Can we achieve supply chain resilience with digitalization?

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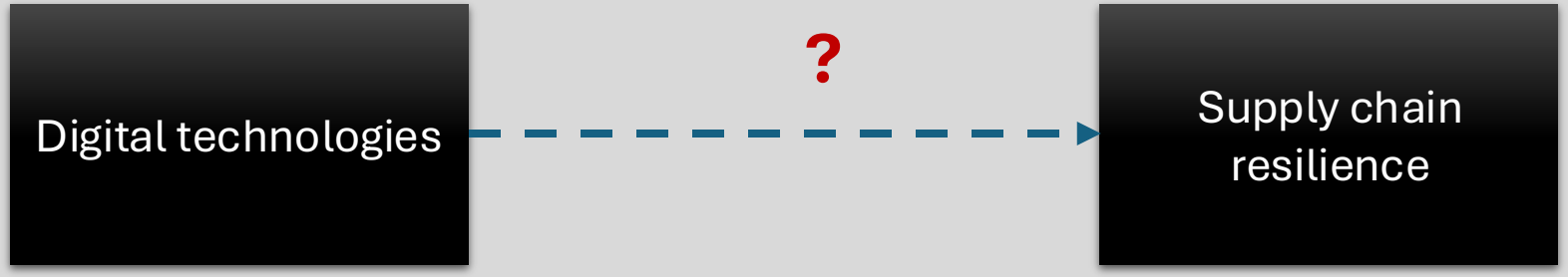
We are trying to link two big concepts…

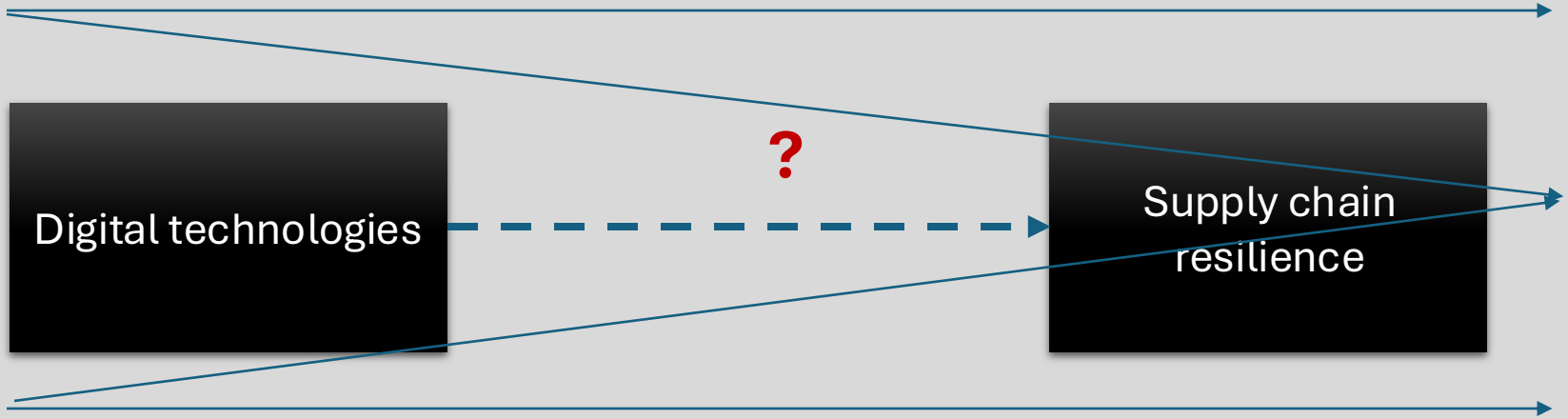


… and we could consider the combined effect of how these lower-level constructs link positively or negatively….

…but the combined effect of how *specific* digital technologies affect *specific* resilience mechanisms—positively or negatively—is not clear.

