

Megatrends impacting SCM

Capstone: Future-proofing supply chains



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Business /SCM megatrends 2024 – what’s topping the charts?

- 1. Climate change**
- 2. Technological disruption**
- 3. Demographic shifts**
- 4. Fracturing world**
- 5. Social instability**

(source: PWC)

- 1. Geopolitics**
- 2. Climate change**
- 3. Cyber attacks**
- 4. ESG**
- 5. Labour shortage and disruptions**

(source: Resilinc)

- 1. Attracting and Retaining an Engaged Workforce Requires Strategy**
- 2. Emerging (& Disappearing) Technologies**
- 3. Cultivating Resilience is No Longer a “Nice-to-Have”**
- 4. A Tentatively Optimistic Economy but Elusive Financing**
- 5. The 2024 Elections and Policy Changes**

(Source: The CEOs right hand)

**Which
megatrends do
you think will
most impact SCM
in near and far
future?**

**Particularly for
your case
company?**

Why?

How?

State of fashion 2024

McKinsey report



Consumer net intent to spend on apparel is 16% down in Europe



More than 65 billion dollars of apparel exports are at risk of being wiped out by climate events



Trade activity on resale platforms grew on average 800% in 2023



The bullwhip strikes back? 73% CPOs think demand volatility may impact supplier relationships in the next 5 years



87% fashion executives think sustainability regulations will impact their business in 2024

Chemical industry key trends 2024

**Sources: GEP 2024,
Deloitte 2024**

- In 2023 global supply exceeded demand, leading to high inventory levels. Similar trend is expected to continue

- Yet, the industry supports more than 75% of all emissions reduction technologies needed to meet 2050 net-zero goals

- Supply chain resiliency expected to be a high priority for global supply chains in the industry

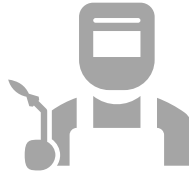
Sustainability focus means focus on carbon emissions and waste reduction plus increasing emergence of circular solutions

Data usage for operational excellence expected to continue

Fleet management outlook 2024



Vehicle Acquisition:
manufacturers continue to struggle to provide accurate, timely and ample vehicle supply.



Preventative Maintenance:
Supply chain disruptions have caused critical parts shortages, driving up vehicle repair costs by up to 20%



Fleet Electrification: how each vehicle will integrate into their fleet and how EVs will impact short-term items such as refueling, maintenance and overall lifecycles.

Sustainability and circularity



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12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



Delivering ESG outcomes through supply chains

Data-Driven Approach To Operationalize ESG Targets

- Companies need to gather baseline data for scope 1, 2 and 3 emissions, and supplier working conditions

Collaboration and data-sharing across the chain and beyond is needed

- Shared Business Practices With Partners Through Policy
- Most of negative environmental and social sustainability issues often happen “along the chain”

Using Buying Power To Influence Supplier Sustainability

- Use leverage to add sustainability related contract terms

EU regulation for textile industry

Status	Regulation and directives
ADOPTED	Waste Framework Directive: Mandates Extended Producer Responsibility (EPR), requiring brands to pay for end-of-life waste treatment
	Corporate Sustainability Reporting Directive: Requires companies to report on environmental and social activities using a standardised methodology
	Corporate Sustainability Due Diligence Directive: Requires environmental and human rights-diligence and improvements across the value chain
PRO-POSED	Eco-design for Sustainable Product Regulation (ESPR): Mandates ecological design and circularity requirements to be practised at the product level, supported by digital product passports
	Waste Shipment Regulation: Facilitates the transportation of waste for recycling and reuse in the EU and bans illegal waste shipments to the Global South
	Ban on Destruction of Goods: Limits destruction of unsold or retained textile products, encouraging the repair or reuse of goods
	Green Claims Directive: Addresses “greenwashing” and introduces requirements on various aspects of consumer-facing product claims
DRAFT	Microplastic Legislation: Aims to reduce the release of microplastics into the environment across manufacturing stages
	Revision of the Textile Labelling Regulation: Streamlines physical and digital product label requirements on composition and origin of textile products

Focus on energy efficiency

Current supply chains built in an era of cheap oil

Energy efficiency / energy risk mitigation

- Consideration of alternative energy sources for facilities and transport fleet
- Adjusting operations (e.g. factory shifts or different manufacturing tasks) based on energy pricing during the day/night
- Adding energy self-sufficiency at larger sites (solar, wind, back-up)

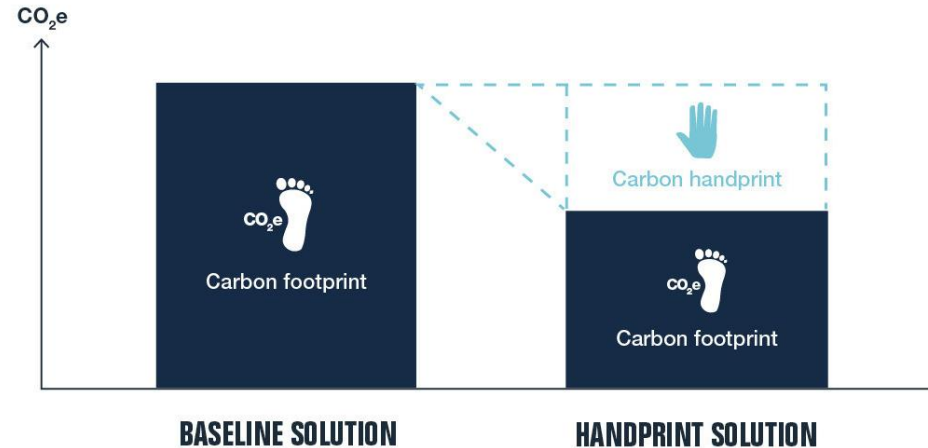
Energy efficiency in last mile logistics

Halldórsson and Wehner, 2020

- 1. High vehicle fill rates**
- 2. Avoidance or minimisation of private transport**
- 3. A pull approach in last-mile fulfilment**
- 4. Commercial trucks delivering goods collectively to pick-up points or locker stations at central hubs that are regularly passed by the end consumers**
- 5. A dense net of pick-up points**
- 6. If home deliveries are a preferred solution high fail rates should be avoided**

From footprints to handprints?

