HEALTHCARE SUPPLY CHAIN INSTITUTE

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Complexity Management in Life Sciences: A Supply Chain Analytics Approach

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About us

Healthcare Supply Chain Institute

The **Healthcare Supply Chain Institute** is a research institute and think tank focusing on supply chain management and logistics in pharmaceutical and healthcare industries.

We are a legally dependent part of the **Steinbeis** foundation, headquartered in Stuttgart, Germany. Steinbeis is dedicated to the transfer of academic findings and knowledge into business. In 2018, Steinbeis achieved a turnover of 172 million euros.

We support companies and organizations in healthcare and pharmaceutical industries in improving their logistics, supply chains, and digital analytics. Our services include:

- Consulting, coaching, knowledge transfer
- Studies, surveys, and expert reports
- Customized analytics and planning solutions
- Training and executive education

Competencies

Our research and consulting expertise lies in planning and optimization of supply chain management and logistics and the design of patient-centric networks.

Our special focus is on creating value with analytics (machine learning and optimization) and the better management of risk, complexity, and uncertainty.

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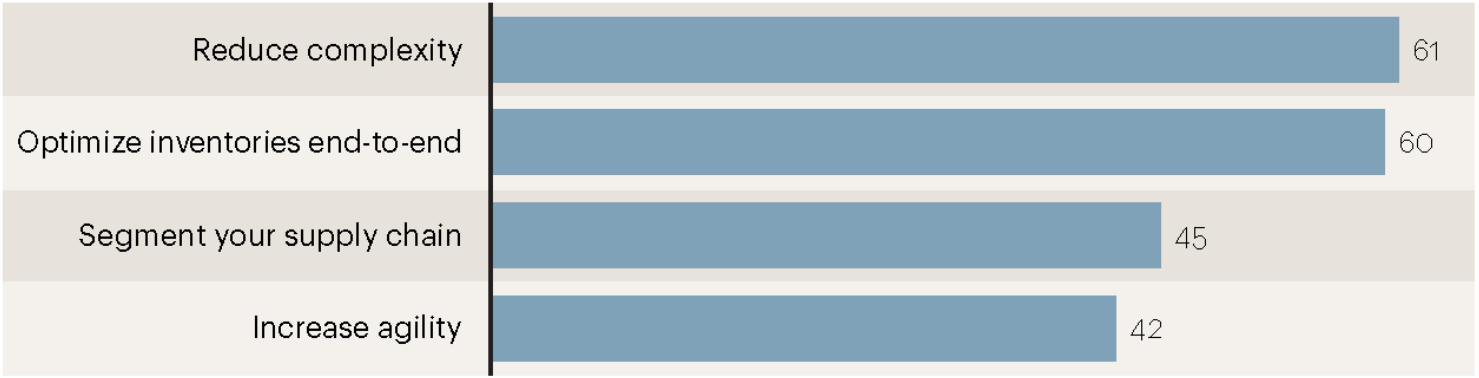
Complexity management is regarded a key priority for supply chains in life sciences