- ERP
- APS
- Blockchain, IoT
- Industry 4.0

- Gen AI
- Gen AI-driven robotics

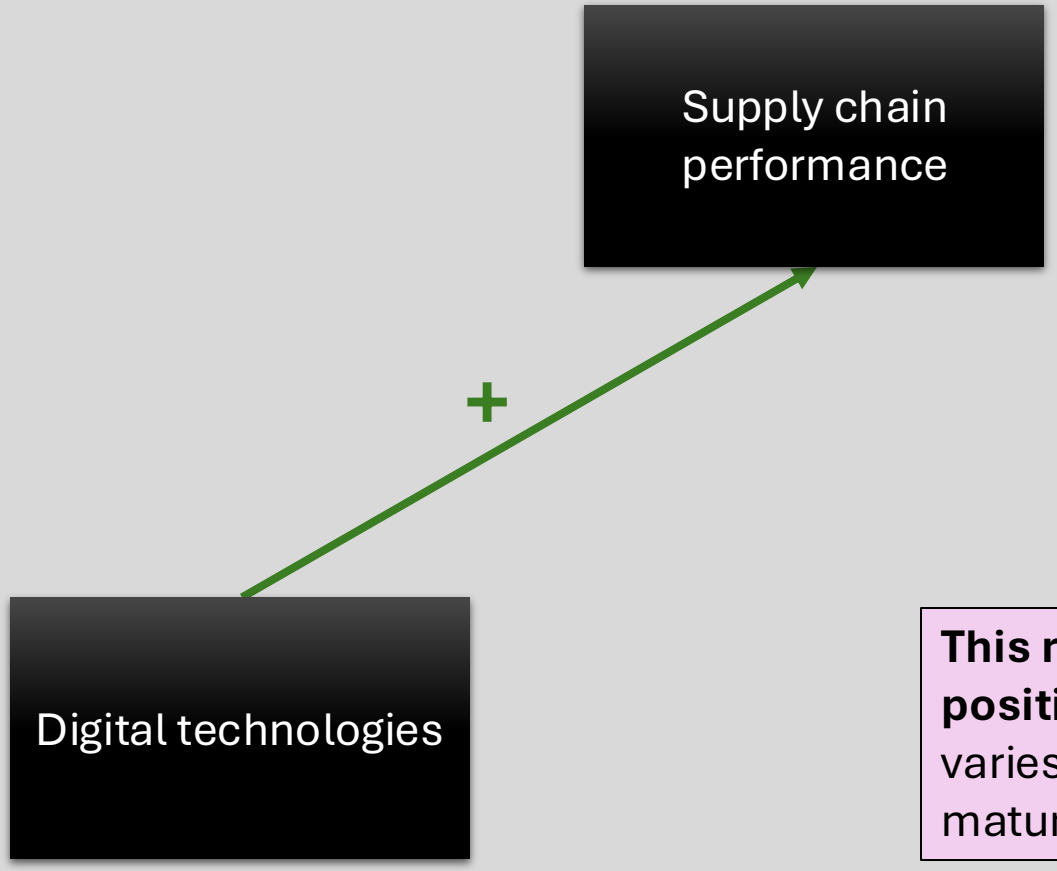


- Risk mitigation
- Prevention
- Robustness

- Response
- Pre-response positioning

- Recovery

If we consider supply chain performance, we do know (or believe) the generally positive relationship of digitalization with performance



- Reliability
- Responsiveness
- Flexibility
- Cost (delivered)
- Asset management efficiency
- Customer satisfaction
- Sustainability

