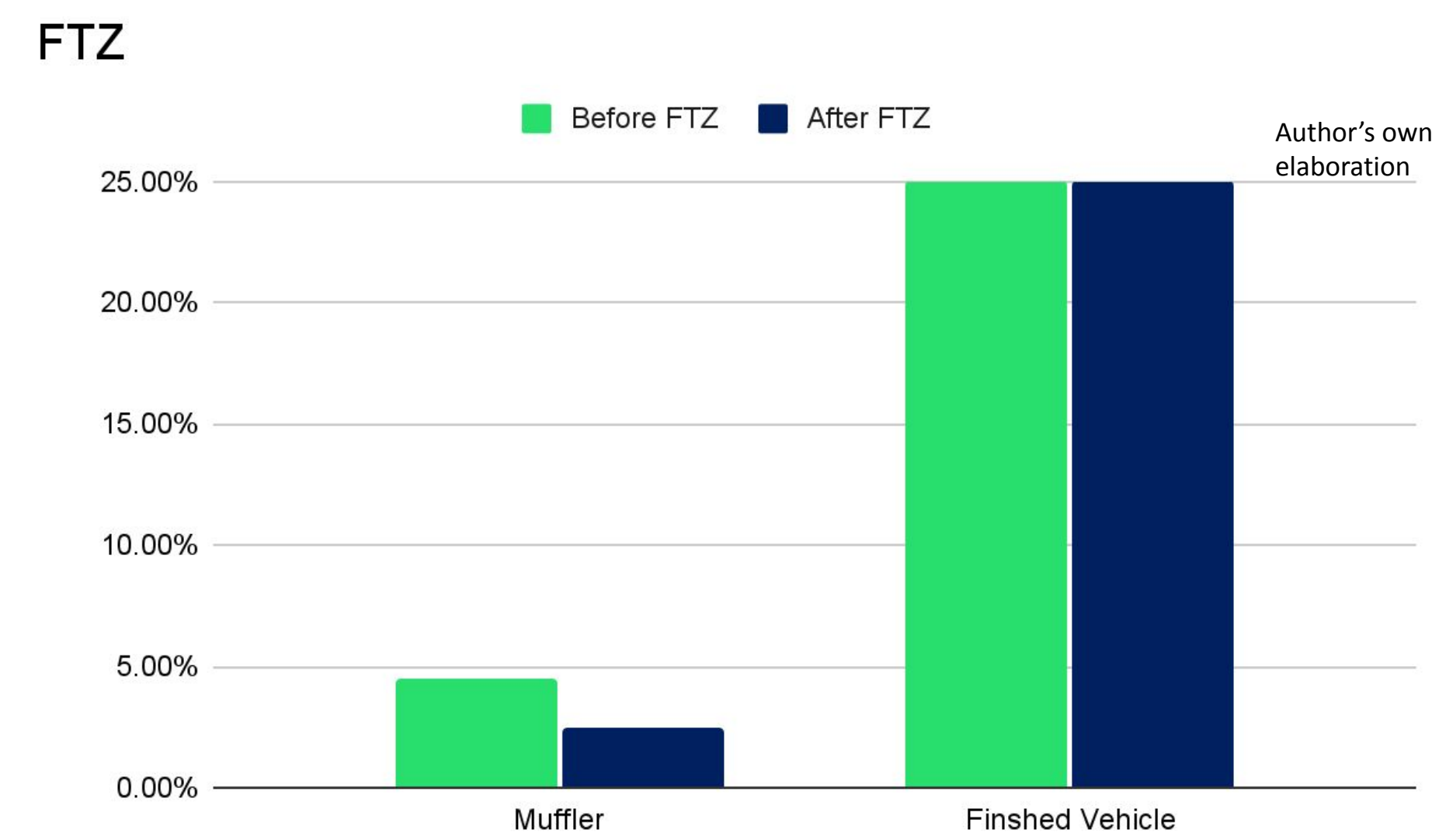
Ford is planning to invest \$3.3 billion in Michigan to build a lithium iron phosphate (LFP) battery plant. By reducing their intake of rare earth metals this would ultimately change trade routes - China has a very heavy hand in the production of goods with rare earth metals found in batteries.

