THE FUTURE OFLogistics 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 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? <u>Which type requires better</u> <u>supply chain management?</u>



Why do companies get it wrong so often? Change!

FRAMEWORK III: THE 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

Now

- All of this but dynamic, responsive, adaptive
- Supply chain segmentation
- <u>Supply chain risk</u> <u>management</u>

Implementation and Execution

Twenty Years Ago

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

Now

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

- 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 customercentric 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 customercentric 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

THE NEW NORMAL

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 <u>early awareness</u> and response; Optimize <u>operating parameters</u> for effective triage; acquire <u>correct amount of</u> <u>flexibility, redundancy, and excess capacity</u>

Trends...



2025

2030



MATERIAL HANDLING & LOGISTICS

APRIL 2017

powered by

- 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

SOCIETY Urbanization The Changing Workforce Sustainability

TECHNOLOGY

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

Current

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

Needs/Opportunities

- Small footprint, high throughput urban warehouses (vertical)
- *Very* efficient large rural warehouses
- Higher frequency transfer of smaller-sized "unit loads"



Trends

- Growth of ecommerce
- 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

Mass Personalization Relentless Competition

Growth of eCommerce

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



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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 High speed, high value **Standardization** material handling and Internet of Things logistics Planning & optimization **E-Commerce** Low cost, low impact Collaboration material handling **Urban** logistics **Technology and automation** Sustainability **Workforce** 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 Millenials The Changing Workforce Sustainability

TECHNOLOGY

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

EMERGING

Cybersecurity and Risk Cloud Computing Al Industrie 4.0

TECHNOLOGY

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 centralize controlled "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



LOGISTICS INFRASTRUCTURE

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?



PLANNING & FLEXIBILITY

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

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THERE IS A STRONG GENERATIONAL ELEMENT TO BOTH



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.)