- Handprint of a product can be created either by preventing or avoiding negative impacts (footprints) that would otherwise have occurred, or by creating positive benefits that would not have occurred (Norris, 2015).



<https://www.cargotec.com/en/blogsandcases/2021/why-is-cargotec-measuring-its-carbon-handprint/>

Footprint vs handprint perspectives

Table 1. The ideas of handprint and footprint according to Biemer et al. (2013 a, b)

Handprint thinking	Footprint thinking
The good we do	The harm we do
Unlimited potential	Limited resources
Recover/Restore	Reduce/Reuse/Recycle
Influence/Educate/Inspire	Admonish
Count accomplishments	Measure quantities
Appreciate/Celebrate	Calculate
Advocate protection	Resist destruction
Entrepreneurism	Problem solving

Current supply chains were not designed with circularity in mind...

Production has typically been centralized

- *Specialization of parts*
- *Economies of scale*

Optimizing for specialization and economies of scale has led to global, complex supply chains, which often make circular flows difficult to implement and expensive

Circularity would often need a switch to:

- Parts commonality and easy disassembly
- More local (re)production

Some pre-requisites for circularity

- **Companies need to scale up circular solutions**
 - Design for circularity and retain asset ownership
 - Increased product traceability
 - Technology and systems to enable disassembly and market mix of new and used
- **Consumers need to be prepared for new solutions**
 - Subscription
 - Rental
 - Pre-loved
 - Upcycled
 - Repair

1

Step 1: Minimize refuse, recall, and returns.

The dominant player is the company.

2

Step 2: Maximize reduce, reuse, and recycle.

The dominant player is the consumer.

Reorganization of global supply chains

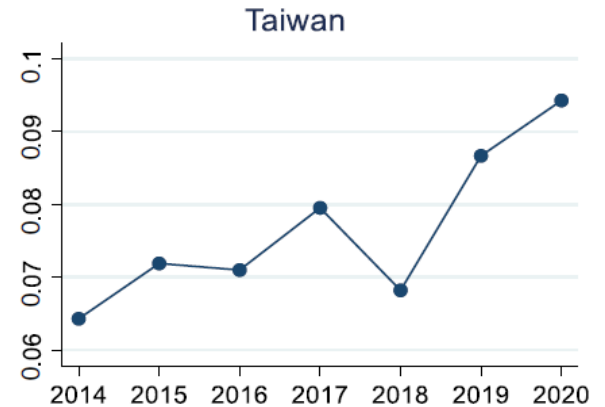
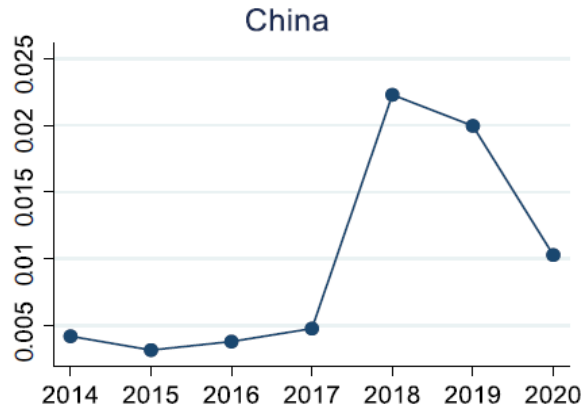
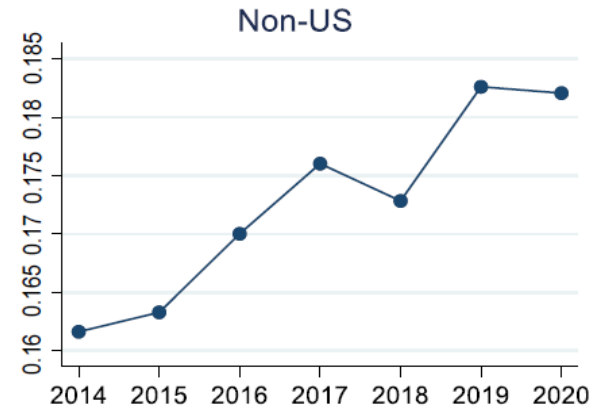
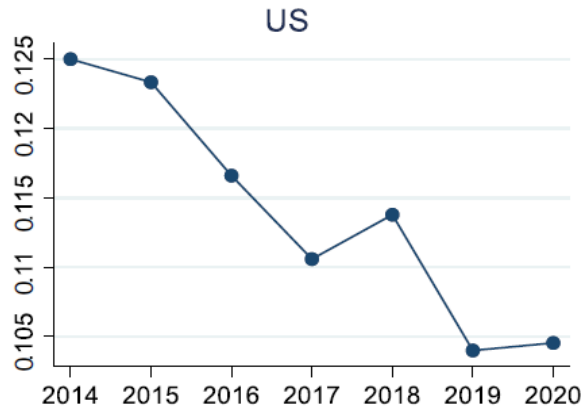


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Making supply chains great again?