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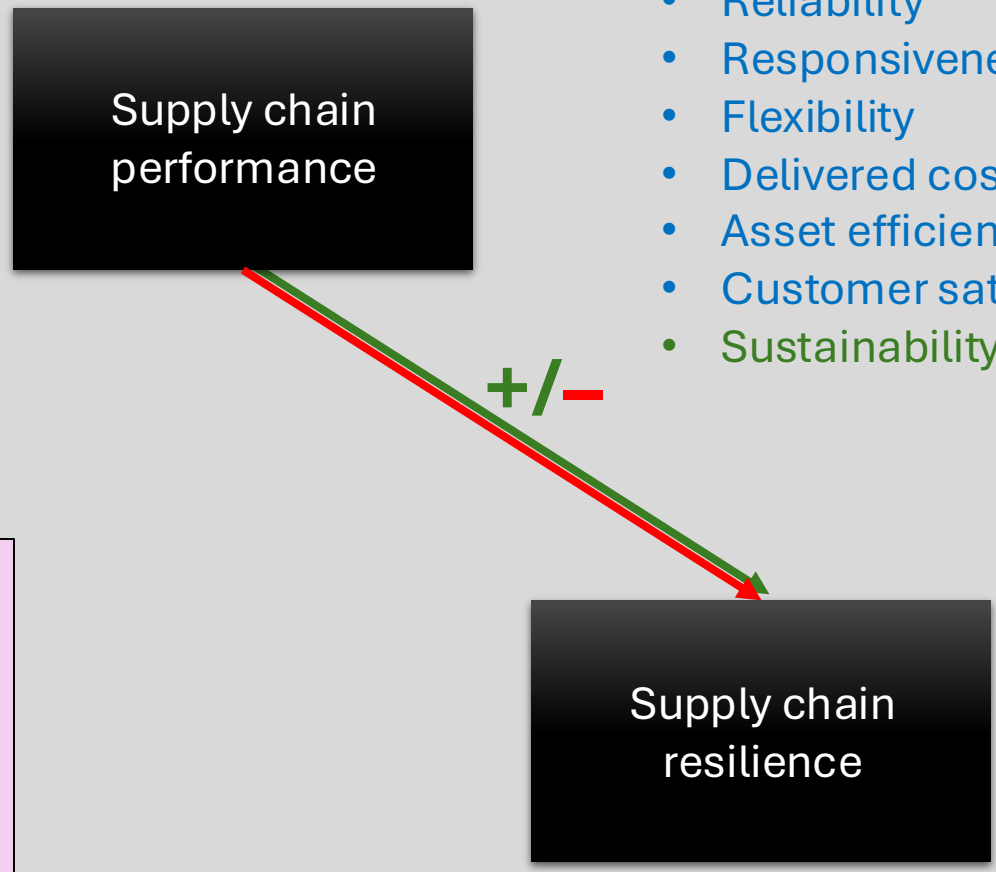
This relationship is generally positive, although the strength varies depending on context, maturity, and technology type.

We also have a mixed (+/–) relationship between performance and resilience (lower level) constructs…



- Reliability
- Responsiveness
- Flexibility
- Delivered cost
- Asset efficiency
- Customer satisfaction
- Sustainability

- Efficiency (–) → redundancy
- Speed (+) → responsiveness
- Cost reduction (–) → robustness if it leads to leaner inventories.
- Visibility (+) → vulnerability to cyber-risks.

