OR: A SCIENCE FOR A BETTER WORLD

Supply chain management from business to humanitarian applications

Luk N. Van Wassenhove
INSEAD
“THE FUTURE AIN’T WHAT IT USED TO BE”

(Yogi Berra)
EXAMPLE 1: A SIMPLE PLANT

Sanofi-Aventis Neuville plant near Lyon, France
NOT SO SIMPLE AFTER ALL

• Development activities (R&D link)
• Logistics (supply chain links)
• Environmental concerns
• Health and Safety provisions
• Anything else?
RISK MANAGEMENT
Accidental and Purposeful Events

22 firefighters divided in 4 shifts, 7/7 d, 365 days per year
An intervention fleet in place
EXAMPLE 2: AN
INDUSTRIAL PARK

Smart City at Hambach, Alsace, France
STANDARDIZATION OF LOGISTICS PROCESSES
Flow of parts delivered to the assembly

More:
- Eberspächer
- Meritor

Delivery by sequence underlined
Supplier by impulse

Schenker

Supplier stock
TOF-Parts, f. ex. SeDrive Unit, belts, wiper...

DC W68 (Hamburg)

Front axle

Wing 2000
Marriage Belt

Wing 3000

Rieter
Underbody panelling

Stankiewitz
Floor carpeting

Behr
Radiator

Webasto
Roof system MCO

Meritor/Splintex
windshield roof module

Continental
Wheels

Magna Door Systems

Door plant
Paneling side doors

Siemens
VDO Automotive

Wing 1000

Cockpit Assembly

AC cable tube
cooling-water line

Tank

Behr

Simoldes
Belt fittings
center tunnel console

Faurecia

seats

Wing 2000

Wing 4000-6000

Magna Système Châssis

KASF

Rear module plant

Wing 1000

Painted body

Powder paint

Magna Système Châssis

Châssis

Siemens

Wheels

VDO

Center

Cars delivery

Mosolf MLT

Cubic Europe

Dynamit Nobel

Cubic printing

Center

Stankiewitz

Behr

Webasto

Meritor/Splintex

TUF-Parts, f. ex. SeDrive Unit, belts, wiper...

front axle

KASF

Rear module plant

Painted body

Powder paint

Stankiewitz

Floor carpeting

DC W68 (Hamburg)

Supplier stock

TOF-Parts, f. ex. SeDrive Unit, belts, wiper...

Ensign

Tank

Behr

Solvay

front axle

KASF

Rear module plant

Painted body

Powder paint

Stankiewitz

Floor carpeting

DC W68 (Hamburg)

Supplier stock

TOF-Parts, f. ex. SeDrive Unit, belts, wiper...
LEAN AND MEAN (AND VULNERABLE?)

- Multiple actors with different objectives to be coordinated
- Synchronized JIT activities with minimal margin for errors (a clockwork)
- Complex material and product flows (cluttering our road networks?)
- How can we make this more resilient?
EXAMPLE 3: GLOBAL OPERATIONS

L’Oreal’s Supply Chain Evolution
A simple and autonomous logistical organization

1 country = 1 plant + 1 DC

Local markets

INDUSTRIAL REORGANIZATION
Consumer Division

Situation 90
A complex and interdependant logistical organization

INDUSTRIAL REORGANIZATION

Situation 2000

A european market

1 continent = 11 specialized plants + 28 DC
FAST TRANSITION TO GLOBAL OPERATIONS FOR SURVIVAL

Do we have the skills and can we handle the risks? What about off-shoring and outsourcing?
EXAMPLE 4: CREATING CUSTOMER RESPONSE SYSTEMS

The history of HP’s Personal Computer business
SUPPLY CHAIN AT THE BEGINNING

Suppliers

Factories in BUILT TO PLAN

End User

Reseller 1st Tier

Reseller 2nd Tier
CURRENT SUPPLY CHAIN

- **Suppliers**
  - Supplier Direct Ship
  - Postponement
  - FGI in 48h

- **Regional HUB**
  - or
  - SMI from supplier hub

- **Factory**
  - Build To Order
  - Bundle To Order

- **Channel Assembly**
  - Channel Assembly

- **Reseller 1st Tier**
  - TV
  - VAR Direct

- **Reseller 2nd Tier**

- **End User**
  - Indirect
  - Direct

- **Services**
  - • HP Prime
  - • Business Store

- **Merging**
FICKLE CUSTOMERS CALLING THE SHOTS

Can we manage constant demand/supply matching, ever shortening lifecycles and individualised customer solutions?
“IT’S A JUNGLE OUT THERE!”