“Contrary to the aims of governmental policies, American manufacturers increased their dependence on foreign suppliers and reduced their dependence on local ones.”
(Chakkol et al. 2023)



Factors to be considered in global supply chains

International transport
Transport modes costs and performance
Benefits of components bulk shipping
Longer lead times
International transport
Customs operations
Inventory reduction options
Various requirements of different geographical markets
Brand, product formulation, peripherals
Taste, language environment
Contents or pack forms
Technological specifications and culture
Differences in production factors' costs across countries
Differences in materials and parts' costs across countries
Differences in knowledge level of workers
Trade agreements and regulations
Duties on import

Duty drawbacks
Government laws, regulations,
and local content requirements
Differential tax rates and transfer pricing schemes
Exchange rate fluctuations
Environmental concerns

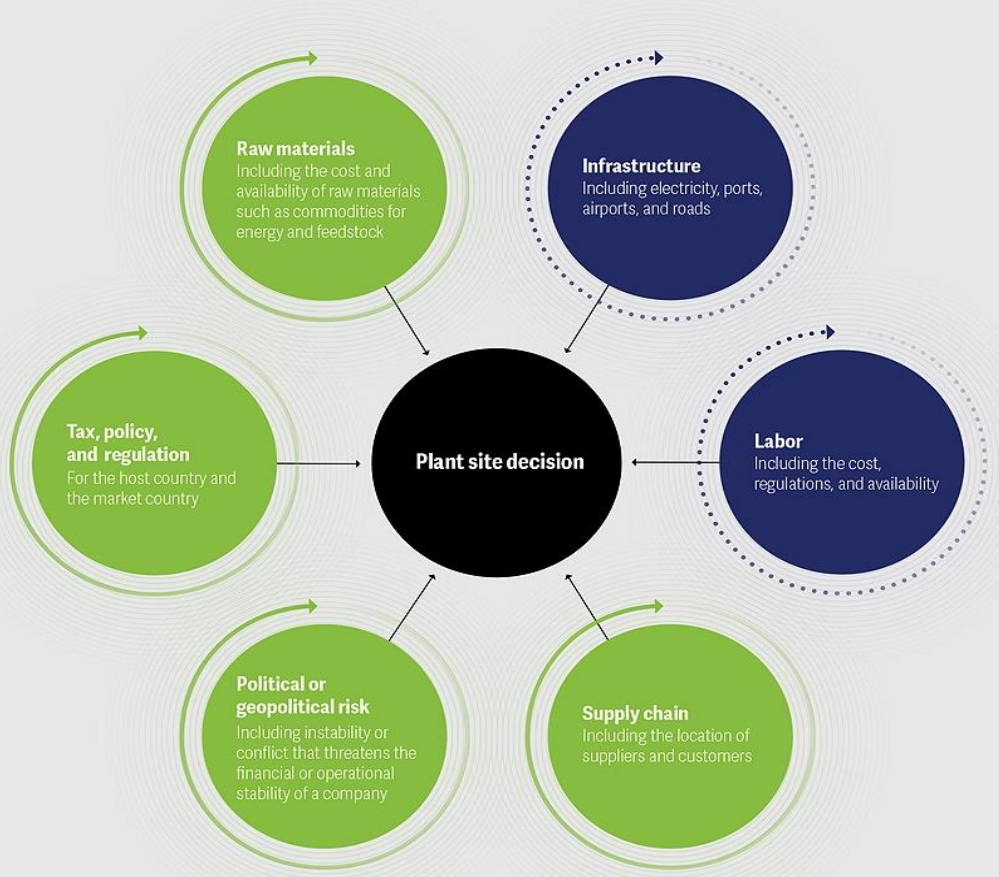
**Which do you think take
priority?**

**Does it depend on the firm /
industry?**

Figure 2

Many of the factors considered for plant site selection have recently shifted or are expected to shift in the near future

- Recent, long-term shift
- Potential future shift



Source: Deloitte
2024

Source: Deloitte analysis.

Trends in global value chains

Low wages less important in global production decisions

- Only 13 percent of globally traded goods are now exported from low-wage to high-wage countries
- Access to talent, market proximity, resource scarcity, risk mgmt., innovation etc.

Trade flows are becoming more regionalized – nearshoring (and reshoring) increasing

Data flows a different story?

- global flows of data have grown 320 times larger since 2005

How to make regionalization work?

TO INCREASE EFFECTIVENESS

- Identify potential suppliers with relevant capabilities
- Develop local capabilities with existing supply base and jointly identify how they can create a regional base
- When sub-scale, partner with others to build attractive platform for potential suppliers

CONSIDER PRODUCT DESIGN

- Design for substitution, to enable replacement of key components in case of disruption and/or allow for late-stage customization in the design to reduce cost of supply chain flexibility.
- Allow for circular economy (reuse, repair, redistribute, remake, recycle), which is facilitated by having production capabilities in close proximity of final consumption areas.

Global network structure linked to level of vulnerability

Whether local, regional or global, these are the things to pay attention to!

Geographical concentration of spend

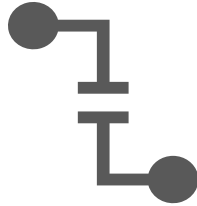
Substitutability of suppliers

Interconnectivity

Number of sub tiers & visibility

Supplier size and financial dependence on your firm

Short-term & mid-term unhooking practices



Short-term: continuity focus

Re-routing flows in response to bottlenecks

Good partnerships with 3PLs etc. important

Discontinuing/last orders from
compromised area & begin to shift orders to
other regions/suppliers

Add temporary buffers / inventory

Mid-term: resiliency focus

Restabilize network around new sources and
monitor capacity

Improving reliability of alternatives in face of
scarcity, emphasis on collaboration rather than
transactions

Adjust capacity, address emergent bottlenecks

Product substitution to address material
shortages

Shift KPIs if needed based on geography & local
context

Long-term unhooking & re-hooking practices

Long-term: strategy-focused

- Review Tier 2 (and further) resourcing and back-up alternatives
- Identify potential triggers for re-hooking in other areas
- Invest in new production capacity and technology based on new market realities
- Revise product mix and dependencies



The demand side – and supply impacts



How is your consumption behavior different to what it was like in 2019?