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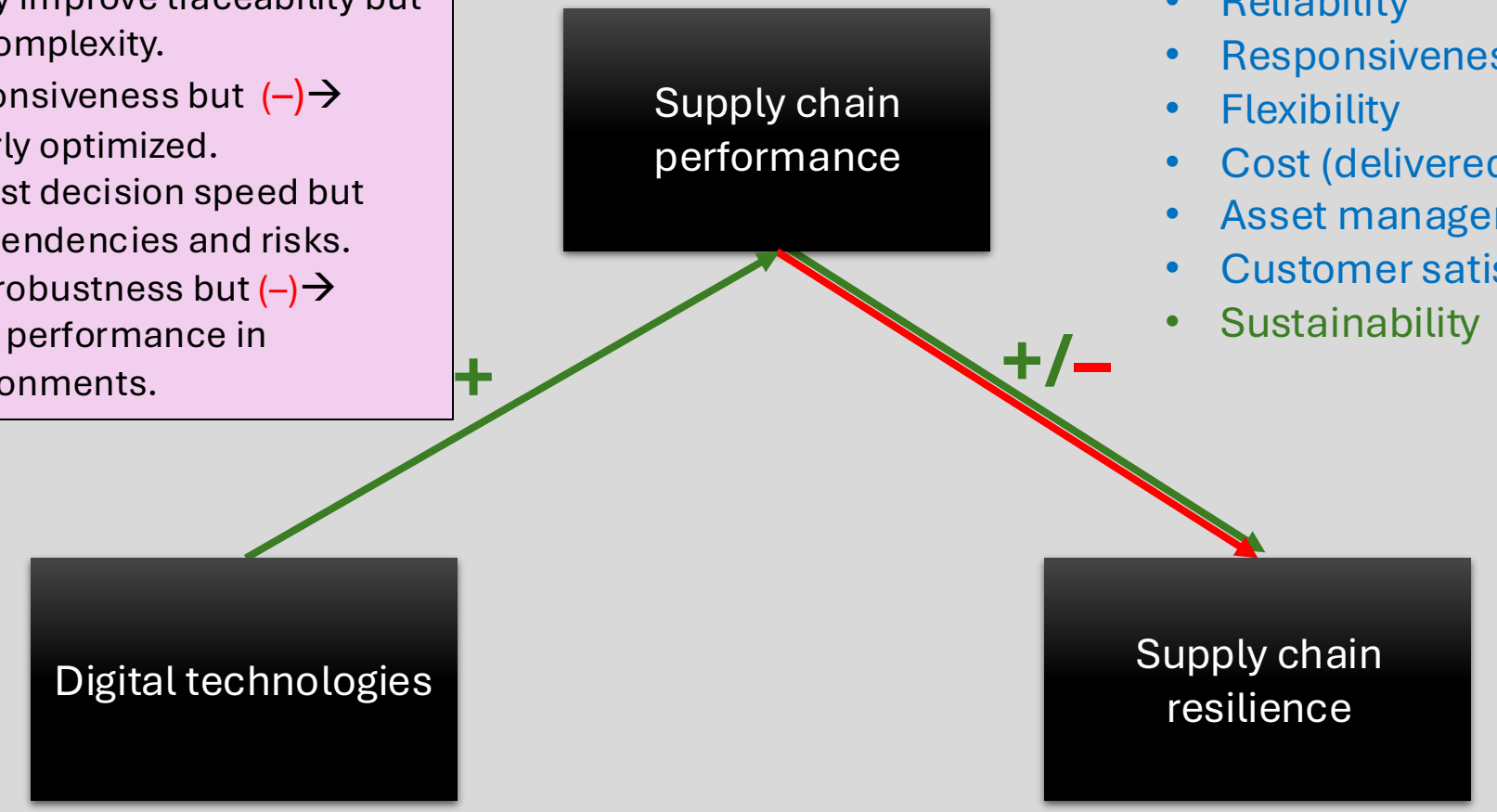
This relationship becomes even more opaque when we consider the marginal effects of digital technologies…

- Blockchain may improve traceability but add cost and complexity.
- APS (+)→ responsiveness but (–)→ flexibility if overly optimized.
- GenAI may boost decision speed but create new dependencies and risks.
- Robotics (+)→ robustness but (–)→ adaptability for performance in uncertain environments.



