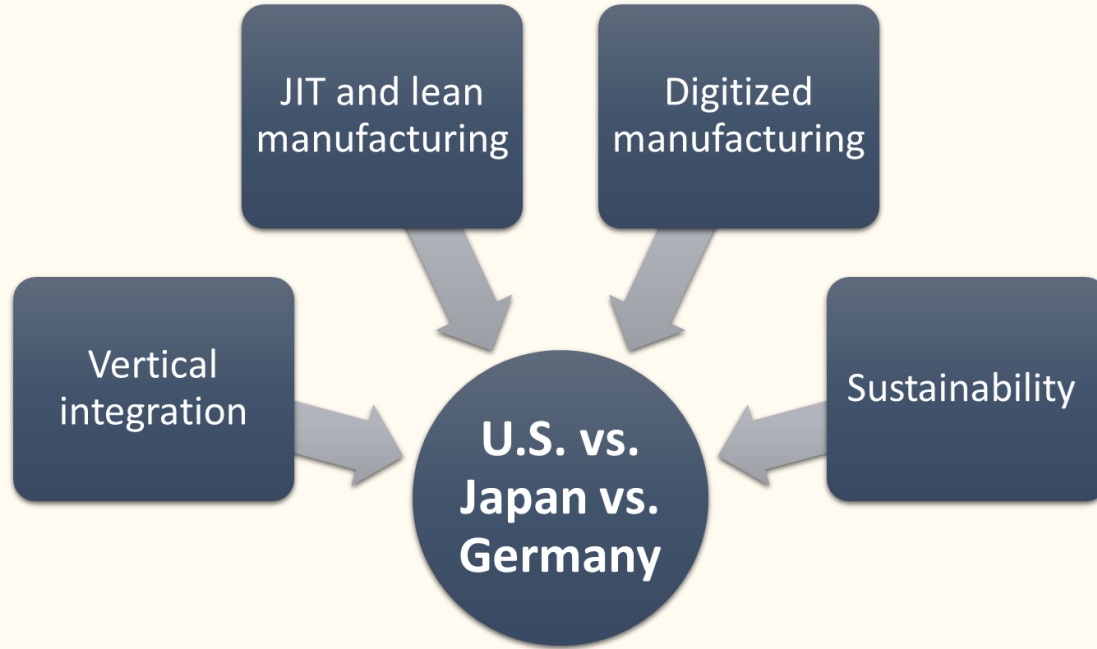




Cross-National Comparison of Operations and Supply Chain Management Practices (United States vs. Japan vs. Germany)

By Madeline Eikamp, Thi Kim Ly Bui, Li Lu, Clara Truong, and Manaswini Gopala

4 Key Concepts:



What are the advantages of global supply chains?

Vertical Integration (US)

- Benefits of vertical integration (cost savings; competitive advantage) align closely with the US's economic philosophy of capitalism and market competition
- Common in technology, retail, and energy industries
 - Ex: Apple controlling both its hardware and software components as well as its retail experience
- Helps businesses remain competitive in the US's open, free-market environment
- Challenges: US antitrust laws - businesses face scrutiny when they threaten to dominate their market or create monopolistic power



Vertical Integration (Japan)



Higher quality,
cheaper parts?

Stable



Cost

Traditional Keiretsu:

- buy from settled suppliers
- historical cost strategy
- buy individual part only

Modern Keiretsu:

- source from global market
- target price
- integrated systems of components

The 4 Dominating Industries

1. Automotive

- a. Volkswagen
- b. Daimler
- c. BMW

2. Mechanical Engineering

- a. SMEs “Mittlestand”

3. Electrical

- a. Siemens

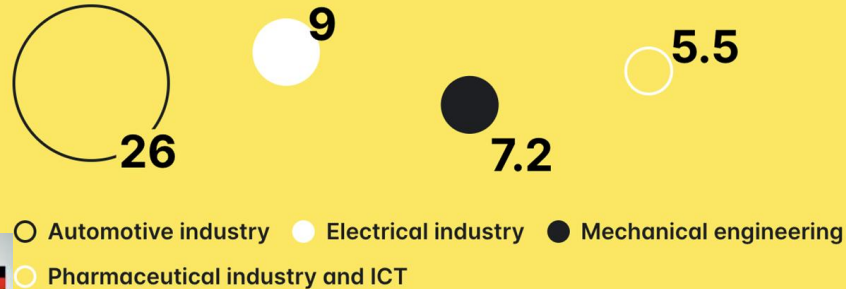
4. Chemical

- a. BASF



Investment in research and development

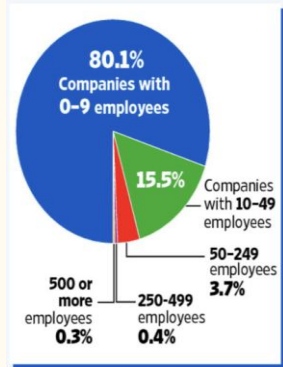
Ongoing innovation is the hallmark of Germany as an industrial base - this is how many billions of euros the leading sectors invested in 2021.



