

Worms 2024

SGR-Chain: Tailored Dual Sourcing

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Objectives

- **What are the key objectives of this module?**
- After this module, you will be able to:
 - Understand some of the **key drivers for dual sourcing**
 - Get to know a simple formula to **allocate sourcing volumes** between two sources
 - Develop dual **sourcing strategies** in a small supply chain simulation

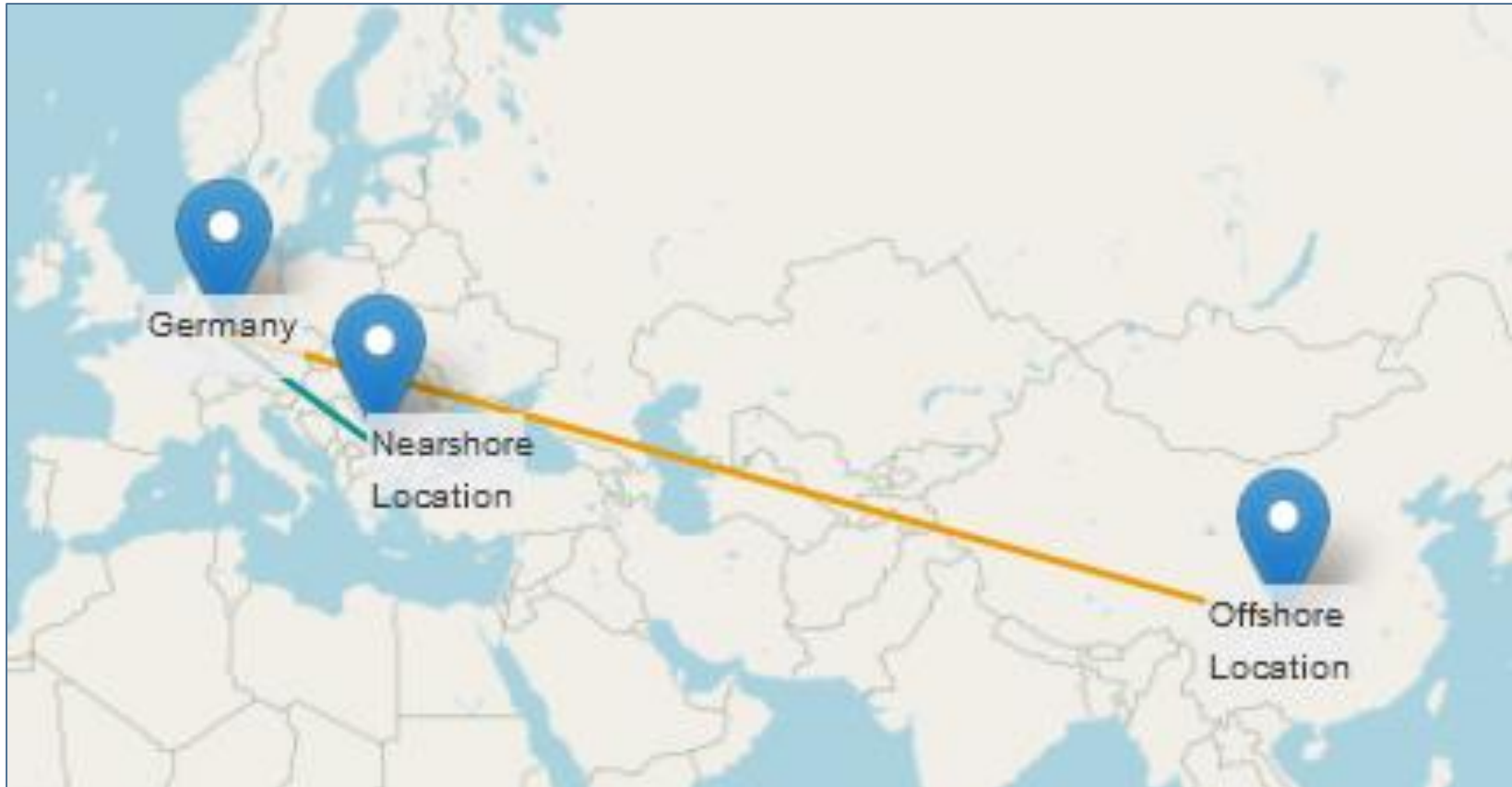


Agenda

1 Why companies engage in dual sourcing

2 Case study: Tailored Dual Sourcing

Should companies source in Asia, Europe, or both?



