Towards defence supply chain resilience – A prestudy of the Swedish defence sector

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Agenda

- Research background, purpose and questions
- The Delphi Technique
- Study 1: Segmentation and differentiation in defence supply chain design – Methodological implications
- Supply chain resilience
- (Pre-)Study 2: Resilience in defence supply chain design
- Q&A

Background to the research

- 1991-2015: The Peace Dividend, NPM, JIT, PSOs
- 2008: Georgia
- 2014: Crimea
- 2015: Defence Bill with renewed focus on Total Defence
- 2019: Defence Bill with increased focus on Total Defence
- 2022: Ukraine + Application for NATO membership (Article 3)

Research purpose and research questions

- Purpose: Identify feasible solutions for how the Swedish defence sector can redesign its supply network to meet the new challenges of a re-established Total Defence.
- RQ 1 (Study 1): How can researchers modify the Delphi Technique to enhance research rigour?
- RQ 2 (Study 2): How can authorities and companies increase defence supply chain resilience in peace, crises and war?

The Delphi Technique

- 1950s: RAND
- Systematic, iterative process, anonymous interaction between panel experts
- Gather opinions of experts, synthesise and statistically summarise opinions, give feedback to participants
- Used when judgmental information is essential
- Critique: scientifically suspect, questionable application
- “if the same information were given to two or more panels, would the same results be obtained?”

Study 1: Segmentation and differentiation

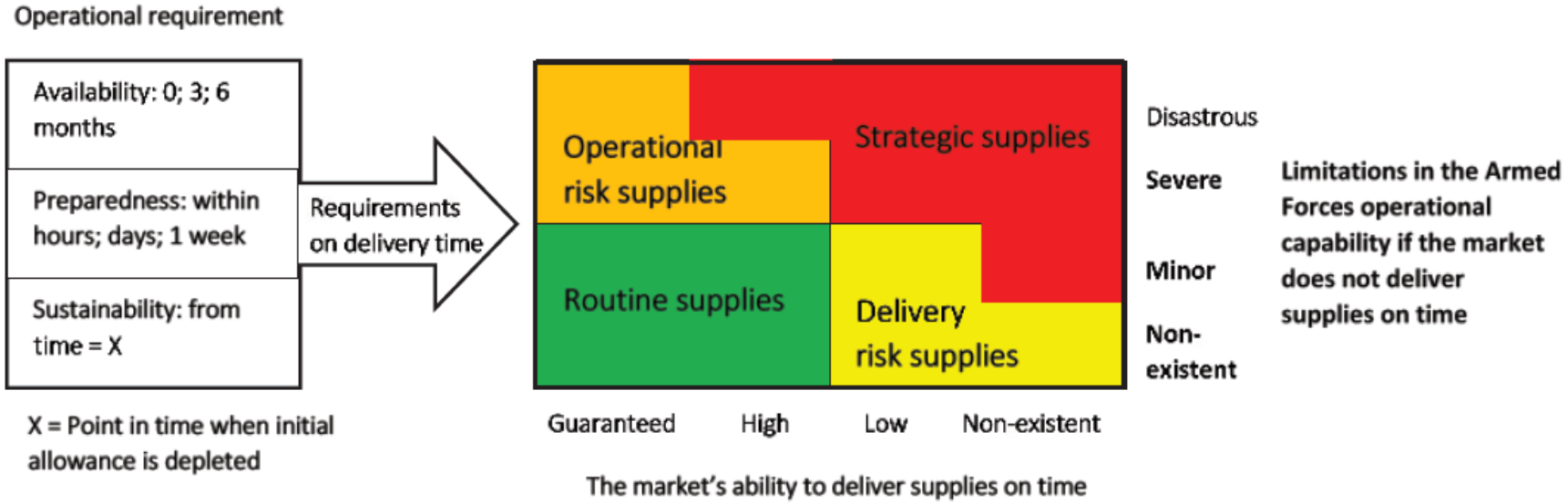
- Modified Delphi study:
  - Three, predetermined, rounds
  - Seeded list (open issues in the literature)
  - Two Delphi panels (ten experts in each)
    - Increased research rigour
    - Statements from different perspectives to the panels
    - Avoid the risk of forcing consensus
  - Two concluding workshops (to review and extend findings)

Study 1: Segmentation and differentiation

- Open issues regarding application of a purchasing portfolio model:
  - Prescriptive or catalyst for discussions?
  - Strict or pragmatic application?
  - Segment-generic or purchase-specific strategies?
  - Static or dynamic application regarding changes in the environment?
  - Static or dynamic application regarding repositioning?
- Presented to the panellists from different perspectives

Study 1 – Findings

- Design rules: Novel, three-dimensional, two-stage segmentation model (4*4-matrix with merged segments)



Study 1 – Findings

- Application rules:
  - Prescriptive for routine segments *and* catalyst for discussion for others
    - Different consensus solutions in the two panels (dissensus)
    - Consensus solution after two concluding workshops
  - Pragmatic application
  - Segment-generic strategies
  - Dynamic application (environment)
  - Dynamic application (repositioning)

Study 1 – Conclusions

- Inconclusive, but the findings indicate that:
  - Conventional designs may miss bipolarity or dissensus
  - Two Delphi panels, presented with statements from different perspectives, may enhance rigour, but also more easily reveal bipolarity or dissensus and avoid forced consensus
  - Concluding workshops are useful to interpret findings and reach consensus solutions
  - The design of a Delphi study will have an impact on which results the study produces
  - Which modification (or combination) was the main factor?

Supply chain resilience

- Globalisation, cost-efficiency, digitisation, vulnerabilities
- Disruptions: terrorist attacks, tsunamis, hurricanes, war
- After two decades of research:
  - No consensus regarding definitions
  - No consensus regarding constructs (definitions, relations)

Supply chain resilience – This paper

- Phases: pre-disruption, during-disruption, post-disruption
- Strategies: proactive or reactive – flexibility, agility, collaboration, redundancy
- Tactics: numerous…

Study 2: Resilience

- Intent: modified Delphi (similar to Study 1)
- Reality: Covid-19 and war
- Prestudy: survey to participants in two existing studies
  - Swedish Armed Forces study: 15 representatives of Swedish defence authorities
  - Plenary session and two workshops to discuss results
  - Swedish Defence University study: 5 representatives of Swedish defence industry
  - Plenary session to discuss results

Study 2: Resilience – Respondents asked to select three tactics each for peace, crises and war

1. Contingency planning
2. Decentralisation of production
3. Flexible production capacity
4. Flexible storage capacity
5. Flexible transportation capacity
6. Multiple allocation of storage facilities
7. Multiple modes of transportation
8. Multiple sourcing
9. Overlapping operational capabilities
10. Prepositioning of supplies (finished goods)
11. Prestorage of supplies (finished goods)
12. Protection of production facilities
13. Protection of storage facilities
14. Protection of transportation
15. Redundancy in operational capabilities
16. Redundancy in production capacity
17. Redundancy in storage capacity
18. Redundancy in transportation capacity
19. Safety stock (materials, components, systems)
20. Standardised supplies
21. Strengthened buyer-supplier relationships
22. Substitute supplies

Study 2 – Findings and conclusions

- Inconclusive, but findings indicate that
  - Multiple sourcing is important in peace and crises
  - Prestorage and prepositioning is important in crises and war
  - In line with results from research in commercial supply chains
  - A holistic view of the entire supply network is required
- Swedish Armed Forces study: workshop discussions
  - Difficult to select only three tactics (moves weak points)
  - Selection of tactics depends on position in the supply chain


Q&A