Does your changed behavior have consequences to the firms you shop from?

What have they needed to / will need to do to match changes in your behavior?



Consumer behavior post pandemic

(Kearney 2020)



Trust is paramount in consumer decision-making



Consumers align behaviors and purchases with their values



Consumers choose to shop and engage where, how, and when they want



Consumers seek authenticity in products and experiences



Consumers value belonging to and participating with broader communities

Welcome to the age of omnichannel fulfillment

Anytime,
anywhere
fulfillment

Next day, same
day and even
same hour
delivery

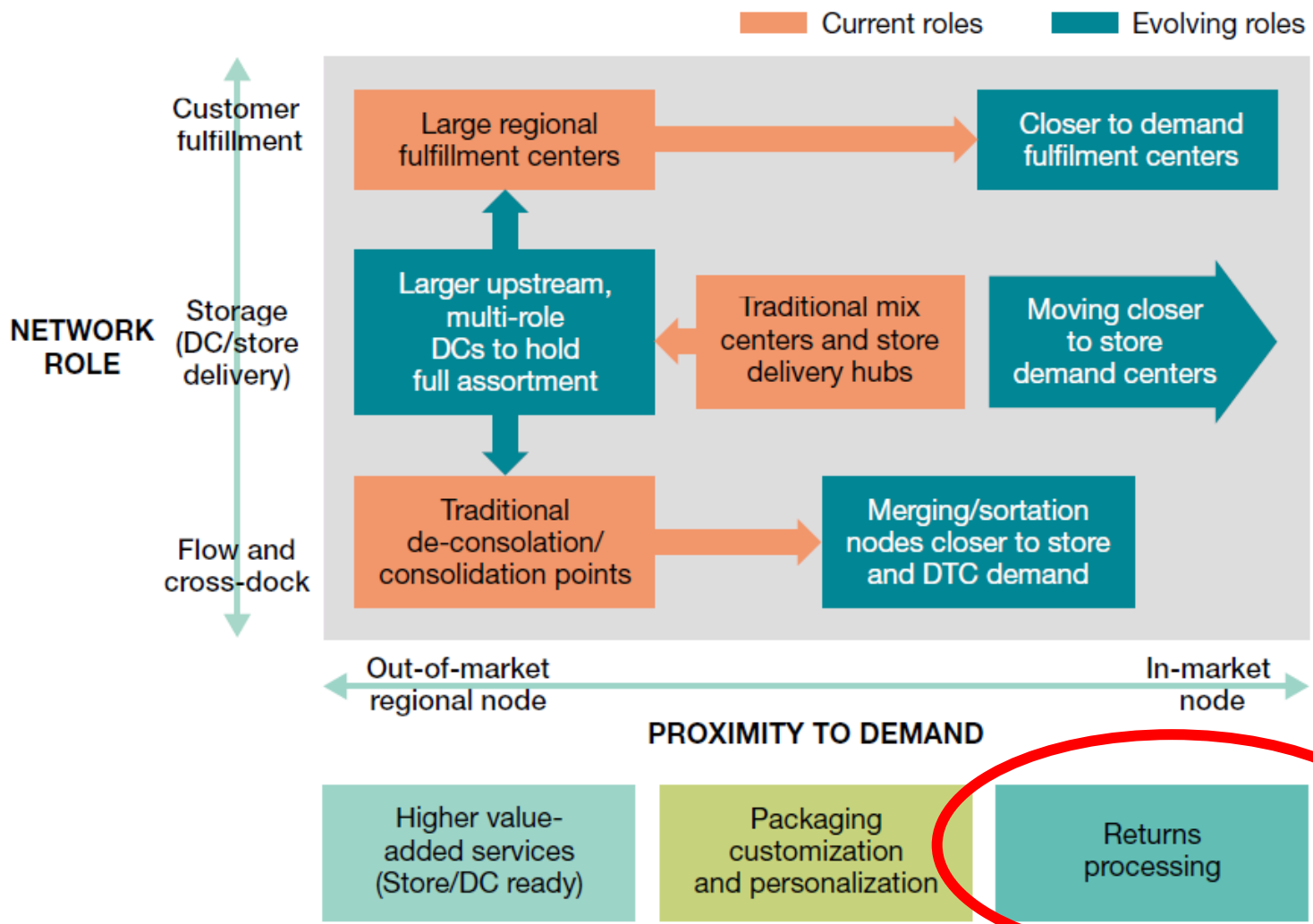
Exploding
product variety
and packaging
choices

