

Supply Chain: What's Now, What's Next, and Capital Project Delivery

Phil Kaminsky
kaminsky@berkeley.edu

BERKELEY **IEOR**

Today

In other industries:

- **What's now** in effective supply chains? [framework]
- **What's next** in effective supply chains? [risk management]

Capital project supply chains

- What seems to be wrong
- The goals of our upcoming project

What Is the Goal of Supply Chain Management?

Supply chain management is a set of approaches that are used to **efficiently integrate** the firms, goods, people, money, and information in the supply chain in order to:

- Minimize some measure of **total system cost**
- **Increase the likelihood** of satisfying customer service requirements

Why is managing a supply chain difficult?

Optimizing is difficult

**We need to globally
optimize**

**The supply chain is dynamic
and uncertain**

The Key Questions:

What if you only had to **optimize** a centrally controlled supply chain?

What if you only had to **globally optimize** a deterministic supply chain?

How do you deal with a supply chain is **dynamic** and **uncertain**?

Optimizing is difficult

What does it mean to optimize the supply chain?

What questions do we answer?

- Strategic
- Operational
- Tactical?

Why is it difficult?

Why is it important?

What can we do about it?

Use advanced techniques, tools, concepts:

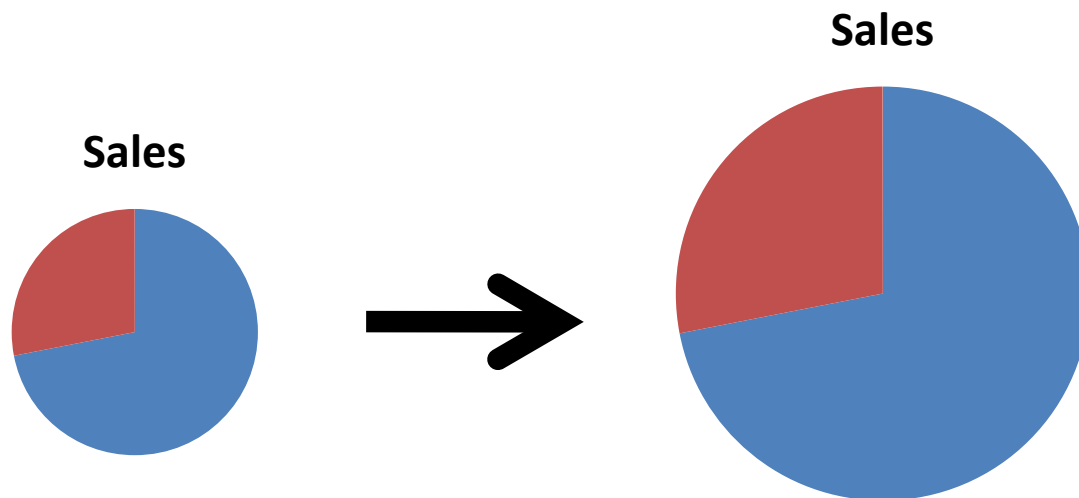
- Mathematical optimization algorithms
- Decision support tools
- Data mining and analytics

Change the problem

- What's the best supply chain?
- Change the product design
- Change the distribution network
 - Cross-docking
 - Outsourcing

We need to globally optimize

Why?



Why is it difficult? What conflicts might arise?

What is the alternative to global optimization?

What can we do about it?