Why companies engage in dual sourcing

- **“We have become more robust overall”**

- “Our purchasing department also constantly assesses risks. We have some areas with high risks where we also rely on dual sourcing, meaning double, alternative sources for certain parts....” (Arno Antlitz, CFO, Volkswagen)

- **Companies use dual sourcing to boost resilience**

- “Companies are also reporting significant progress in longer-term strategies designed to increase network resilience. For example, 81 percent of [surveyed companies] say that they have implemented dual-sourcing strategies during the past year, up from 55 percent in 2020...” (McKinsey, 2022)

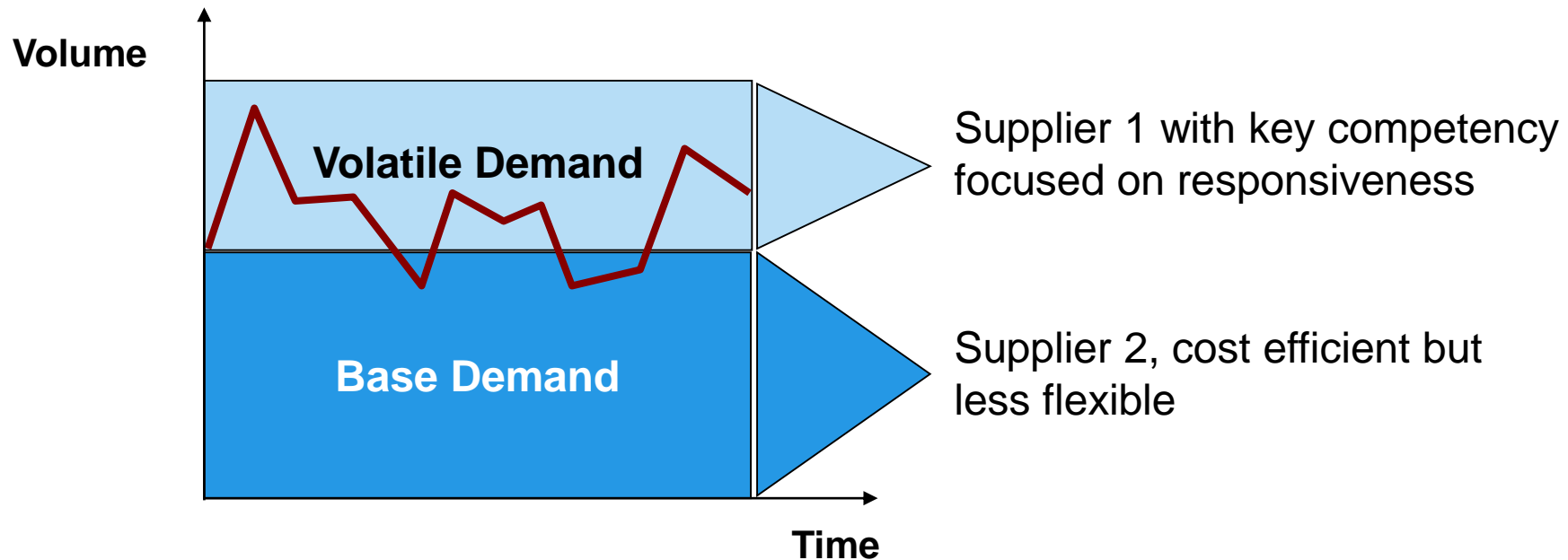
- **“Due to increased demand fluctuations, sourcing closer to home wins over other lower cost options overseas”**

- “... buy a harness from China for 15% less than in Mexico. But if a design is altered after a batch of Chinese-made harnesses is already on the boat from Shanghai, the company has to foot the bill for up to six weeks of shipping and handling of obsolete parts.” (Van Mieghem, 2008)

Single versus multiple sourcing

- **Single sourcing:** Items are sourced from a single supplier, allowing for economies of scale and more efficiency.
- **Multiple (dual) sourcing:** Items are sourced from multiple (two) suppliers, allowing for risk diversification in the supplier base.