Hyperlocalization

Personalization

FIGURE 1

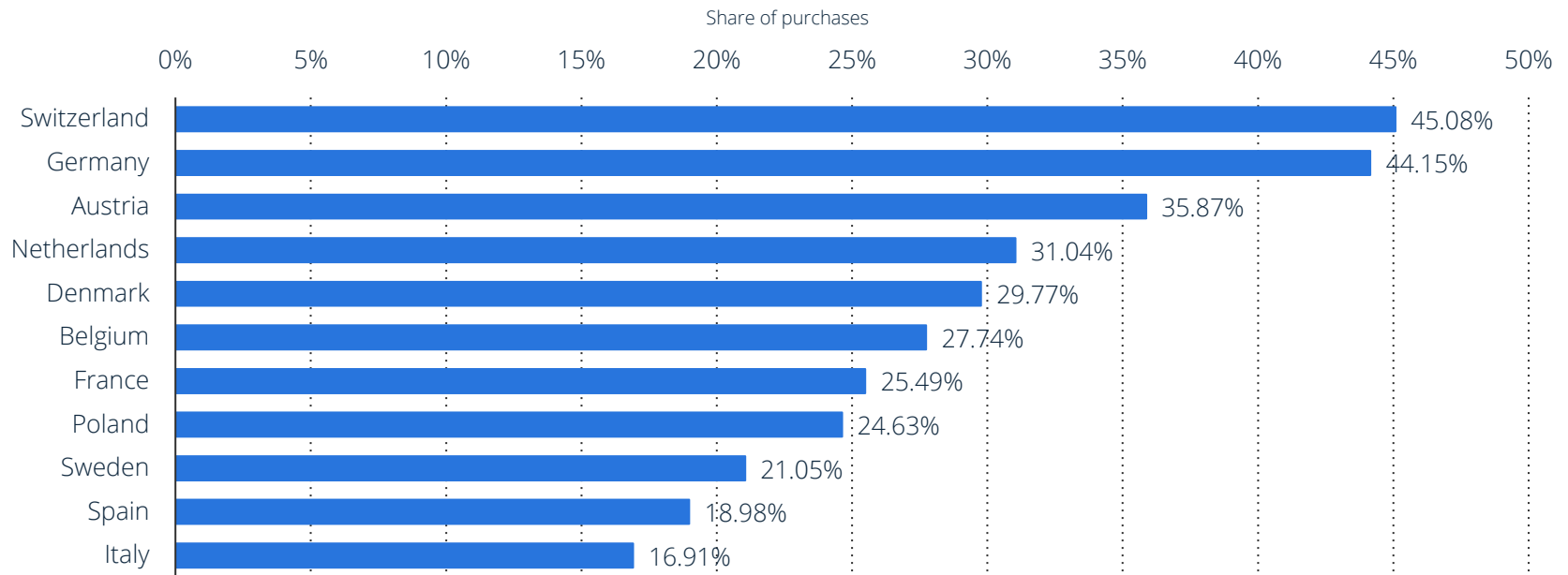
Distribution network dimensions



Circular economy needs more than just “returns processing”!

Share of online fashion purchases that got returned in Europe in 2022, by country

Share of online fashion purchases returned in Europe 2022, by country



Note(s): Europe; 2022; based on monitoring of leading online marketplaces

Further information regarding this statistic can be found on [page 8](#).

Source(s): Yocabè; ID.1385697


7 returns misalignments

Karlsson et al. 2023


Misalignment	Description	Business goal impact
Lenient policy and reduced return rate	A lenient policy drives sales but, inevitably, also the returns rate.	Sustainability & Profitability
Disarrayed return timeframe and demand variation	Allowing a long time for returns prevents bringing back seasonable items into the supply chain.	Customer experience & Cost efficiency
Incoherent conditional requirements and process execution	A lack of process compatibility for returns that fail to meet communicated conditional requirements.	Cost efficiency & Customer experience
Incoherent customer service guidelines	Vague instructions and the burden of returns decisions rests on the customer service department alone.	Customer experience & Cost efficiency
Insufficient information system resources	Analogue and manual systems prevent the efficient collection of data.	Profitability & Cost efficiency
Insufficient data-driven decision-making capability	Lack of ability to take advantage of return data to make well-informed decisions.	Organizational design & Cost efficiency
Incoherence in multichannel and omnichannel	Treating returns differently across channels leads to an inhomogeneous customer experience and an ad-hoc return process design.	Employee experience & Customer experience

Designing a product returns strategy

Product return strategic decision variables: Involves the long-term decisions regarding 'policymaking, locations designing and selection, selection of 3PL, product recovery strategies, and capacities of facilities are made at this level.'



Product return tactical decision variables: This comprises mid-term decisions concerning 'markets will be supplied from what locations, and flow of supply chain network.'



Product return operational decision variables: This includes short-term decisions regarding 'production quantity, lot sizing of products, return product recovery also allocating inventory or production to individual orders and setting a date by which the order is to be filled.'

Future of warehousing

Facilities with capabilities suited for more complex and diverse network roles

- store delivery, customer fulfillment and cross docking, circular economy operations



Position fulfillment nodes much closer to demand centers with forward deployed inventory

Impact of economic situation?

Manufacturers are struggling with supply chain disruptions, labor shortages, and increased operational expenses (e.g. material and energy prices), as a result we may see:

- Increased delivery costs
- Lack of free returns
- Restrictions on return policies

Consumers will likely increasingly go for the lower priced alternatives

- or reused options?

