

EXPLORING GLOBAL VALUE CHAINS FOR US HEALTHCARE PERSONAL PROTECTIVE EQUIPMENT (PPE)

Dissertation Paper for the 2024 Engaged Management
Scholarship Conference

Dr. Luwanda Jones

September 2024

Advisory Chair: Dr. Susan Mudambi

Committee members: Dr. Misty Blessley & Dr. Matt Wray

External Reader: Dr. Bertrand Guillotin

Exploring Global Value Chains for Healthcare Personal Protective Equipment

Focus: *Make PPE in America Act*:
Medical-Grade Nitrile Gloves



Nitrile



Synthetic Vinyl



Vinyl

AGENDA



Research Overview



Research Motivation



Research
Methodology



Exploring Global
Value Chains for
Healthcare PPE



Limitations



Contributions



RESEARCH MOTIVATION

Big concerns about healthcare supply chain resilience and national security, but little research on improving federal government practices

COVID-19 PPE
shortages

GAO Dec. 2020
supply chain
deficiencies

Executive orders
on supply chain
resilience

Make PPE in
America 2021
legislation

RESEARCH METHODOLOGY

QUALITATIVE: INTERPRETATIVE APPROACH

Data Analysis Technique

8 semi-structured questions

Field visit to Domestic PPE manufacturing factory

17 Participants

Types of Organizations

2 Government, 1 Non-Profit, 2 Domestic PPE manufacturers, 1 PPE Reseller, 1 Academic

Expertise: Medical Supply Chain/Logistics, Procurement, PPE manufacturing, PPE engineer, Reseller/Distributor

Data Analysis

Braun & Clarke (2022) Reflexive Thematic Analysis process

Recorded and transcription tools

Zoom/MS Teams

MS Word/Otter.Ai

NVivo/Excel

EXPLORING GLOBAL VALUE CHAINS FOR HEALTHCARE PPE

- Examines the global implications of federal legislation
 - Make PPE in America Act
 - Focus: Medical-grade glove supply chains
 - Validate Study One: Meaningful Differences
 - Adapting and Anticipating Supply Chain Disruptions
 - Supply Chain Resilience and Robustness

RESEARCH QUESTIONS

- How does the Make PPE in America Act 2021 affect the global value chain for medical-grade gloves*?
- What are the significant supply chain challenges of meeting the expectations of the Act?
- What can be done to help the parties in the medical glove supply chain meet the requirements of the Act?

** In 2021, almost no US manufacturing of medical gloves. Almost all medical gloves purchased by the federal government were imported from Malaysia, Thailand, and China.*



Literature Review

Impact of COVID-19 on the PPE Market Supply Chain

- Firms and governments rethink strategies and focus on domestic production (Morales-Contreras et al., 2021; Ngo & Dang, 2022; Shih, 2021).
- China and Malaysia leaders in low-tech, low-cost production for items like gloves (Gereffi, 2020).