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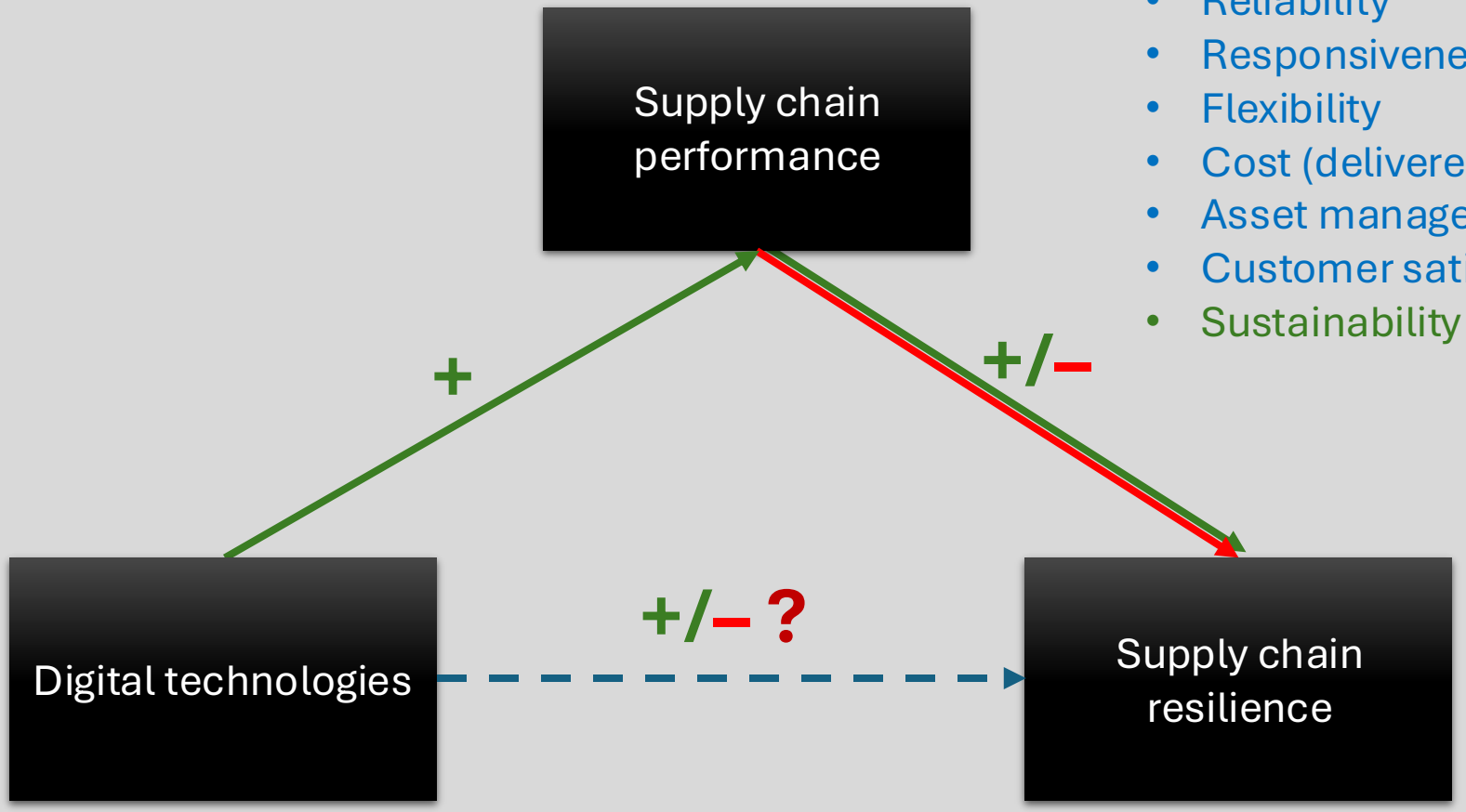
We can now consider all three concepts together to appreciate the complexity of the question



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To conclude, can we achieve supply chain resilience with digitalization? Like many relationships

1. It's complicated
   - Digitalization affects performance in mostly positive ways, but resilience and performance interact in mixed ways.
   - Performance mediates the pathway, making the net effect opaquely dependent on lower-level interactions.
2. It depends… on the
   - Specific technology or a bundle of technologies (IoT+blockchain+cloud)
   - Particular processes
   - Resilience mechanism (prevention vs robustness vs recovery).
   - Performance dimension (cost, speed, sustainability, etc.).

   Effects may be positive, negative, or ambivalent, depending on conditions

No universal relation: the impact is contingent. Does resilience improve only when there is a **fit** between

- The digital technology applied
- The performance mechanism it influences, and
- The resilience capability that the supply chain context requires?


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ORIGINAL ARTICLE

Sodhi et al. (2022)

Why emerging supply chain technologies initially disappoint: Blockchain, IoT, and AI

ManMohan S. Sodhi[1] | Zahra Seyedghorban[2] | Hossein Tahernejad[3] | Danny Samson[2]