Source: Stifterverband Wissenschaftsstatistik

Vertical Integration (Germany)

- 4 Dominating Industries
 - High-quality
 - Complete control over production processes
 - Competitive edge
- Role of Mittelstand (SMEs)
- Focus on quality over ownership

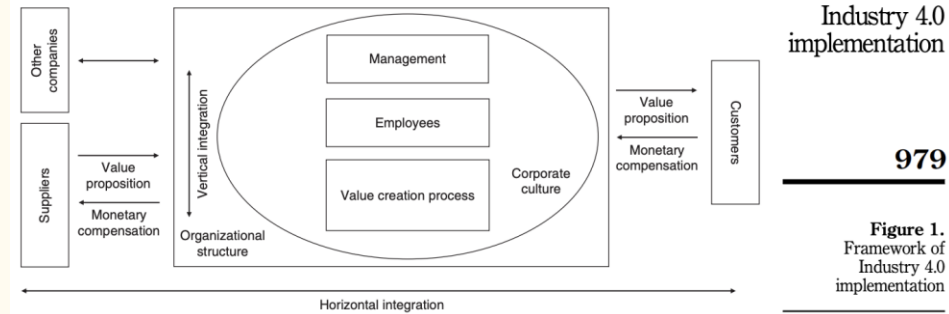


Source: Association of German Chambers of Industry and Commerce (DIHK)



Backbone of the EU Economy: 2/3 of GDP is generated by SMEs

Horizontal Integration



- Industry 4.0 and Digital Collaboration
- Sustainability initiatives

JIT and Lean Manufacturing (US)

- Adopted from Japan in 1980s and 1990s
- Challenges: deeply ingrained cultural and structural differences
 - Mass production = large inventories and lots of waste
 - More transactional or even adversarial relationship with suppliers
 - Geographic spread of manufacturing facilities and supplier networks
- Slowly but surely, US companies adapted and found success
 - Ex: Dell's "build-to-order" model



Just-In-Time and Lean Manufacturing (Japan)

Trend:



Automotive



Electronics



Food Production



Worldwide

Modern:

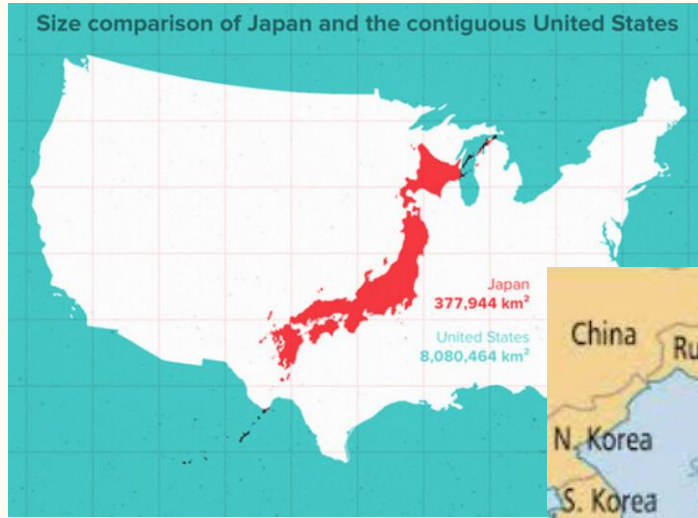
Upgrade

IOT
Technology



AI

Just-In-Time and Lean Manufacturing (Japan)



Work Ethic:

- Group > Individual
- Work itself takes precedence over leisure
- High employee loyalty

Culture:

- Customer orientation
- Cleanliness of environment

- Space constraint
- limited recourse



reduce waste,
improve efficiency

JIT and Lean Manufacturing (Germany)

- Emphasis on continuous improvement
- JIT production → Reduce Costs
- Prominent focus on quality and efficiency