Tailored dual sourcing



- Allocate “**base demand**” to best-cost country (e.g. China)
- “**Surge demand**” is filled from high cost country (high-cost, but high response country)
 - Takes advantage from proximity which allows responsiveness

Source: Allon & Van Mieghem (2010)

Allon and Van Mieghem (2009): A simple square-root formula to determine strategic sourcing allocations

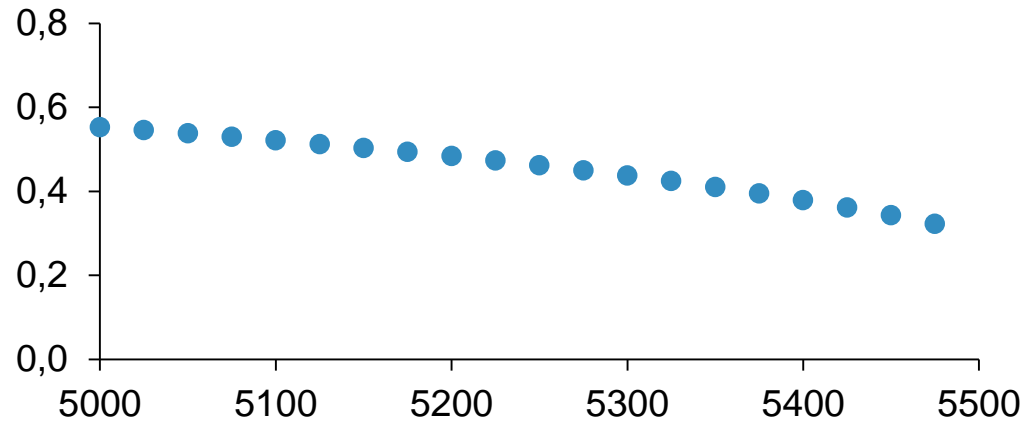
$$\text{Base allocation ("offshored fraction")} \cong 1 - \sigma \sqrt{\frac{h}{2\mu\Delta c}}$$

- μ : Average demand per week
- σ : Standard deviation of demand per week
- c_E : Sourcing cost per unit in Europe (onshore location)
- c_A : Sourcing cost per unit in Asia (offshore location)
- h : Holding cost per unit per week
- L_E : Transportation lead time from Europe in weeks
- L_A : Transportation lead time from Asia in weeks
- Δc : Asia's sourcing cost advantage per unit = Europe cost – China cost – additional holding cost ($\Delta c = c_E - c_A - h(L_A - L_E)$)

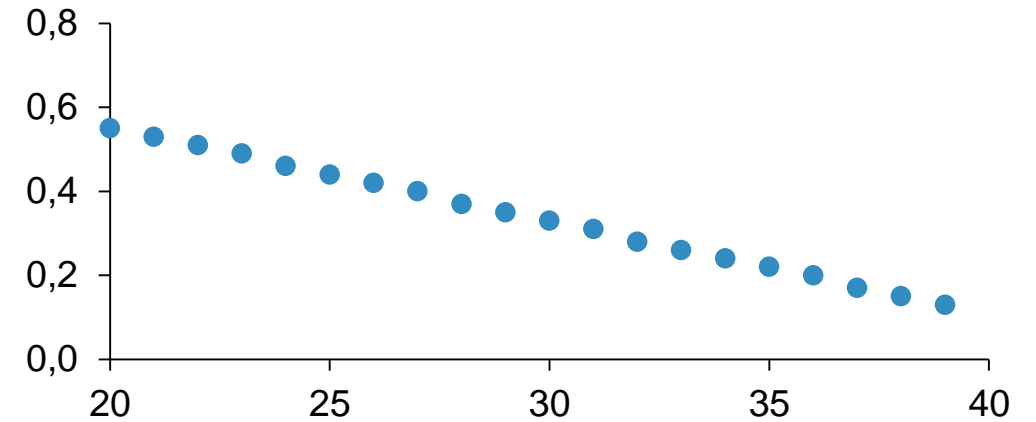
Note: The allocation expression is meant to be a reasonable approximation/starting point for a more refined analysis

How sourcing parameters affect strategic sourcing allocations - Offshore fraction as function of...