Information Exchange

- EDD
- Online Marketplaces

Alliances & Partnerships

- Using local information

Supply Contracts

- Aligning Goals

VMI, continuous replenishment

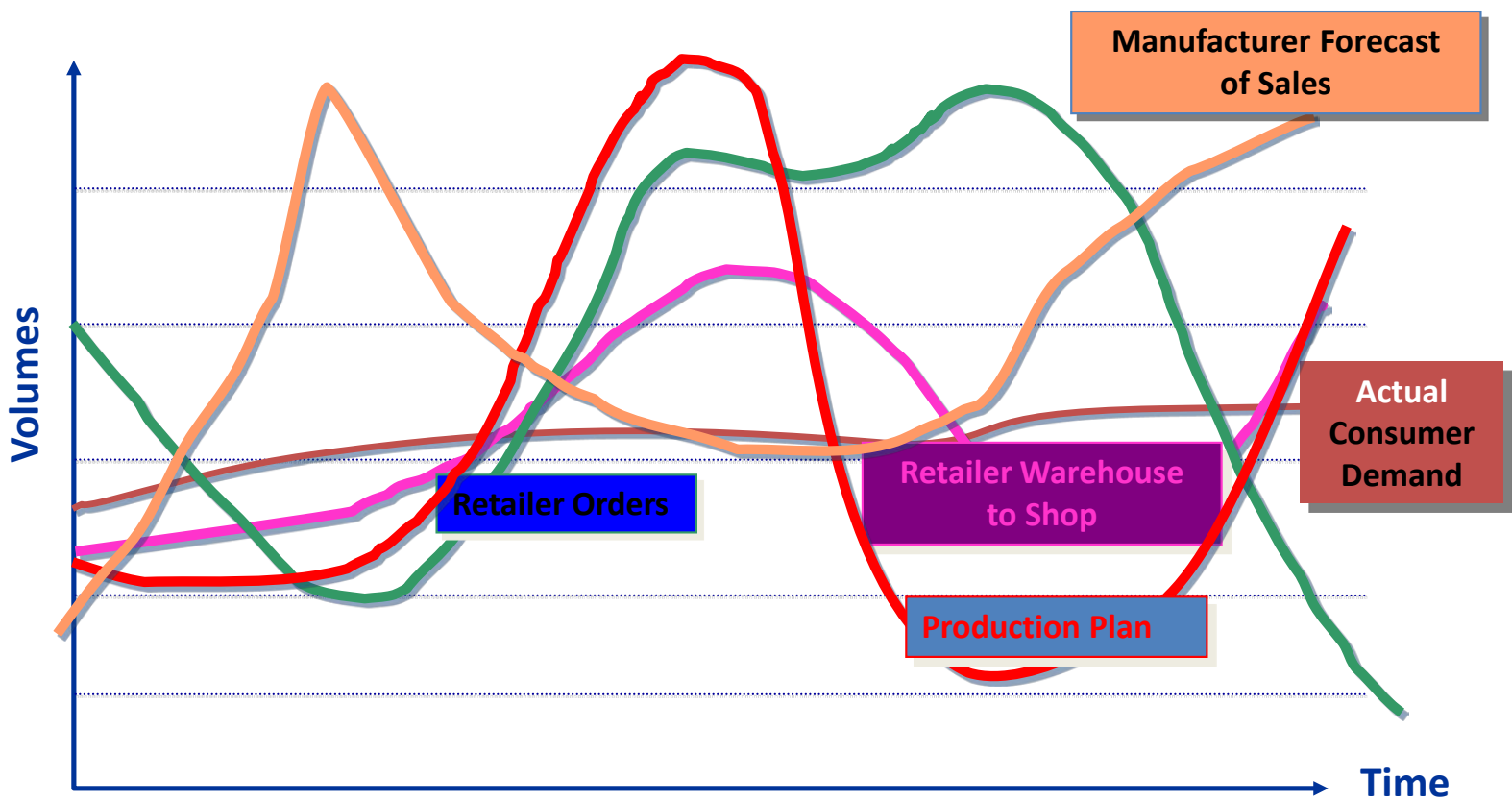


Variation and Uncertainty

What is variation? Why does it matter?