Offshoring and Domestic Manufacturing

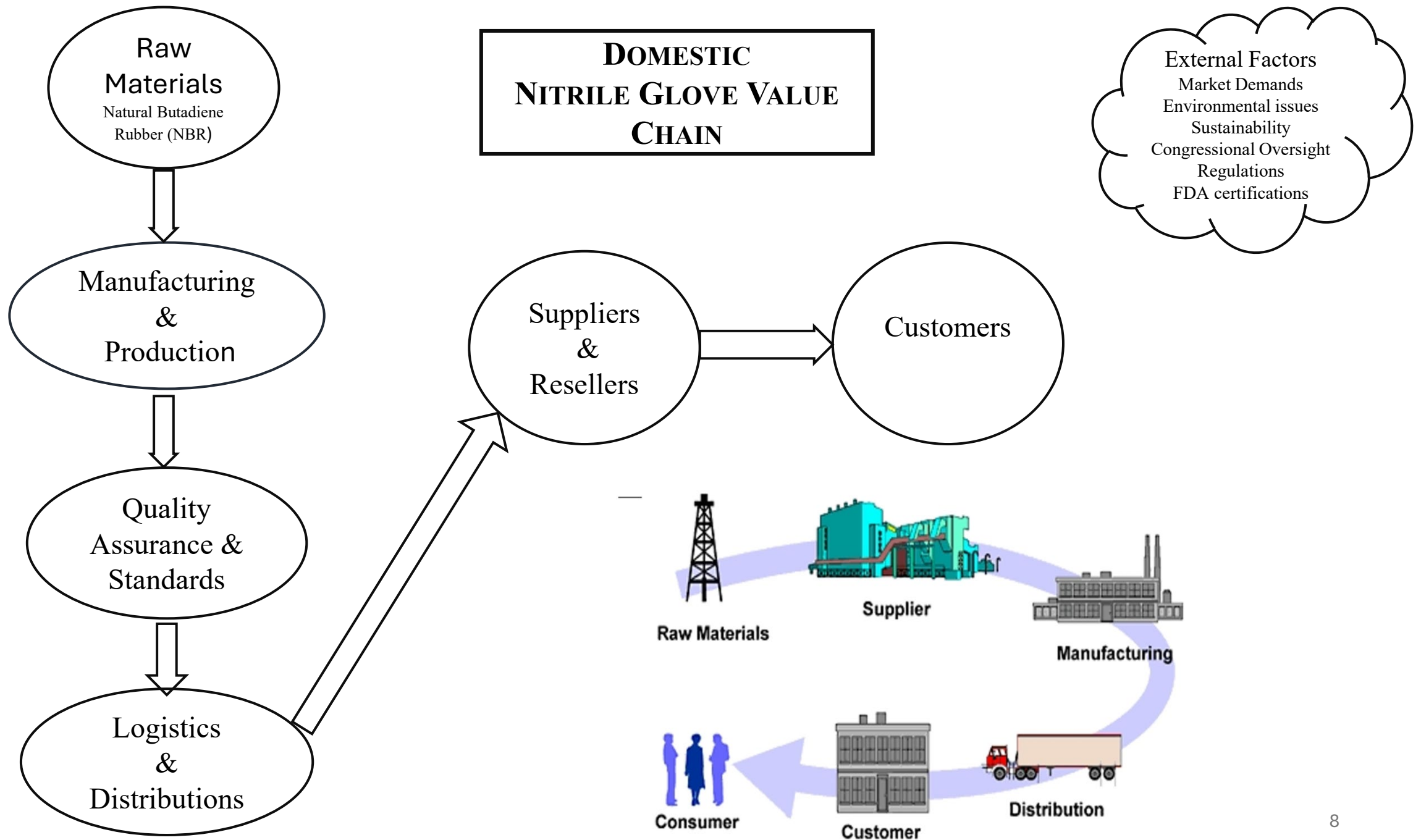
- 2014 manufacturing sector saw increased productivity and output;
- 2001 to 2010: decline in manufacturing jobs due to outsourcing (Sergent, 2014)

Supply Chain Resilience and the Global Value Chain

- Building supply chain resilience is a fundamental strategic goal for governments worldwide (Gereffi et al., 2022)
- Biden and Harris administration recognizes supply chain resilience as impacting the U.S. national security (Wei & Li, 2022)

The Federal Procurement Process Concerning Domestic Production Post-COVID-19

- Biden and Harris Administration established a policies aimed to stimulate American businesses and industries and support American workers (Exec. Order No.14005, 2021)
- The impact of federal contracts on companies over the long term remains uncertain (Cecire et al., 2020).



An aerial photograph of a large container ship sailing on a deep blue ocean. The ship is viewed from above, showing its deck loaded with numerous colorful shipping containers in shades of orange, red, blue, and white. The ship's wake is visible in the water. The text "RESEARCH FINDINGS" is overlaid in a white, serif font across the middle of the ship's deck.