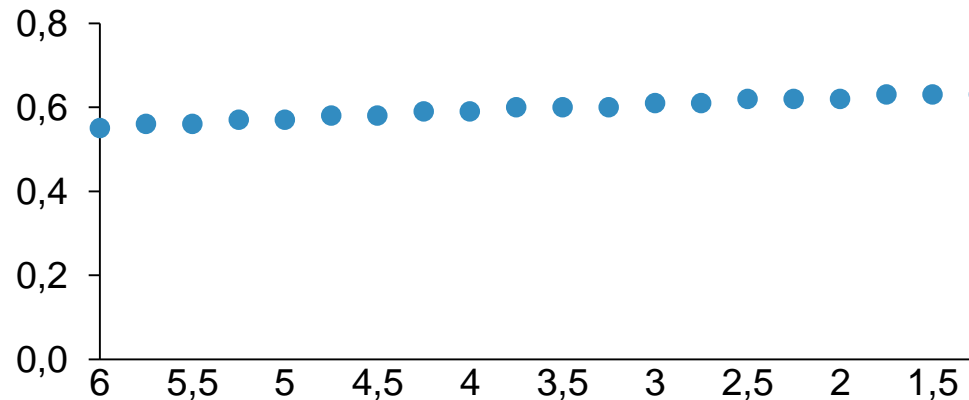
Offshore sourcing cost



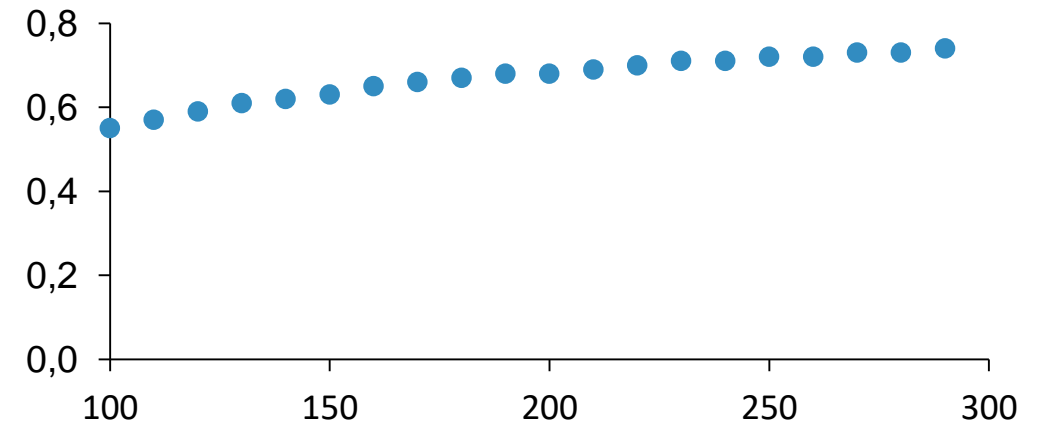
Standard deviation of demand (demand volatility)



Leadtime to Asia (Leadtime differential)



Weekly demand volume



References

- Allon, G., and Van Mieghem, J. A. (2009). Global dual sourcing: Tailored base-surge allocation to near-and offshore production. *Management Science*, 56(1), 110-124.
- Allon, G., and Van Mieghem, J. A. (2010). The Mexico-China sourcing game: Teaching global dual sourcing. *INFORMS Transactions on Education*, 10(3), 105-112.
- A webpage with additional apps on dual sourcing:
<https://bullwhip.co.uk/post/2024-08-11-a-collection-of-dual-sourcing-web-apps/>

Agenda

1 Global sourcing and reshoring

2 Case study: Reshoring

Interactive case study: Dual sourcing at Parts Inc.