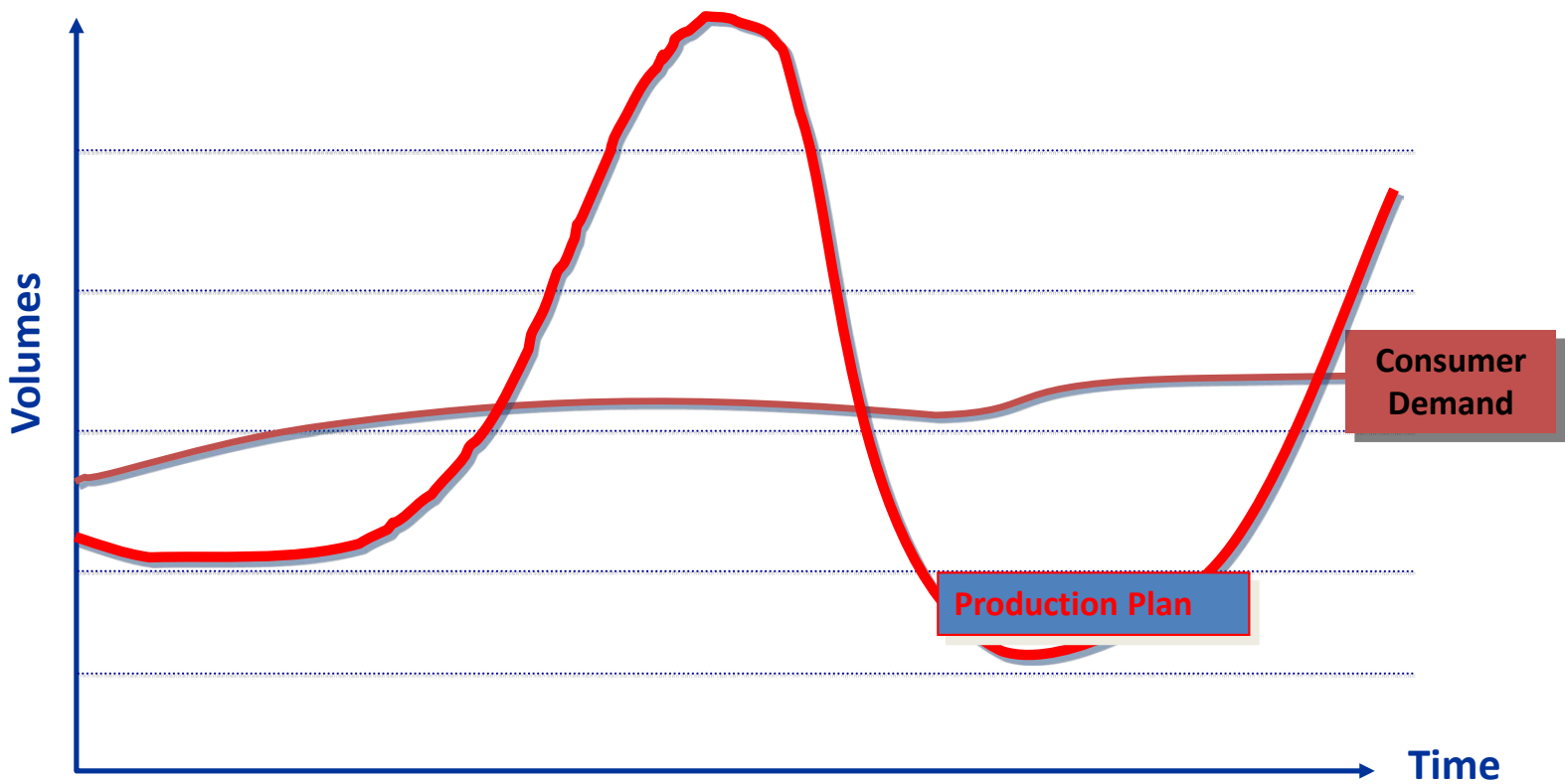
What is randomness? Why does it matter?

What is variability?