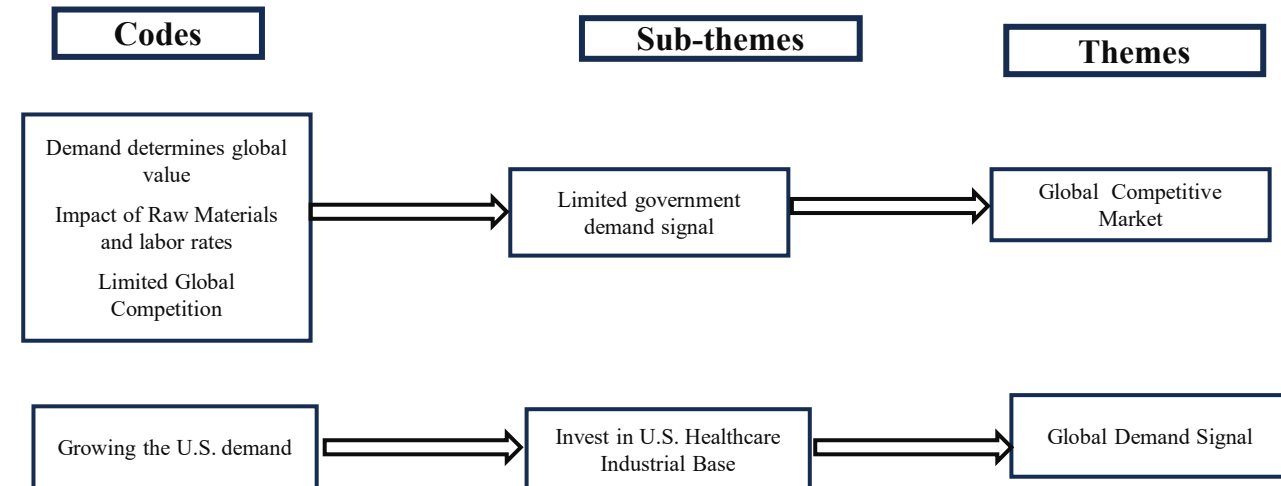
RESEARCH FINDINGS

CODES & THEMES

Make PPE in America Act

impact on the

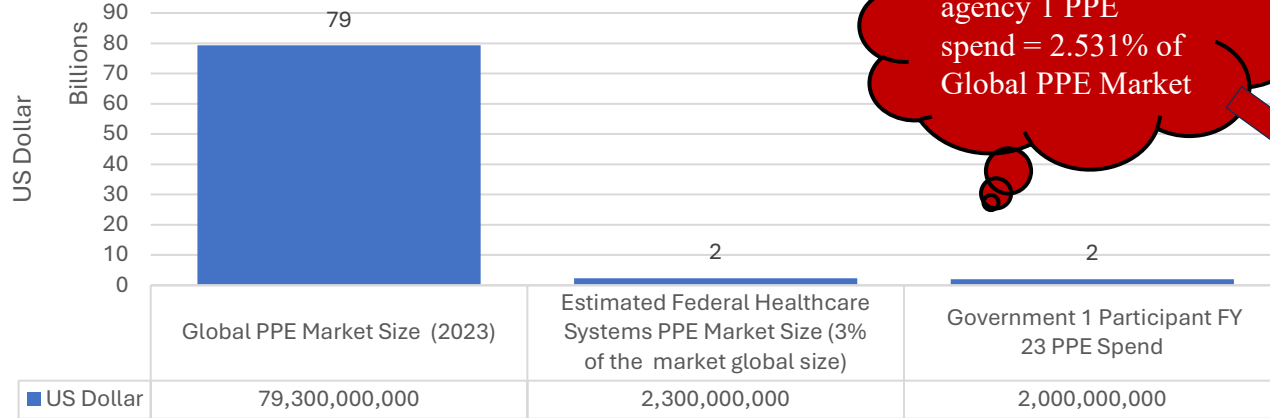
Medical-Grade Nitrile Glove
Value Chain



Research Question 1:

How does the Make PPE in America Act Impact the Global Supply Chain?

Global PPE Market Size versus Federal Healthcare Systems and Government 1 FY23 Actual PPE Spend