Supply chain digitalization



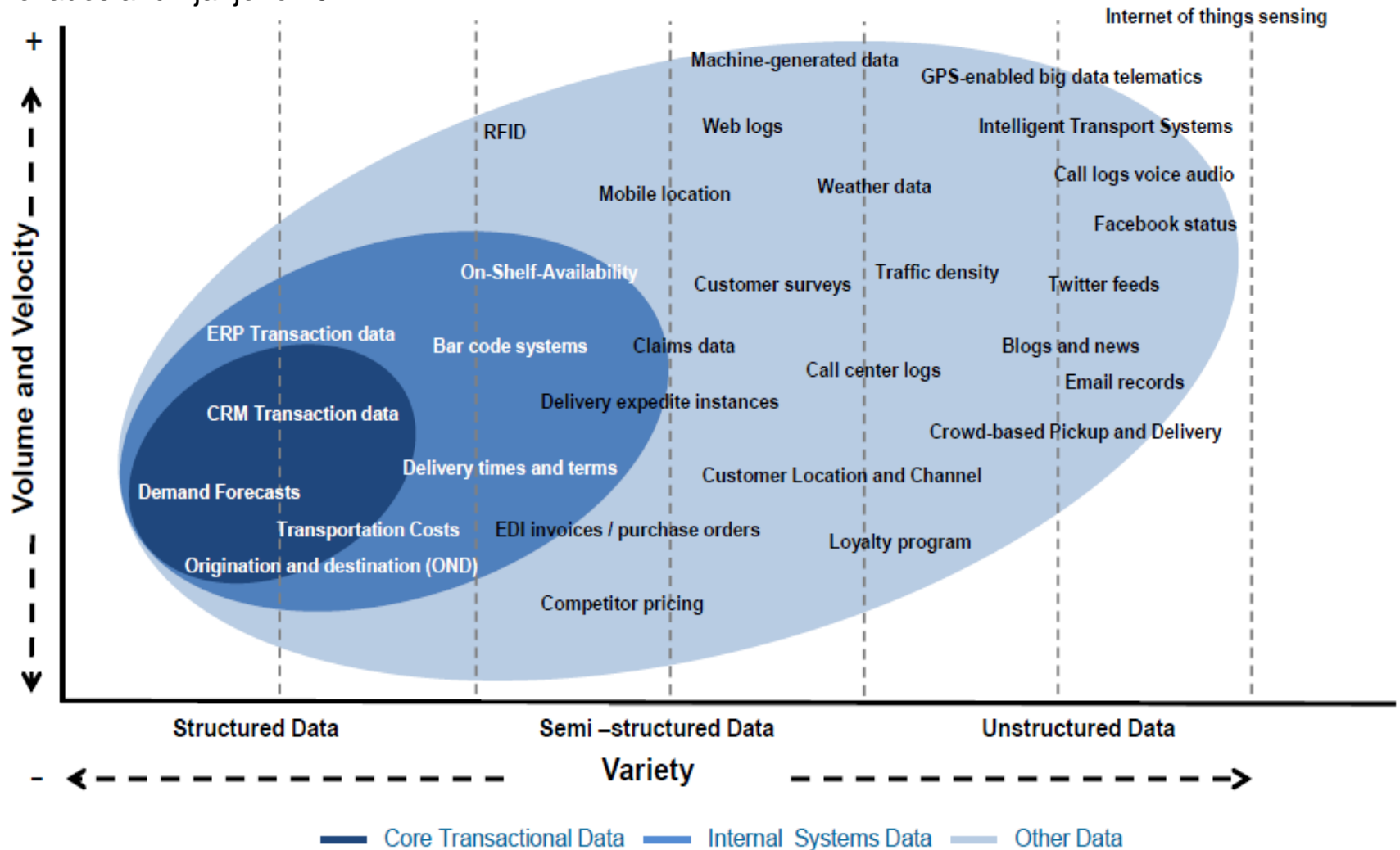
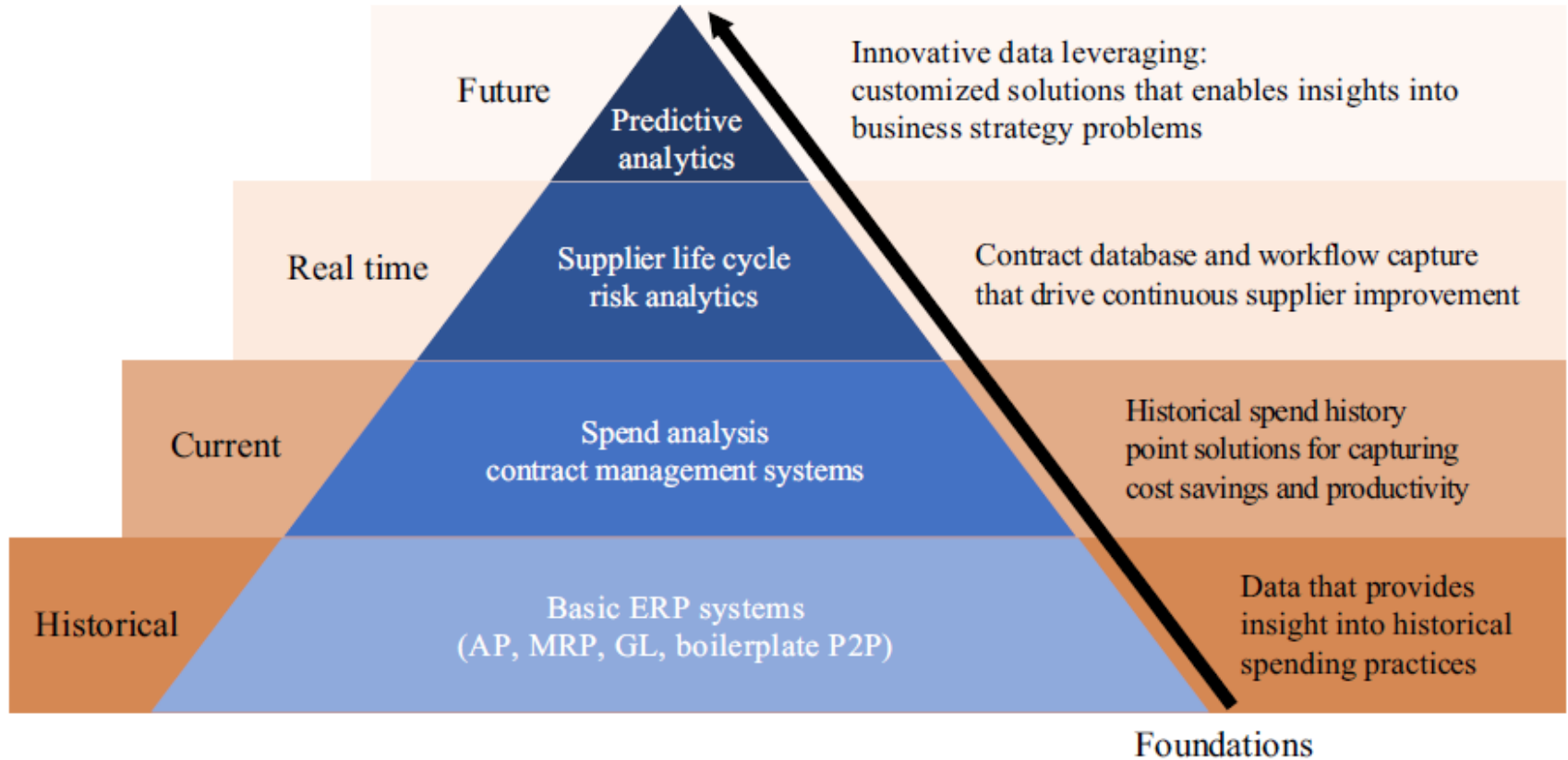