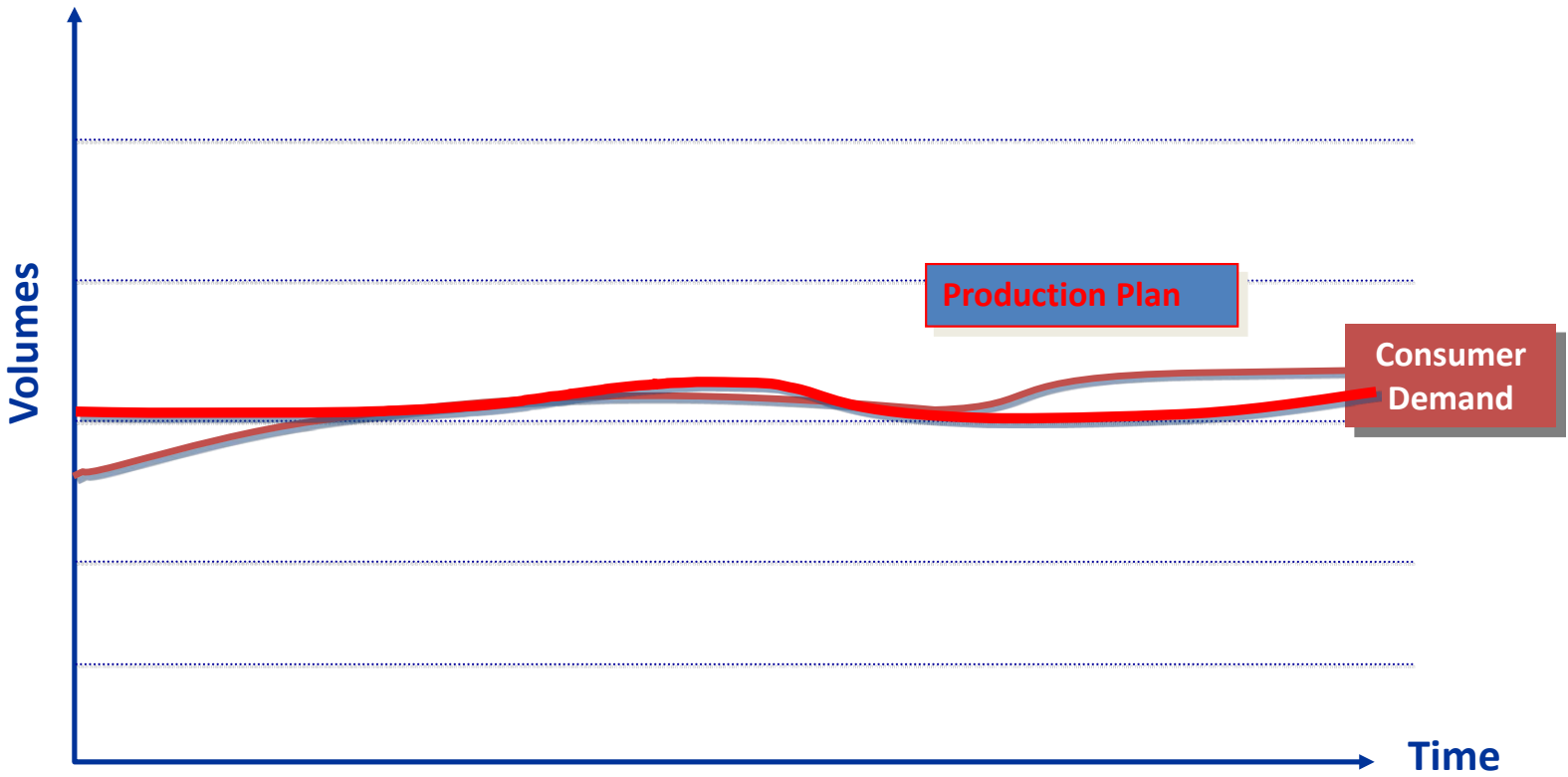
Source: Tom Mc Guffry, *Electronic Commerce and Value Chain Management*, 1998

Why does it matter?



Source: Tom Mc Guffry, *Electronic Commerce and Value Chain Management*, 1998

Why is this better?



Source: Tom Mc Guffry, *Electronic Commerce and Value Chain Management*, 1998

Dealing with Variation & Uncertainty

Information

- Centralize information

Centralize ordering

Awareness

Information

Speed

- Shorter lead times
- Quicker to market

Flexibility

- React more quickly to changes
- Postpone differentiation

After 20 years, supply
chains got lean!

What's Next?

**DATA, VISIBILITY, AND RISK
MANAGEMENT**

The New Normal

Dynamic, Adaptive, Responsive

- Network configurations **change** as systems change
 - *Onshoring vs. offshoring vs. flexibility*
- Inventory and production allocation **adapts** to changing supply and market conditions
Inventory policies and parameters **continually updated** to respond to supply and demand side signals
- Pricing **dynamically updated**
- Partners more closely manage inventory to **adapt to changing** demand and supply
- Supplier mix **dynamically changed**
- Differentiation **can be postponed** more
- Information **lead times eliminated**
- Deliveries **coordinated**
- Strategic logistics partnerships **reduce costs + increase flexibility**

How?