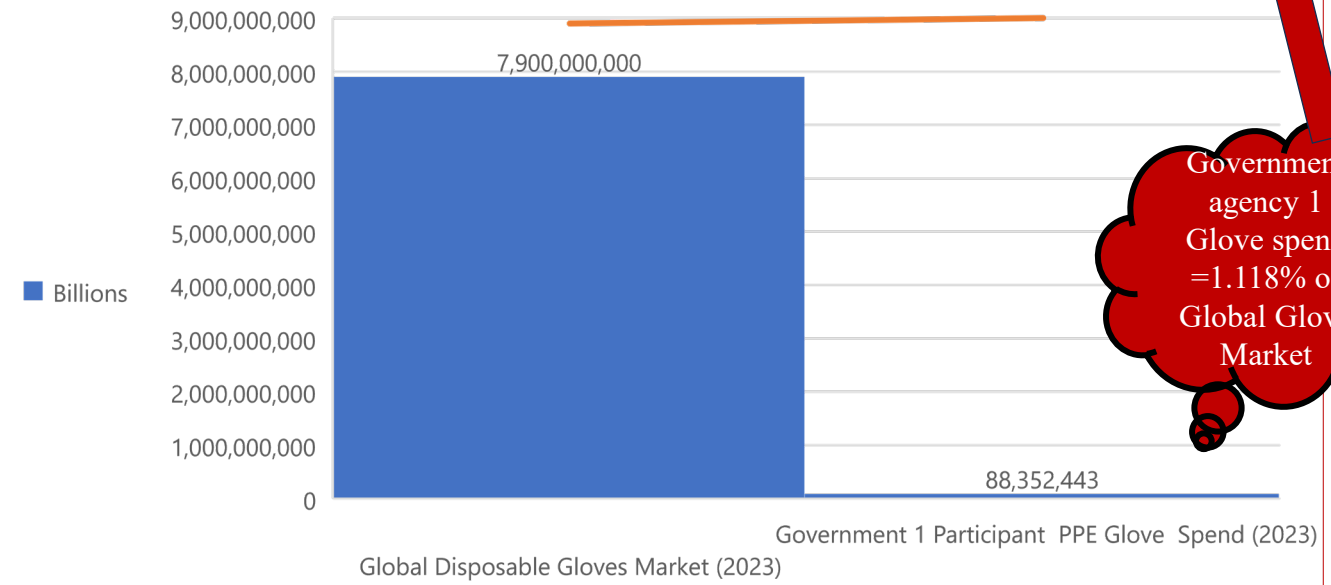


Government agency 1 PPE spend = 2.531% of Global PPE Market

Insufficient Federal Demand to impact PPE Global Value Chain
Must consider entire Healthcare Industrial Base