Figure 1. SCM Data Volume and Velocity vs. Variety



What types of digitalization projects are prioritized in SCM?

Source: GEP 2022 & The Economist



Advanced automation and robotics



IoT for real-time tracking and monitoring



Predictive analytics & real-time data analytics

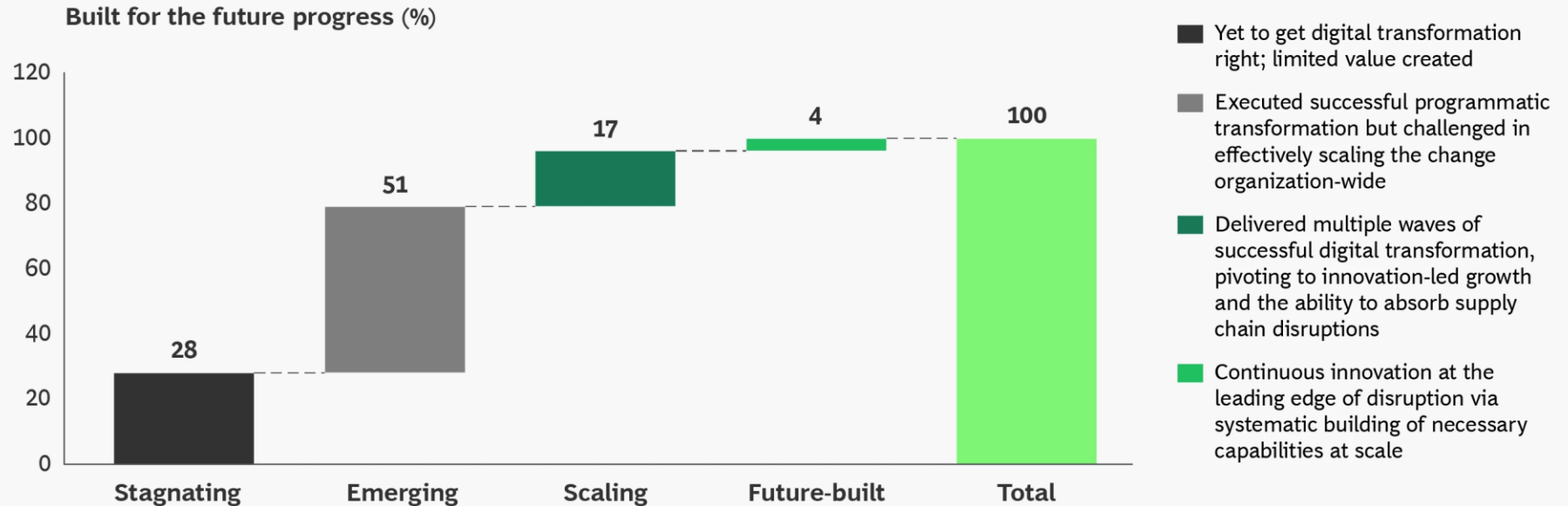


AI to support decision making



Improved traceability (e.g. blockchain)

Fewer Than 25% of Companies Are Leading the Way to the Supply Chain of the Future



Source: BCG Build for the Future Survey 2022.

Note: Respondents are supply-chain-focused companies operating in the following industries: consumer products, retail fashion and luxury, medtech, biopharma, power and utilities, oil and gas, transportation and logistics, automotive and mobility, hardware and semiconductors, and materials and processing.

How AI is changing supply chains

 Real-time route optimization

 Improved forecasting

 Automated document processing

 Delivery emissions reductions

 Risk management

 Production planning

 Predictive maintenance

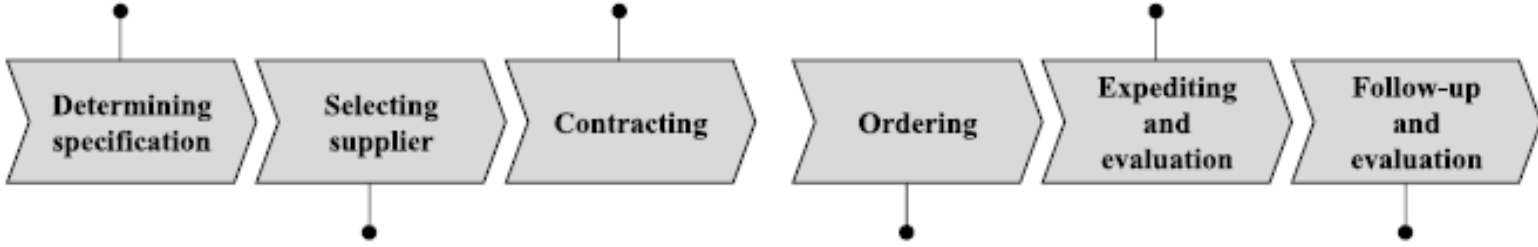
Top Use Cases for AI/ML in the Supply Chain

Decision-makers cite inventory management, fraud detection and quality management as top use cases