Anything we forgot?
I’m afraid so…
EXAMPLE 5: COPING WITH ENVIRONMENTAL LEGISLATION

A costly hassle or an opportunity for competitive advantage?
Information to customers

Financial Guarantee

Visible Fee

Collection Targets

Historical Waste

Free Riders?

Reverse Logistics

NCH/ERP view

Reverse Logistics

Free Riders?

NCH/ERP view

Collection

Reuse Possibility

Information to Recyclers

Treatment

Experience with existing consortia

Substance Restrictions

Eco Design

Sale

Household Waste

Non Household Waste

Information to customers

Manufacturing

Suppliers

Relationship Issues

X 25 states
YES, ADDITIONAL COMPLEXITIES AND UNCERTAINTIES

And increasing costs for business

But is it good for the environment?
OK, ARE WE DONE NOW?

Not quite, I’m afraid…
CHILDREN IN AFGHANISTAN
CAN WE CONTINUE TO CLOSE OUR EYES?

Every 5 seconds a child dies of hunger

It takes 15 cents per day to feed a child in school…
LET’S PAUSE HERE AND DO A SMALL RECAP

Things have become a lot more complex and risky with fickle customers and a tiny margin for errors.

Business is more than just greed.
SO

WHAT IS

THE GOAL?
SUSTAINABILITY

Environmental, Societal, Economic Responsibility

“Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

United Nations Division for Sustainable Development
WOW!
BALANCING PROFIT, PLANET AND PEOPLE

But isn’t that incredibly difficult?
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Enter Operational Research…
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BUT FOR WHOM?
OPERATIONAL RESEARCH

Deals with complex interdependent systems

Analyses different scenarios over time

Integrates multiple disciplines with process as well as analytical approaches

Balances different stakeholder objectives
EXAMPLE 1: LINKING SUPPLY CHAIN DECISIONS TO THE BOTTOM LINE

HP’s Inventory-Driven Cost Metric
## How High-Tech Products Compare on Global Supply Chain Cost Drivers

<table>
<thead>
<tr>
<th>HP Products</th>
<th>Labor Content</th>
<th>Weight</th>
<th>Inventory Driven Cost</th>
<th>Product Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portable CD Read / Writer</td>
<td>Very L</td>
<td>L</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>InkJet Printer</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Desktop PC</td>
<td>L</td>
<td>M</td>
<td>H</td>
<td>L to M</td>
</tr>
<tr>
<td>Large Format Inkjet Printer</td>
<td>H</td>
<td>H</td>
<td>L</td>
<td>H</td>
</tr>
</tbody>
</table>
**Inventory Driven Costs**

<table>
<thead>
<tr>
<th>Price Protection</th>
<th>Product Returns</th>
<th>Traditional Inventory Costs</th>
<th>Material Devaluation</th>
<th>Excess &amp; Obsolescence</th>
</tr>
</thead>
</table>

**Formula**

\[
\text{RONA} = \frac{\text{Revenues} - \text{Expenses}}{\text{Working Capital Requirement} + \text{Fixed Assets}}
\]

**Cash-to-Cash Cycle**

- Days Receivables Outstanding
- Days Inventory Outstanding
- Days Payables Outstanding
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For the company and its stockholders when margins are small and competition is tough
EXAMPLE 2: CLOSED-LOOP SUPPLY CHAINS

Making money out of product recovery
A CLOSED-LOOP SUPPLY CHAIN

- Raw materials mining
- Primary materials production
- Component manufacture
- Final product assembly
- Materials re-processing
- Component re-processing
- Product re-processing
- Product collection & inspection
- Product demand & use
- End-of-life product disposal
EXAMPLES OF CLOSED-LOOP SUPPLY CHAINS

