THE FUTURE OF

Logistics and Supply Chain?

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Who knows?

BUT...

Managerial Frameworks

+ Current Focus

+ Trends

→ How things might look...
3 Frameworks
WHY IS MANAGING A SUPPLY CHAIN DIFFICULT?

Optimizing is difficult
We need to globally optimize
The supply chain is dynamic and uncertain
FRAMEWORK I:
THE 3 KEY QUESTIONS

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

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

3. How do you deal with a supply chain that is dynamic and uncertain?
SO OVER THE PAST 25 YEARS...

Advanced techniques, tools, concepts: Optimization, Decision support, analytics

Change the problem: Product design, network design, cross-docking, outsourcing

Information Exchange: EDD, Online Marketplaces

Alliances & Partnerships: VMI, QR, CPFAR

Supply Contracts: Aligning Goals

Speed: Reducing lead times

Pricing: Limit variation, Utilize capacity

Awareness: Status information, Quick reaction

Flexibility: Postpone differentiation, Quick reaction
FRAMEWORK II: DIFFERENT SUPPLY CHAINS FOR DIFFERENT PRODUCTS

What are the two key types of products? Which type requires better supply chain management?

Efficient supply chain

Functional Products

Flexible, Responsive supply chain

Innovative Product

Why do companies get it wrong so often? Change!
FRAMEWORK III:
THE DEVELOPMENT CHAIN

Plan/Design
Source
Supply
Produce
Distribute
Sell

Product Architecture
Make/Buy
Early Supplier Involvement

Strategic Partnerships
Supplier Selection
Supply Contracts

Supply Chain
Development Chain
The Past Few Years...
**THE BIG PICTURE**

### Strategic Focus

**Starting Twenty Years Ago**
- Focus on cost minimization + matching supply and demand
- Network design/Network optimization
- Inventory management
- Supplier selection
- Strategic partnerships
- Pricing

**Twenty Years Ago**
- Optimization
- Product Design
- Postponement
- Bullwhip minimization
- Lead-time reduction
- Supply contracts
- Data and visibility part I
- S&OP

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**Now**
- All of this but dynamic, responsive, adaptive
- **Supply chain segmentation**
- **Supply chain risk management**

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**Now**
- Visibility part II
- **Robustness**
- **Dynamic, adaptive strategies**
- **Integrated risk management**
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?

- Understand your system
- Increased 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-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 entire supply chain to enhance responsiveness
- Large quantities of supply-side and demand-side data and sophisticated algorithms to optimize design
Supply Chain Risk Management

- Recognize different types of risk ranging from well understood to rare and unpredictable
- Employ different strategies for different types of risk
- For well-understood risk, hedge with buffers [time, inventory, capacity flexibility]
- For “black swans”, hedge with a combination of triage strategies, rapid response, redundancy, and flexibility

How?

For well-understood risk: Optimize inventory; Decrease lead times, acquire correct amount of flexibility, redundancy, and excess capacity

For black swans: Strategies for early awareness and response; Optimize operating parameters for effective triage; acquire correct amount of flexibility, redundancy, and excess capacity
Trends...
• 5 Years, 9 events, 300 people
• Collect ideas of thought leaders from government, industry, and academia
  — Identify trends that could disrupt the industry
• Speculate about key capabilities required to get there, potential impacts....
TRENDS 1.0

MARKET
Growth of e-commerce
Relentless competition
Mass personalization

TECHNOLOGY
Wearable computing
Additive manufacturing
Robotics and automation
Data & Predictive Analytics
Sensors & IoT

SOCIETY
Urbanization
The Changing Workforce
Sustainability
Current

• Distribution inefficient
• Congestion bad
• Large factories at remote sites

Trends

• Growth of e-commerce
• Personalized product & service
• Urbanization

Future

• Unit load becomes an each
• Deliveries within hours, in congested urban areas
• Many warehouses in cities
• Different last mile delivery integrated with order fulfillment

Needs/Opportunities

• Small footprint, high throughput urban warehouses (vertical)
• Very efficient large rural warehouses
• Higher frequency transfer of smaller-sized “unit loads”
Pressure on producers

- High degree of customization *and* low cost
- Order anywhere
- Quick delivery *and* package finds customers
Costs about the same as
Infrastructure challenge

- New distribution system in high density urban areas
- Smaller footprint production & storage – go vertical with new material handling
Mobile and Wearable Computing
Robotics & Automation

Opportunity to assist workers
• Provide workforce real time instructions
• Assist manual tasks improves safety
Intelligent systems

- Anticipate consumer’s needs
- Real time control without human intervention
COMPETENCIES

- Total supply chain visibility
- Standardization
- Internet of Things
- Planning & optimization
- E-Commerce
- Collaboration
- Urban logistics
- Technology and automation
- Sustainability
- Workforce
CAPABILITIES

Total supply chain visibility
Standardization
Internet of Things
Planning & optimization
E-Commerce
Collaboration
Urban logistics
Technology and automation
Sustainability
Workforce