Research Findings-Question One:
Make PPE in America Act's Impact of the PPE Global Value Chain

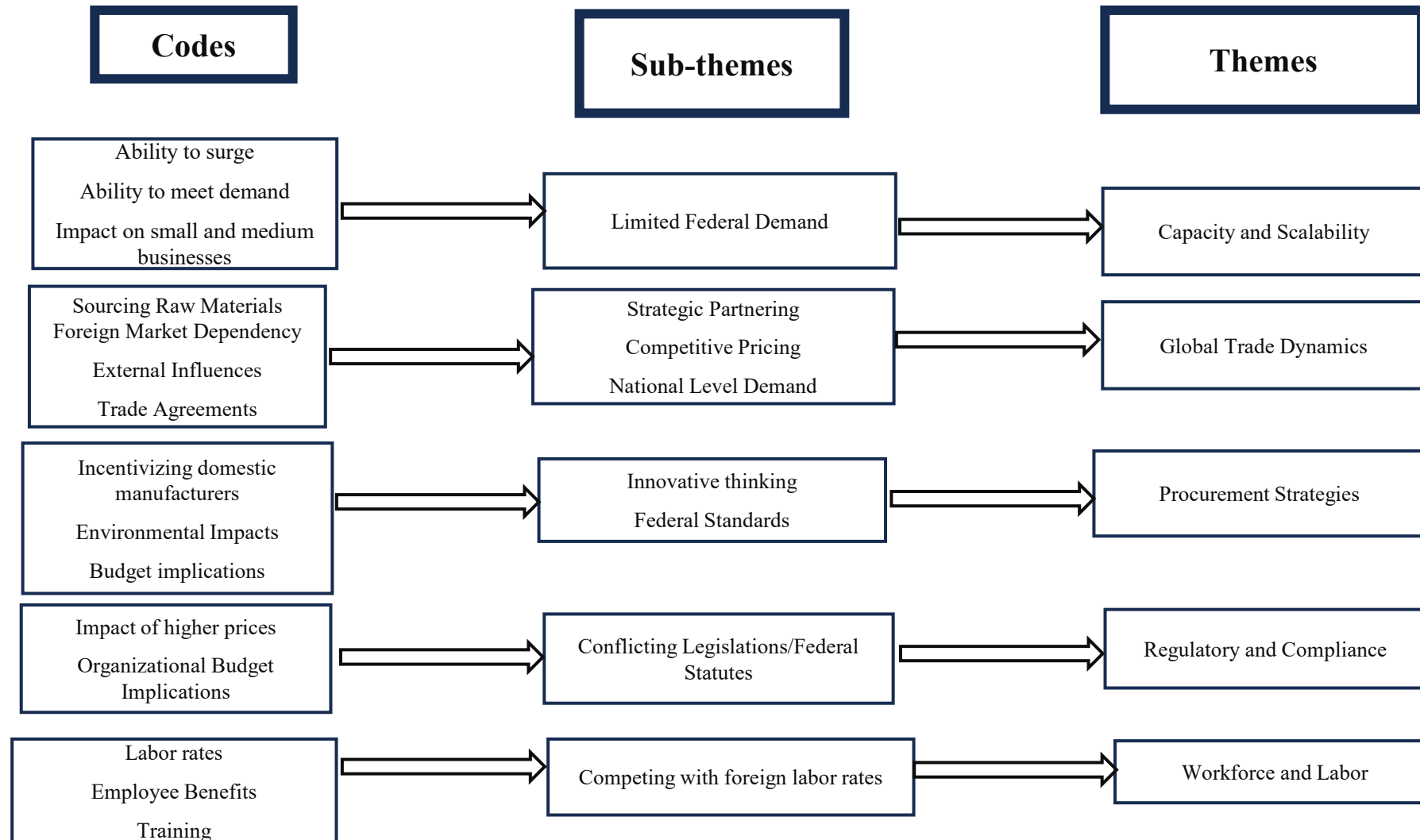
Global Disposable Glove Market versus Government 1 Actual FY23 Glove Spend