- **Improve** your system
- Increase **visibility** of supply side and demand side (one tier is not enough)
- Large quantities of **data** (big data) and **systems to analyze the data** and make decisions
- **Flexible systems** designed to take advantage of all of this

The New Normal

Customer/project-segmented Supply Chains

- **Different network configurations** for different subsets of customers based on customer-centric value proposition
- **Different inventory policies** for different subsets of customers based on customer-centric value proposition
- **Different differentiation strategies** for different subsets of customers based on customer-centric value proposition
- **Different supplier contracts and strategic partnerships** for different subsets of customers based on customer-centric value proposition
- **Different logistics strategies** for different subsets of customers based on customer-centric value proposition

BUT

- **Leverage system commonalities** to minimize costs...

How?

- Increased visibility
- Large quantities
algorithms to

CUSTOMERS ted

Supply Chain Risk Mitigation

STEP ONE:

Recognize that there are fundamentally different types of risk that require different risk mitigation strategies

→ *Some supply, demand, operating uncertainty is well understood*

→ *Some events are “black swans”*

Unknown-Unknown Uncontrollable



Known-Unknown

Controllable

Supply Chain Risk Mitigation



STEP TWO:

Adopt appropriate mitigation strategies

→ For **well-understood risk**, hedge with buffers

→ **Time: visibility to decrease response times**

→ **Inventory: What is the correct amount? Place?**

→ **Capacity: How much is too much? Too little?**

→ **Flexibility: How much? What kind?**

→ For “**black swans**”, hedge with a combination of

→ **Triage strategies**

→ **Rapid response**

→ **Redundancy**

→ **Flexibility**

Supply Chain Risk Mitigation



STEP THREE:

Optimize strategies

For well-understood risk

Optimize inventory levels

Decrease lead times

Acquire correct amount of flexibility, redundancy, and excess capacity

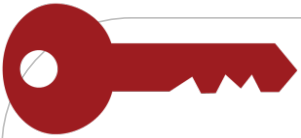
For black swans

Develop strategies for early awareness and response

Determine appropriate operating parameters to allow effective implementation of triage strategies

Acquire correct amount of flexibility, redundancy, and excess capacity

Supply Chain Risk Mitigation



Keys

- **Optimize simultaneously to leverage common resources**
- **Visibility leads to more efficient buffers + more effective early response + triage strategy**
- **There is a tradeoff between daily operating conditions and the cost of triage strategy implementation**
- **The same set of tools and approaches that enable dynamic, adaptive, responsive supply chain strategies and customer segmented supply chains enable effective risk mitigation**
- **Execution relies on visibility, adaption, responsiveness**

So, to Hedge SC Risk...

Problems are dynamic, so solutions must be adaptive and responsive

Adaptive solutions require visibility, data, and smart decision making

Solutions must be aligned to leverage commonalities

Concepts are not enough – systems must be modeled and optimized

So What About Capital Projects?

Complex Global Networks

- 90% of owner operator investment is outsourced

Demand Estimation is Not the Problem

- To a large extent, demand is fixed based on design decisions, delivery schedules

Current Risk Mitigation Strategy

- Fabricate, acquire, deliver ASAP [but this also has risks]

Observations from Current Practice

- Procurement, not delivery
- Little supply chain optimization, little focus on system efficiencies
- Transactional focus
- Projects take longer, cost more, suffer from quality issues and create unnecessary environmental, health and safety risk.

Our Goals

Better Understand These Complex Global Networks

Better Understand the Risk

- What is it? [disruptions/cost/quality]

Develop Models, Tools, and Approaches to Address this Risk

- With the right amount of WIP at the right time

First Step: Framing whitepaper – To Be Posted in 30 Days

We look forward to collaborating with PPI, and with those of you who are interested in participating in this initiative.