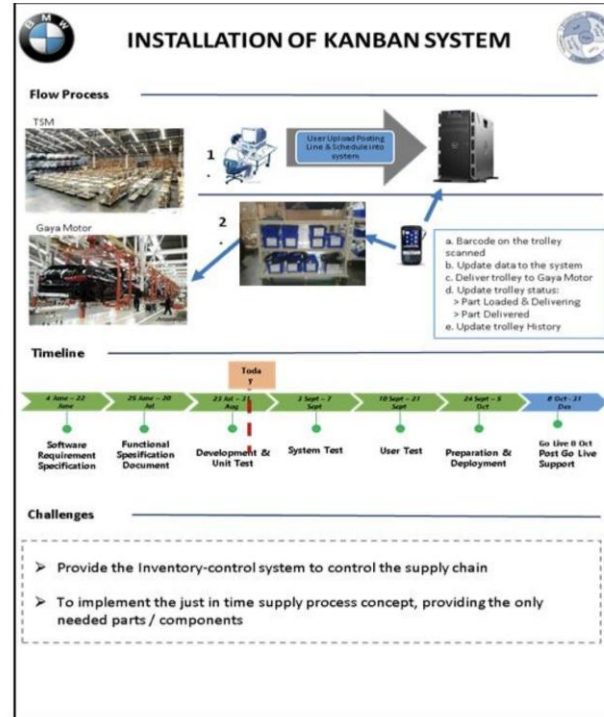
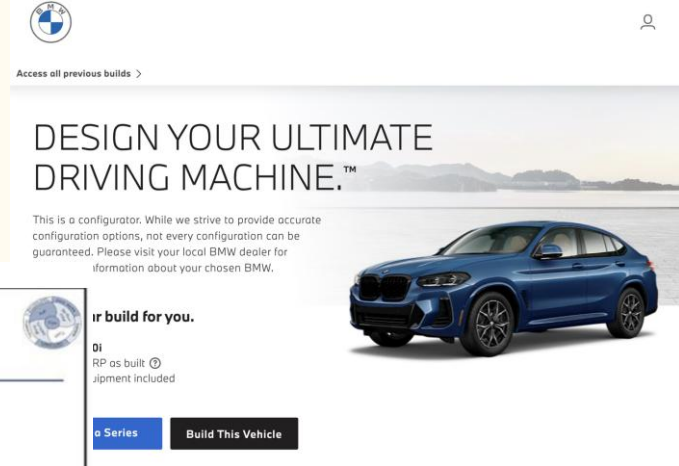


Fig 3:- Installation Kanban System BMW Jakarta
Source : BMW Jakarta



Shifts in production

“BTS” → “BTO”

- Removes slack
- Reduce inventory carrying costs
- Avoid rebates

Digitized Manufacturing (US)

- Digitized manufacturing = integrating advanced technology into production processes to keep up with global competition
 - Automation, AI, IoT, robotics
- Ex: Amazon automated guided vehicles (AGVs), robots, and AI for predictive logistics
- Challenges: high initial cost; skills gap in the US
- As an economically developed nation, the US is well-positioned to support digitized manufacturing and its future advancements.

Digitized Manufacturing (Japan)

A survey about an annual assessment of the ability of countries to adopt digital technologies: Japan ranked 32nd of 64 economies surveyed



Main Reason	Other Factors
Threatens traditional policies and practices	A shortfall of 2.3 million digital workers by 2026
Cautious approach to risk, less willing to explore and implement new technologies	Few women in Japan are pursuing STEM degrees
	Education system has been slow to adapt to the digital age

Lag Behind!!

Digitized Manufacturing (Japan)

Technology:

- Automation and Robotics
- IoT devices
- Predictive Maintenance Technology
- Digital Twins



Industry:

- Automotive
- Electronics
- Energy Sector

... ..