Government agency 1 Glove spend = 1.118% of Global Glove Market

CODES & THEMES

Challenges implementing the Make PPE in America Act, specifically medical –grade nitrile gloves



Research Question 2: What are significant supply chain challenges in implementing the Make PPE in America Act, specifically with medical-grade nitrile gloves?

RESEARCH FINDINGS FOR RESEARCH QUESTION TWO- Challenges in meeting requirements of the *Make PPE in America Act*



Capacity and scalability

Availability of raw materials to conflicting legislation



Global trade dynamics

Availability of raw materials to conflicting legislation
Continuous reliance on foreign market



Procurement strategies

Incentivizing domestic manufacturers with limited financial resources
Higher cost
Finding Domestic Manufacturers
Innovative solutions for raw materials
Impact on Small Businesses



Regulatory and compliance

Environmental and sustainability concerns relative to manufacturing
Water recycling; gas emissions; tariffs

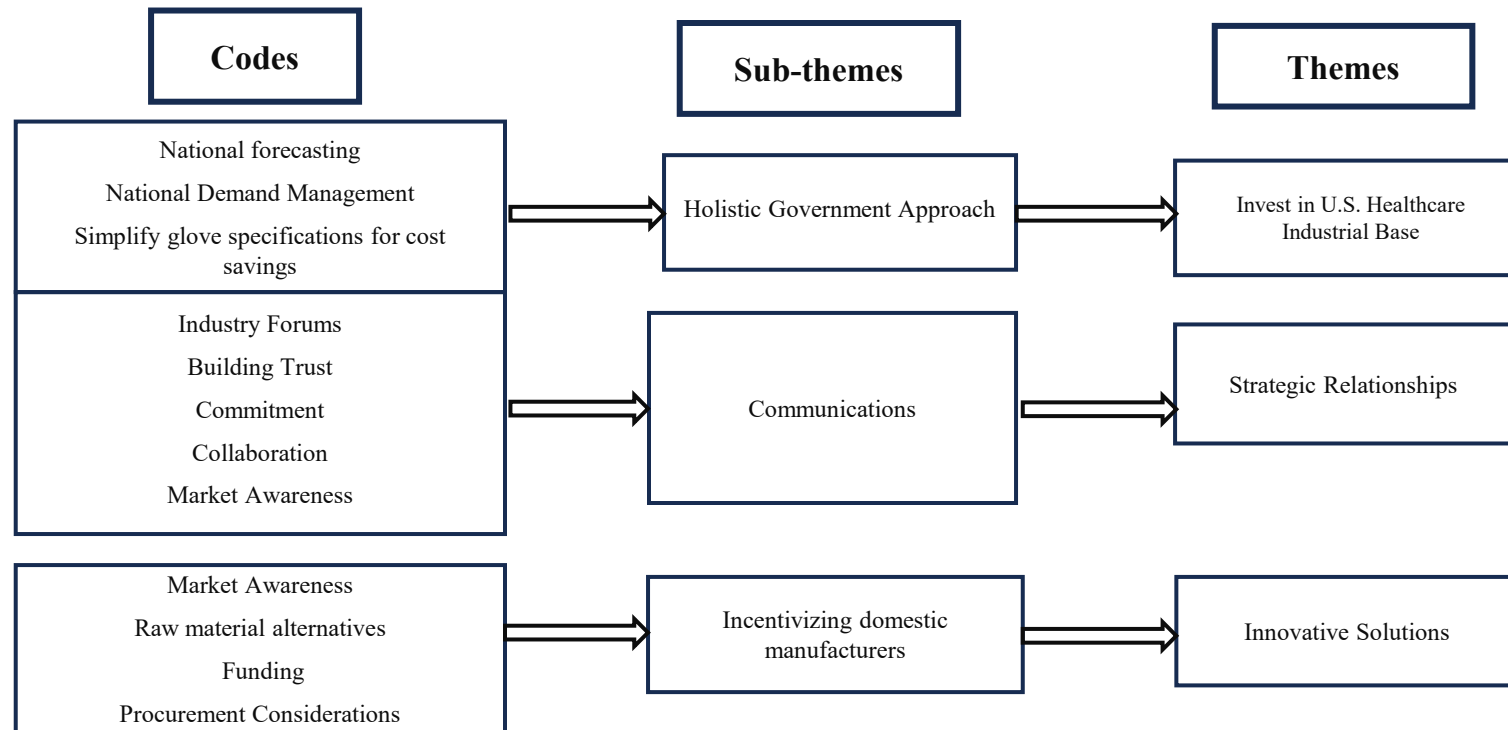


Workforce and labor

Salary and benefits; training; finding and retaining skilled employees

CODES & THEMES

Strategies to help meet the requirements of the Make PPE in America Act



Research Question 3:

What can be done to help the medical glove supply chain adapt to meet the requirements of the Act?

RESEARCH FINDINGS for Research Question Three

- **Actions to help meet the requirements of the *Make PPE in America Act***
 - Government
 - Better collaboration with industry and Congress
 - Federal agencies join consortiums
 - Long term commitments
 - Focus on the National Healthcare Industrial Base
 - Recommend to Congress: Amend the current legislation
 - Industry
 - Innovative approaches to incentivize domestic production
 - Alternative innovations to nitrile, such as corn-based or vegetable-based
 - Government and Industry
 - Strategic Relationships
 - Forming partnerships
 - Continuous communications



Contributions



Contribution to Theory

Factors contributing to adapting and anticipating disruptions

Factors contributing to resilience and robustness

Updated definition of resilience:

- An organization's capacity to rebound from a disruptive incident and rejuvenate itself quickly
- Resilience requires visibility, flexibility, collaboration and agility

Integrates academic literature with practical experience



Contribution to Federal Government Practice

Insights for government managers at all levels

Provides insights for domestic manufacturing

Managers can incorporate strategies into their supply chain risk management plans

Use to inform information to create supply chain resilience and risk strategies

Limitations

- Limited to 2 federal organizations/three commercial firms
- Field research explored one company
- Does not include cybersecurity supply chain insights

Future research

- Explore how supply chain resilience affects national security
- Explore most effective approaches for managing cyber risk in the supply chain
- Incorporate quantitative research methodology as a mean to capture a broad range of participants from government, academia and commercial industry



CONCLUSIONS

- The federal government does not have the demand to impact the PPE Global Value Chain
 - Must include national healthcare industrial base to impact the global value chain
- Incentivize domestic manufacturers who have domestic PPE factories in the US and are not getting raw materials from China
- Government needs to work with industry for alternative solutions to raw materials for gloves
- Government agencies can use research to develop supply chain risk strategies and supply chain assessments