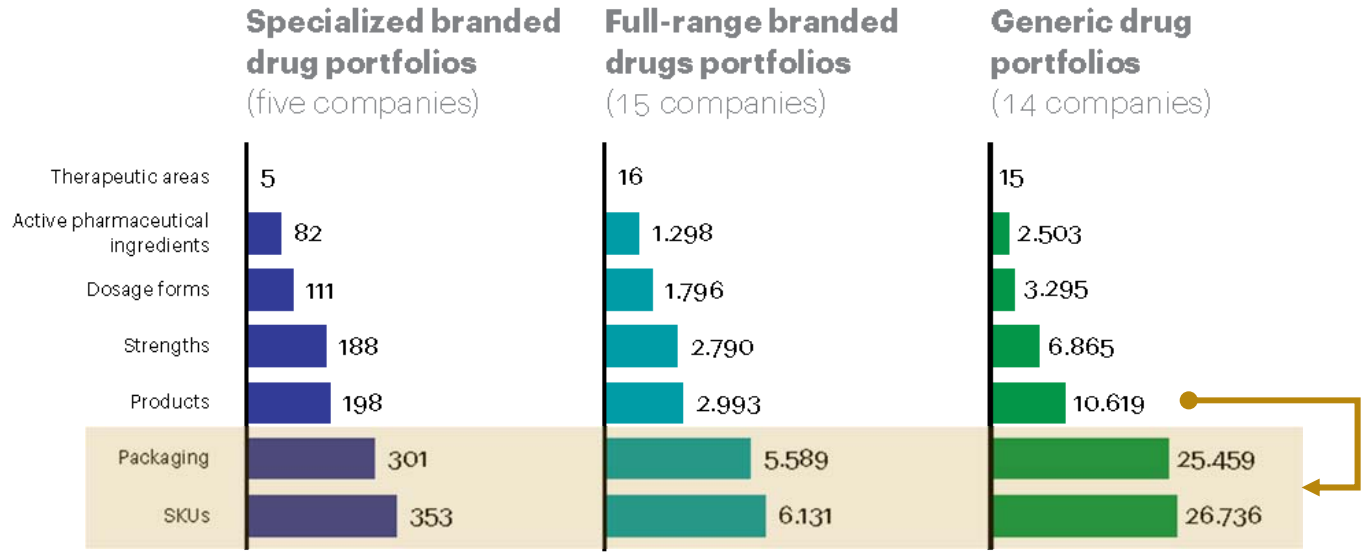
- **Major supply chain initiatives in life sciences** (% of respondents):



Source: A.T. Kearney Pharma Supply Chain Panel 2014

- Growing number of high-value but low-volume products (SKUs) increases pressure to manage product complexity

Complexity fingerprints show that product-complexity mostly increase at the packaging/ SKU-level



Source: A.T. Kearney (2019)

- A multiplicator between 1.8 and 2.5 between products and SKUs indicates that significant complexity can be found at this stage of the value chain.
- This identifies the SKU/packaging level as key area are for complexity reduction.

We developed a data-driven analytics approach for evaluating and managing complexity in supply chains

Analytics Methodology

We use a data-driven model to evaluate product complexity and optimize SKU rationalization and consolidation.

Data-driven Approach

- Demand data (volume, variability)
- Packaging and inventory cost data
- Complexity cost
- Safety stock levels (or requirements)
- Distribution network (allocation of markets to warehouses)
- Market and/or regional compatibility (and associated costs)
- Technical / regulatory requirements (leaflet / box)

Business Logic

Evaluation of all relevant cost elements across value chain (supply chain, manufacturing, marketing) and constraints (technical, regulatory) when evaluating and optimizing product complexity.

Use Cases

- Quantity benefits of complexity reduction
- SKU rationalization: Evaluate impact of eliminating SKUs (sales versus cost impact)
- SKU consolidation: Identify cost-optimal language groupings for SKU consolidation (i.e. multi-country packs)

Verbal description of developed optimization model

Objective:

- Elements: Packaging (manufacturing) cost, inventory cost, complexity cost, market compatibility cost (considering economies of scale and risk pooling effects)

Decisions:

- Assignment of SKUs to markets

Constraints:

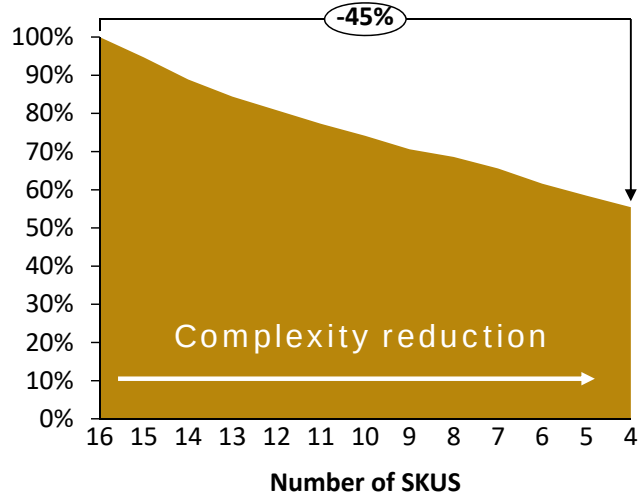
- Configuration of distribution network (allocation of markets to warehouses)
- Technical /regulatory constraints (e.g. maximal number of languages per box / leaflet)
- Market / regional compatibility constraints (e.g. markets that should not be served by same SKU due to sales responsibilties, supply chain integrity etc.)
- Already defined SKUs (if necessary)
- Total number of SKUs per region