High speed, high value material handling and logistics
Low cost, low impact material handling
Workforce
HIGH SPEED, HIGH VALUE
MATERIAL HANDLING AND LOGISTICS

Total supply chain visibility
- Delivery to customer, not a location

Internet of Things
- Centralized control over a large domain

Planning and Optimization
- Anticipatory logistics

Focus is on added value
LOW COST, LOW IMPACT

MATERIAL HANDLING AND LOGISTICS

Collaboration

- Shared warehouses and collaborative freight transportation

Urban logistics

- VRP w/ predictive traffic info, crowdsourcing

Technology & automation

- Flexible/scalable material handling, robotics, wearable computing, rapid truck loading and unloading

It’s all about efficiency
TRENDS 2.0

MARKET
Growth of e-commerce
Relentless competition
Mass personalization

SOCIETY
Urbanization
Gen Y and Millennials
The Changing Workforce
Sustainability

TECHNOLOGY
Wearable computing
Additive manufacturing
Robotics and automation
Data & Predictive Analytics
Sensors & IoT

EMERGING
Cybersecurity and Risk
Cloud Computing
AI
Industrie 4.0
No place is the rate of change faster than among the technologies that drive supply chain, logistics and material handling. And that will be the case through 2030.
IMPACT

SHRINKING UNIT LOADS

Driven by eCommerce
Role of Additive Manufacturing
IMPACT

DIFFERENT FACILITY TYPES

- IoT intensive
- Automated inbound and outbound
- Integrated centralized control

“Last mile” focused
Congestion
Personalized delivery
Different needs. Different Facilities. Urban infrastructure, additive manufacturing, transfer facilities, omni-channel.

In the past, pallets ruled. Now, single piece unit loads will become the norm.

Wearables and devices that improve human performance will radically impact worker capabilities.

Autonomous vehicles, drones, will impact long haul and last mile. McKinsey estimates that 80% of last mile deliveries will be autonomous within 10 years.
THINK ABOUT IT

Ubiquitous sensors
Faster and faster internet speeds
Cloud computing accessible everywhere
Centralized control
AI
To the untrained eye at a distance, logistics infrastructure does not appear likely to change much in the years ahead. Some ask: How many Panama Canal scale projects are out there after all?
Rapid changes in flows, modal choice, and vehicles → changes in how infrastructure is designed

- Semi- and fully-autonomous and other new vehicles will create new planning challenges
- Infrastructure design will focus on reliability and flexibility
- Multi-modal systems will start inside the building and end inside the customer’s location
- Collaboration between users and planners will be mandatory and drive network design
- Postponement and localization will become more prevalent
- Innovative infrastructure funding will match shorter life cycles
CONSUMERS

WORKFORCE
THERE IS A STRONG GENERATIONAL ELEMENT TO BOTH

Silent Generation

Baby Boomers
  - WWII until 1960’s

Gen X
  - 60’s to 80’s

Millenials
  - 80’s to 2000

iGen
  - since 2000

Tech savvy

Job expectations

Comfort with gig economy

Purchasing expectations

Security and Risk
CONSUMERS

The consumer is king. In fact, millions of consumers are kings. All at the same time.
Death of the salesman?
The Internet Changes how business buys.
In the past, the purchasing process took more time, working through purchasing managers, sales meetings and pricing negotiations.

And just as product personalization will dominate by 2030, personalized logistics will, too.

The consumer as the moving target...
Deliver it to anywhere I am, at a specific time, or better Track where I am and deliver it to my phone!

Bottom Line Disrupter
The Consumer is the

eCOMMERCE + GLOBALIZATION + GENERATIONS + TYRANNY OF NOW
WORKFORCE

As a formal profession, supply chain is barely three decades old. Yes, material handling and logistics have been practiced for a very long time. But the term supply chain first reached a broad audience in 1982 in the *Financial Times*.
FACTS (AND EDUCATED SPECULATION?)

Numbers of new workers will not keep up with exodus of aging workers

In 2015, Millennials surpassed Gen X as largest segment of workforce

Harder for available workers to be hired into supply chain jobs because of different and better skills

Gig economy growing

Automation
3 KEY WORKFORCE CHALLENGES

1. Finding people
   - Understand the labor market
   - Align of work with available workers
   - Commit to the flexible workforce
   - Improve the image of and provide greater visibility for our profession

2. Improving workers’ skills
   - Provide more effective education and training
   - Tighten collaboration with academia
   - Clearly articulate functional skills

3. Managing and retaining workers
   - Create company cultures that allow them to thrive
   - Adopt effective training methods
   - Provide more effective approaches to performance evaluation
A TALE OF 3 COLLARS

Blue-collar workers
- Less repetitive, standardized work than today due to automation; more administration, oversight and exception handling
- Minimum credential: High-school diploma

Grey-collar workers
- Installation, programming, maintenance and repair of automation and related mechanization
- Minimum credential: 2-year technical- or trade-school degree

White-collar workers
- Engineering and management
- Minimum credential: 4-year university degree (industrial engineering, supply chain, logistics, etc.)
QUESTIONS