CONTRIBUTIONS TO THEORY

- Contributes to the existing supply chain risk management and resilience literature by combining academic literature with real-world experience
- Adds a federal government perspective to the literature
- Aligns with supply chain risk management strategies

An updated definition of Supply chain resilience:
An organization's capacity to rebound from a disruptive incident and rejuvenate itself quickly

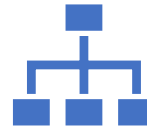
CONTRIBUTION TO PRACTICE



Provides valuable information on the challenges associated with the Make PPE in America Act



Provides a plethora of information to develop and assess supply chain risk and develop risk strategies



Supply chain leaders can use this research to align organizational priorities



Leverage insights to cultivate stronger relationships with key stakeholders and suppliers.



Gain visibility into critical suppliers within the organization.

LIMITATIONS AND FUTURE RESEARCH



Limitations

Data limited to 2 federal agencies and 4 industry firms

- Expand to include additional federal, industry and Congressional staffers

Field visit limited to one industry firm: lack of sponsorship

Did not explore cybersecurity implications to supply chain resilience



Future research

Explore impact of cybersecurity on government supply chains

Explore how federal agencies have implemented supply resilience in their organizations

Use mixed research methods to comprehensively address a broader audience

- Quantitative research could reach a wider range of participants



QUESTIONS

The Best Research is On-the-Ground
Field Research



References

- Braun, V., & Clarke, V. 2022. *Thematic analysis: A practical guide*. Sage Publications.
- Cecire, M. M., Sutherland, M. D., Seka, K., Schwarzenberg, A. B., Lee, L. E., Green, V. R., Gottron, F., Bodie, A., & Sutter, K. 2020. *Covid-19 and domestic PPE production and distribution: Issues and policy options*. Congressional Research Services. <https://crsreports.congress.gov/product/pdf/r/r46628>
- Gereffi, G., Pananond, P., & Pedersen, T. 2022. Resilience decoded: The role of firms, global value chains, and the state in covid-19 medical supplies. *California Management Review*, 64(2):46–70.
<https://doi.org/10.1177/00081256211069420>
- Grandview Research. (2024). Disposable Medical Gloves Market Size & Share Report, 2030.
<https://www.grandviewresearch.com/industry-analysis/disposable-medical-gloves-market>
- Grandview Research. 2023. *Personal Protective Equipment (PPE) market report, 2030*. Personal Protective Equipment (PPE) Market Report, 2030. <https://www.grandviewresearch.com/industry-analysis/personal-protective-equipment-ppe-market>
- Library of Congress. 2021. *S.1306 - Make PPE in America Act 117th Congress*. Congress.GOV.
<https://www.congress.gov/bill/117th-congress/senate-bill/1306>

References

- Morales-Contreras, M. F., Leporati, M., & Fraticchi, L. 2021. The impact of covid-19 on supply decision-makers: The case of personal protective equipment in Spanish hospitals. *BMC Health Services Research*, 21:1170. <https://doi.org/10.1186/s12913-021-07202-9>
- Ngo, C. N., & Dang, H. 2022. Covid-19 in America: Global Supply Chain Reconsidered. *The World Economy*, 46(1): 256–275. <https://doi.org/10.1111/twec.13317>
- Sergent, J. F. 2014. *The Obama Administration proposed establishing a national network for the Congressional Research Service*. <https://crsreports.congress.gov/product/pdf/R/R42625/20>
- Shih, W. C. 2021. *Bringing manufacturing back to the U.S. is easier said than done*. **Harvard Business Review**. <https://hbr.org/2020/04/bringing-manufacturing-back-to-the-u-s-is-easier-said-than-done>
- United States Government, Exec. O. 14005. 2021. *Executive Order 14005 on ensuring the future is made in all of America by all of America's workers*. The White House. <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/25/executive-order-on-ensuring-the-future-is-made-in-all-of-america-by-all-of-americas-workers/>
- Wei, L., & Li, W. 2022. Analyzing the Supply Chain Resilience Strategy of the Biden Administration. *China International Studies*, 97: 78–107