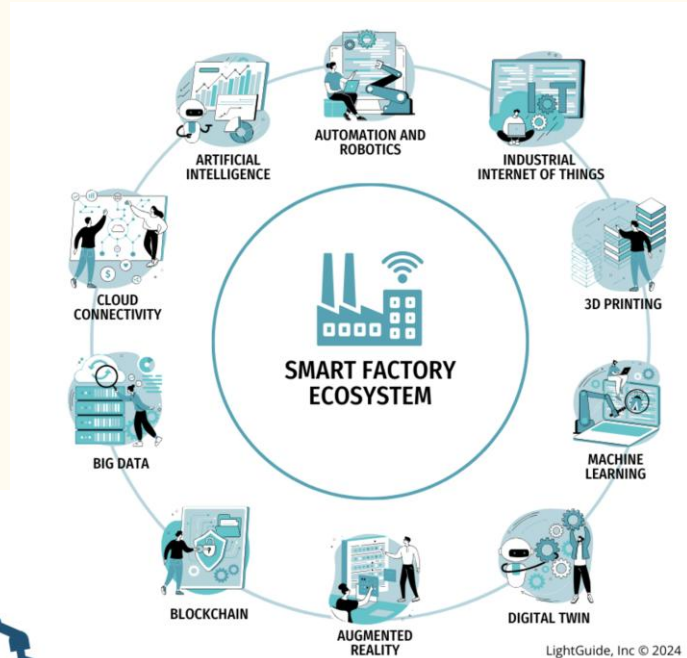
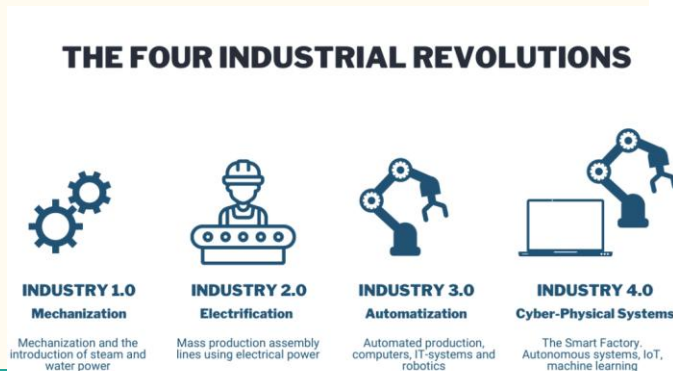
A Digital Transformation: Industry 4.0

- Industry 4.0 Pioneer: Introduced in 2011
- “4th Generation of Manufacturing”
- Widespread German Influence on global supply chain networks

- Big data techniques
- Blockchain technology
- AI
- Digital Twin
- Machine Learning



From Lean
manufacturing to
Smart
Manufacturing



Sustainability (US)

- Regulations at the federal and state level to incentivize companies to act more sustainably
 - Clean Air Act; Clear Water Act
 - California's AB 32 (Global Warming Solutions Act of 2006)
 - Cap-and-trade program: requires companies to hold permits (allowances) for each ton of carbon dioxide they emit. If they fall below their allowances, they can sell the surplus.

Sustainability (Japan)



Edo Period

Green Logistics

Electric Vehicles (EVs)
“Green” Logistics Routes
Renewable Energy Sources



Green Supply Chain

- Sustainable Supply Chain Management
- Carbon Emissions Tracking



- ★ Environmental Assessments of Suppliers
- ★ Promote energy efficiency



- ★ Data collection Framework
- ★ Toyota’s Environmental Challenge 2050 Outline

Sustainability (Germany)

- German Supply Chain Due Diligence Act
 - Human Rights
 - Environmental obligation
 - Mercury pollution
 - Persistent organic pollutants
 - E-waste

- Sustainability and Industry 4.0 in
Leading German Industries

- Blockchain technology and machine learning software
- Led to a decrease in costs
- Efficient use of resource
- Improved efficiency → Competitive advantage

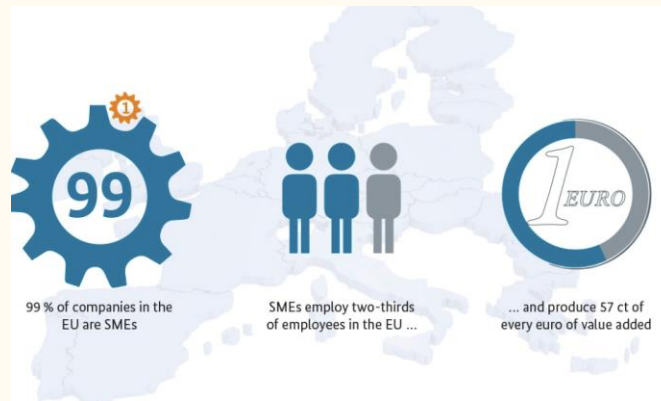


Table 1. Sustainability ranking of German companies

1	Hipp	11	Milupa
2	Alete	12	Bosh
3	BMW	13	Frosta
4	Miele	14	Toyota
5	Bärenmarke	15	Coppenrath & Wiese
6	Landliebe	16	Volkswagen
7	Audi	17	Storck
8	Otto	18	Iglo
9	Mercedes-Benz	19	Haribo
10	dm-Drogeriemarkt	20	ING-Diba