Case Background

- Global sourcing is a key challenge for companies. In this case, you will decide on the optimal allocation of sourcing volumes across a nearshore location in Europe and an offshore location in Asia.
- Parts Inc. is selling mechanical parts to customers in Europe. Over the past decade, Asia has become the main sourcing destination for one of their business units. However, managers have become worried about their current sourcing practices, considering cost changes and higher market volatility.
- Parts Inc. wants to review whether more dual sourcing strategies should be adopted. To start the analysis, five key items have been identified, and relevant data has been collected.

The dual sourcing app

Dualsource

Inventory cost are defined as percentage of sourcing cost

Strategic sourcing allocation based on Allon and Van Mieghem (2010)

Dualsource

Inventory cost: 1% of sourcing cost

Sourcing Cost Offshore: 7000

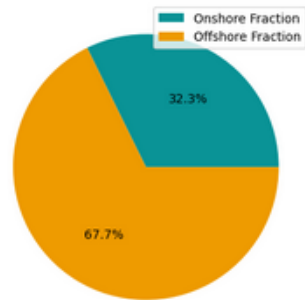
Weekly demand: 200

Leadtime differential: Diff 7

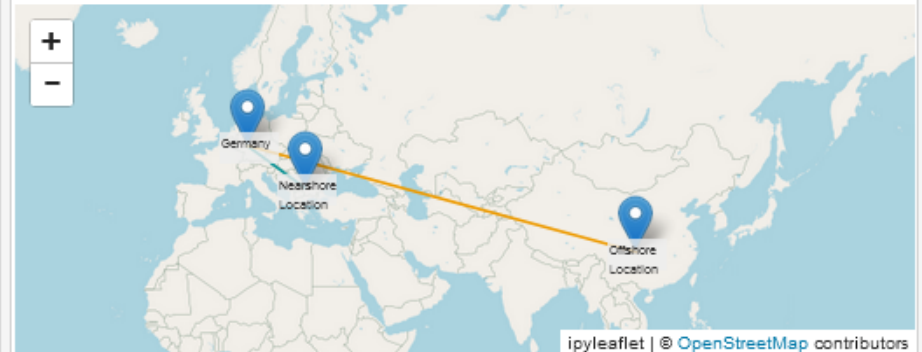
Sourcing Cost Onshore: 9000

Weekly standard deviation: 30

Optimal dual sourcing strategy

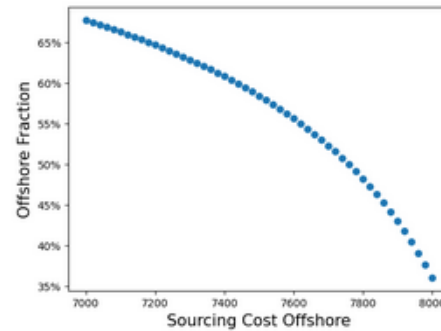


Near (onshore) and offshore sources

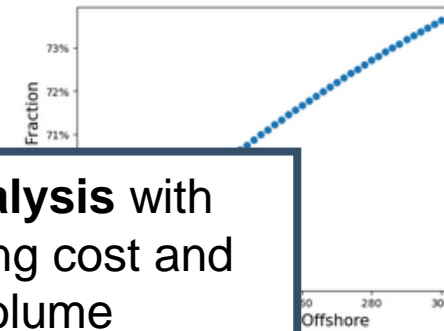


Leadtime differential = lead time from Asia - lead time from Europe in weeks

What happens if offshore costs increases?



What happens if demand increases?



Sensitivity analysis with regard to sourcing cost and demand volume

Dual sourcing at Parts Inc.: Tasks

Develop sourcing strategies for five selected items:

Item	1	2	3	4	5
Sourcing cost Europe (onshore)	9.000	9.000	3	500	20
Sourcing cost Asia (offshore)	7.250	6.000	2	420	10
Weekly standard deviation	7	60	10	70	20
Weekly demand	50	100	1.000	400	40

- Transportation lead time from Europe is 1 week, while supply from Asia requires 3 weeks. Inventory cost for all items is 3% of sourcing cost.

Explain your results:

- Explain to senior management why sourcing allocations vary considerably across items.