Computational complexity: *For example, there are* ***10.480.142.147 possible SKU combinations*** *for* ***16 markets*** *(this number increases exponentially if more markets are considered)*

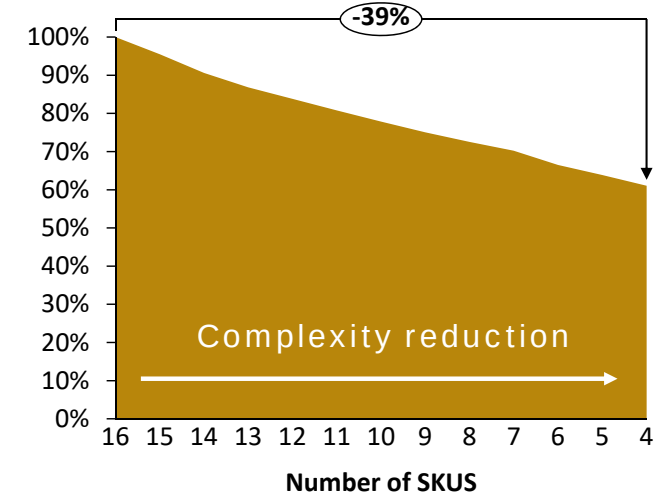
Example: SKU consolidation via language grouping Europe

- Scope: 16 European market with dedicated, single-market SKUs

Supply Chain Cost [as percentage of baseline]



Market inventory [as percentage of baseline]



- **SKU consolidation** shows substantial **cost and inventory reduction** due to economies of scale in packaging and inventory centralization effects

Example: Introducing SKU-commonality can reduce complexity cost in supply chain

Example configuration

- 16 Central European markets have been groups into 8 SKUs (multi-country SKUs)

Results (against baseline without shared SKUs):

- 24% supply chain cost reduction, 22% reduction of market inventory (maintaining same service levels)

Note: Same colors indicate shared SKUs, grey colored markets out of scope

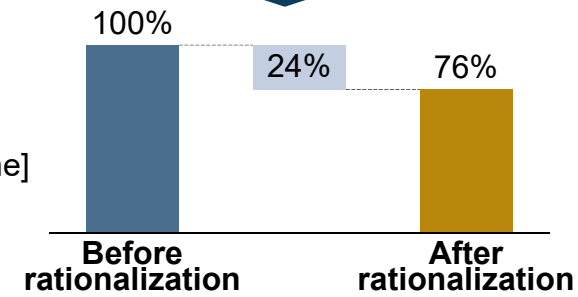
Example 2: SKU rationalization via elimination of redundant products

Brand	Strength	Market Usage	Material	Material Description	Pack Size	Rationale	Sales & Volume comp. by
BRAND X1	150	H	718425	X1 FCT 150MG 28(X14) DEH	280	Large pack (N3) can serve as hospital pack	100% to 718424 (7x14)
		M	718423	X1 FCT 150MG (4X14) DE	56	Medium pack (N2) not required by patient	90% to 718424 (7x14) 10% to 718427 (2x14)
			718424	X1 FCT 150MG (7X14) DE	98		
			718427	X1 FCT 150MG (2X14) R25	28		
		S	718426	X1 FCT 150MG (X14) DES	14		
	300	H	718430	X1 FCT 300MG 28(X14) DEH	280	Large pack (N3) can serve as hospital pack	100% to 718429 (7x14)
		M	712811	X1 FCT 300MG (4X7) R25	28		
			718428	X1 FCT 300MG (4X14) DE	56	Medium pack (N2) not required by patient	90% to 718429 (7x14) 10% to 718432 (2x14)
			718429	X1 FCT 300MG (7X14) DE	98		
			718432	X1 FCT 300MG (2X14) R25	28		
		S	718431	X1 FCT 300MG (X14) DES	14		

Source: Leiter (2011) – Novartis data

Supply chain cost

[as percentage of baseline]



- Model calculates **supply chain cost impact** of **eliminating pack sizes** and transferring volumes to other SKUs

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