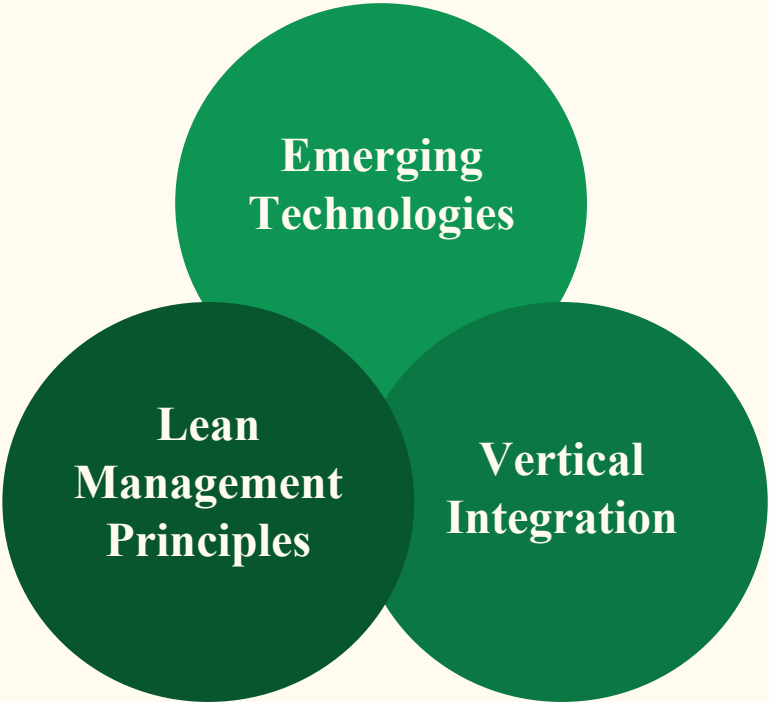
SMEs: Challenges to Implement Sustainable SCM

- **Initial high cost investments** make it harder for SMEs to adopt sustainability technology in their processes
- **Strict regulations** create barriers
 - Intellectual property systems have made it costly to patent sustainable technologies
- **Gaps in Knowledge** of sustainability efforts in SCM among SMEs



Comparative Analysis

Similarities

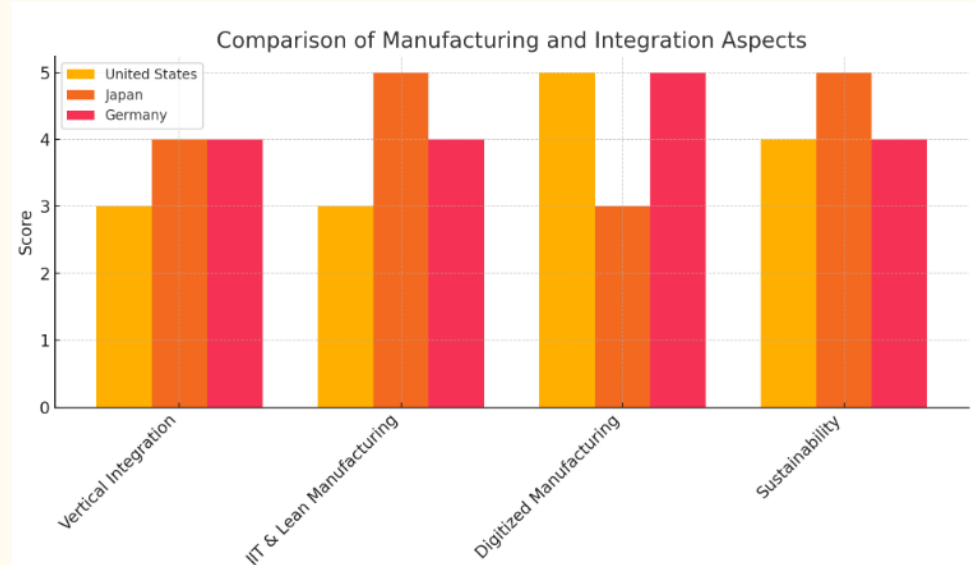


Differences

Aspect	United States	Japan	Germany
Vertical Integration	Flexibility and cost savings	Maintain strong control, and start to adapt.	A balance between vertical and horizontal integration
JIT & Lean Manufacturing	Widely adopted	Pioneer	Smart manufacturing
Digitized Manufacturing	Lead in advanced technologies	Work to overcome challenges from older systems	Lead in Industry 4.0 initiatives
Sustainability	Resilience and flexibility	Eco-friendly policies	Different supply chain methods combination