AI opportunities in the purchasing process

- Improvement of the data quality of the commodity group codes
- Spend analysis/ management
- Assistance in the search for products/services
- *Cost categorisation in spend management (Heinrich and Stühler, 2018)*
- RPA for operational support (e.g. discount requests)
- Automatic alerts
- Negotiation bot
- *Identification of risks in supplier contracts (Heinrich and Stühler, 2018)*
- *Analysis of the negotiation behavior of suppliers (Schulze-Horn et al., 2020)*
- Forecasting
- RPA for operational support (e.g. price adjustments, invoice automation)
- Order confirmation



- Screening supply markets, supplier scouting
- Intelligent newsfeed
- Data analysis and deriving category strategies
- Chatbot for automated queries
- Risk management
- *Supplier identification, evaluation of suppliers and risk factors (Heinrich and Stühler, 2018)*
- *Analysis of the cost structure of suppliers (Schulze-Horn et al., 2020)*

- RPA for operational support (e.g. requests, control)
- Lead-time prediction
- AI-based price forecasting
- *Ability to operate more quickly (Heinrich and Stühler, 2018)*
- *Determine the optimal time to order (Schulze-Horn et al., 2020)*

- Analysis of orders regarding the adherence to compliance guidelines
- Allocation of incomplete invoices
- *Bots for monitoring order fulfilment and goods reception (Flechsig et al., 2021)*
- *Automated invoice management (Flechsig et al., 2021)*

Human judgement will still be needed

Statistical methods

Human judgement

Strengths

- Process large data sets
- Precision and accuracy
- Flexibility and scaling
- Speed

Complementarity

- Connect unrelated areas
- Creative and innovative
- Explain decisions
- Empathy and emotion

Weaknesses

- Only as good as the data
- Lack creativity and innovation
- Cannot explain the decision
- Lack empathy and emotion

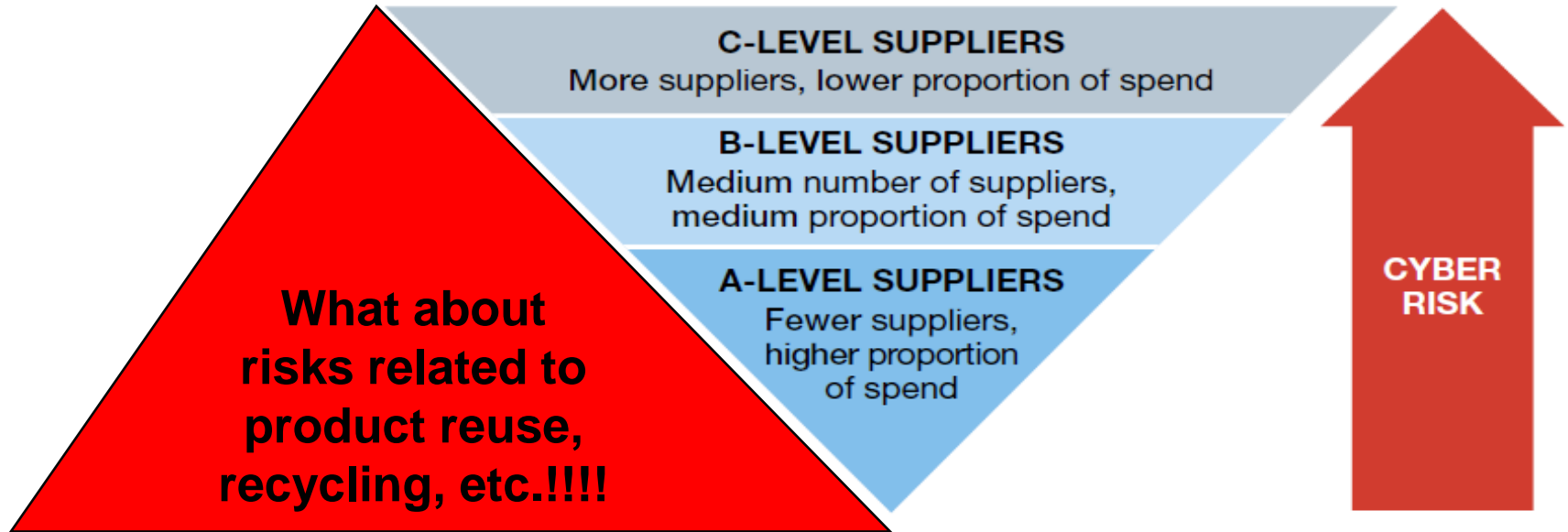
- Processing limitations
 - Subject to cognitive biases
 - Inconsistent
 - Physical limitations
-

Browning et al. 2023

Increased digitalization brings a new risk to the table

FIGURE 1

C-level suppliers and cyber risk



In fact many new risks to the table!

System risk	Technical Integration, Dependency, Standards, Compatibility, Complexity, Interoperability issues where systems are not able to interact among themselves Not able to extract meaningful data generated through BDA, Old system to feed data which require new systems
Operational and manufacturing process risk	Higher vulnerability to operational accidents, Dependence on technology providers, Sabotage by employees, IT-interface problems, No established standards,, Different dynamics and time structures of manufacturing processes Not able to optimize work-stations to benefit the entire production line, improper infrastructure to plan operations No coordination between human and machine via user interfaces
Social risk	Acceptance by society, Lack of standards by working groups within the industry, Not able to establish technology partnerships, Consumption, Pollution, Job losses, Internal resistance and corporate culture, Lack of qualified personnel, Concerns regarding Artificial Intelligence, Lack of ability to combine data/obtain quality data
Cyber security and safety risk	Cyber-attacks, Unsecure data possession and data handling, Challenges in storing, discovering, and sharing data, Security/Privacy, Data breach