Rare Earth Materials

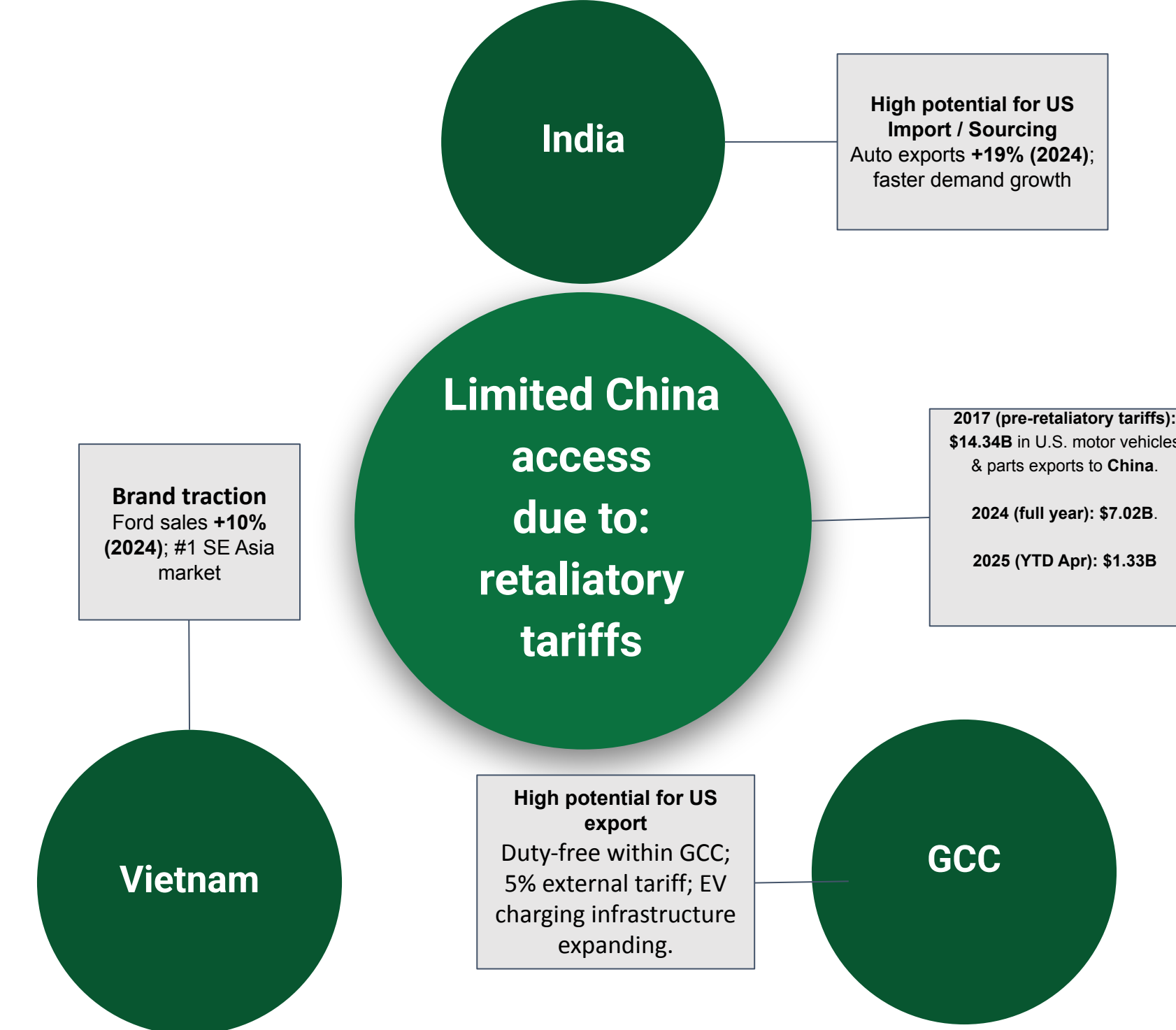


3. Free Trade Zones

Without FTZ's automakers pay the full tariff on the vehicles as seen in the graph this will be 25% no matter where assembled. What they can do is an inverted tariff which allows them to pay the 2.5% tariff on all the components. This allows the tariffs on the car to actually be cut in half on some parts making and vehicles and parts go to new routes.



6. Market Diversification



Evolving Trade Pathways and Strategy for Geopolitical Resilience

Hunter Newton, Mattias Kotz,
Paul Knapschaefer, Reagan
Robinson

Faculty Advisor: Cassia Galvao
Texas A&M at Galveston
Industry Advisor: John Hark,
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