Comparative Analysis

1. United States emphasizes **advanced technologies** and flexibility in its supply chain (Digitized Manufacturing)
2. Japan leads in **JIT & Lean Manufacturing** while also demonstrating strong performance in **Sustainability**, showcasing its focus on eco-friendly policies and its ability to adapt to technological challenges.
3. Germany's supply chain reflects a combination of **smart manufacturing** and innovative **sustainability methods**.



Environmentally Benign Manufacturing (EBM): Cross-National Comparisons

- *A Case Study Analysis 1*

EBM:

Environmentally Benign Manufacturing (EBM) involves designing manufacturing processes that minimize environmental harm while maintaining efficiency. It focuses on reducing waste, conserving energy and materials, eliminating toxins, and lowering emissions. EBM encourages cost reduction, legal compliance, and long-term sustainability by incorporating sustainable methods into production.

Applications across industries:

1. Toyota - Lean to green
2. Mercedes Benz - Waste Recycling Leadership
3. Toyo Seikan Saitama plant - TULC
4. Motorola
5. Siemens - EMAS

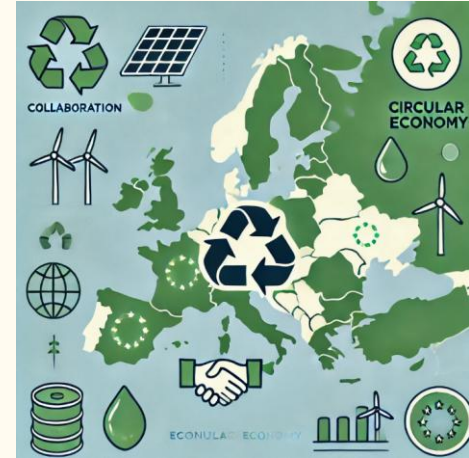


Cultural Differences - US, Japan & Europe



US

JAPAN



EUROPE

Strengthening Purchasing and Supply Chain Management at Toyota

- *A Case Study Analysis 2*

- The 2011 Tohoku Earthquake in Japan caused severe disruptions to supply chains across industries.
- Some of the suggestions put forward during the discussion were that firms should **store buffer stocks** or **build identical assembly lines in two geographically different locations**.
- These are completely in contrast to the Japanese manufacturing system which focuses on JIT Practices.
- This led Japanese firms to propose an innovative solution known as “virtual dual sourcing.”
- Not only this, but Toyota also developed innovative solutions like the RESCUE systems and many more to enhance supply chain resilience and disaster response.

- Toyota and its suppliers are held together by a strong and long-lasting bond, which enables them to act as a single entity.
- Toyota addressed supply chain disruptions by surveying parts and materials, a process made successful through years of mutual trust with suppliers.

RESCUE

RESCUE is a supply chain information database which serves as a means of storing component information and visualizing potential disruption risks along the supply chain. Also, the geographical distribution of the risk associated with each component and facility can be seen on a map.

RESCUE has been applied internationally, such as in Thailand, where it helped identify risks in ten facilities and was integrated into the SCR-Keeper system, now adopted by several ASEAN countries.



Advantages of Global Supply Chains

1. Technological Integration and Innovation
2. Operational Efficiency Through Lean Practices
3. Adapting to global environmental challenges
4. Aligning plans with market and culture
5. Inter-Industry Support
6. Rapid Response to Disasters
7. Knowledge Sharing



Conclusion

In comparing the United States, Japan, and Germany across key supply chain metrics, it becomes evident that each country excels in distinct areas, reflecting their unique strengths and priorities. However, all three nations share a common goal: to develop better and more efficient supply chains in their own way. By learning from each other's strengths and adopting best practices, countries can enhance their supply chain efficiency and adaptability.

By connecting supply chains through these practices, companies worldwide can create **stronger, more resilient, and sustainable networks**. This collaboration benefits all stakeholders, fosters innovation, and ensures long-term competitiveness in an increasingly interconnected global market.