• Containers (cameras, toner cartridges)
• Industrial remanufacturing (copiers)
• Cellular telephones
• Product life extension (jet engines, aircraft)
• Tire retreading (passenger and commercial)
• Telecommunications (circuit packs)
Activities in the Reverse Supply Chain

- Timing, quantity, quality of used products:
  - Product acquisition mgmt
  - Return rates

- Develop channels,
  - Remarket, Secondary markets,
  - Cannibalization

- Reverse logistics
  - Test, sort, disposition
  - Disassemble
  - Repair,
  - Remanufacture
A Business Perspective on Closed-Loop Supply Chains

Only an integrated approach can release the value
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For both the company and the natural environment
EXAMPLE 3: RISK AS A THREAT AND AN OPPORTUNITY

An integral way of doing business
SOUCRES OF RISK

• Financial Valuation & Economic Factors
• Volumetric (Forecasting)
• Pricing and Upstream Cost (Economic)
• Strategic Behavior (Supply Chain Partners)
• Political and Regulatory Factors
• Environmental Factors (weather, natural hazards)
• Disruptions (Accidents, Sabotage, Strikes)
• ….
DESTRUCTION OF A REGIONAL ECONOMY-HOUSTON

Flammable and Toxic Chemical Facilities in Houston
Total Exposed Population = 1,953,631
Total Flammable Facilities = 74
Total Toxic Facilities = 80

Worst case for typical toxic facility (3-minute radius red circle) in excess of 200,000 dead--Lasting damage to regional and national economy
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For business and society to operate in a safer world
EXAMPLE 4: HUMANITARIAN LOGISTICS

Business can help but humanitarians can also teach business a thing or two
THE CRISIS IN AFGHANISTAN

The Main Road

A problem along the road …

Almost safe …

Almost there …

UNJLC worker dressed as the locals

Food distribution
Transport Capacity Assessment – South Sudan
- Road constraints -
Transport Capacity Assessment – South Sudan

- But also … -

from the warehouse at port …

via long haul …

to the corridor …

and via short haul …

or via this short haul …

to the beneficiaries
THE ULTIMATE SUPPLY CHAIN?

«don’t know when, where, what, how much, where from and how many times»

• Both demand and supply side vary

• Need to quickly configure and choreograph

A high degree of uncertainty, limited authority and scarce resources (human, financial)
He Can Use Some Help
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Build better coordination mechanisms and competences for a more professional response to disasters (planet and people)
EXAMPLE 5: PARTNERSHIPS BETWEEN BUSINESS AND NOT-FOR-PROFIT

Teaching elephants how to dance
moving the world

TNT-WFP Partnership
Looking for a Partner
WHAT IS THE WORLD FOOD PROGRAMME?

• The UN agency charged with fighting global hunger
• World’s biggest humanitarian organisation (budget 1.6 Bi)
• On any given day of the year:
  - 40 ships on the high seas
  - 20 planes in the air
  - 1,000 trucks on the ground
TNT’S PARTNERSHIP WITH THE WORLD FOOD PROGRAMME

A long term partnership (€ 5 million for first year) between TNT and the World Food Programme (WFP), with an initial commitment by TNT for 5 years

<table>
<thead>
<tr>
<th>Emergency Response</th>
<th>Joint Logistics Supply Chain</th>
<th>Private Sector Fund-raising</th>
<th>Transparency &amp; Accountability</th>
<th>School Feeding Support</th>
</tr>
</thead>
</table>


BENEFITS FOR TNT

• Positive influence on TNT’s reputation and employee motivation

• The perception of the value that our industries add to the world will improve

• The development of skills to deal with the most challenging of circumstances

• The development of business opportunities in areas that would otherwise be hard to enter
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Helps companies build the case for Profit, People and Planet
ANOTHER LITTLE RECAP

5 examples of profit/planet/people combinations

HP: linking decisions to bottom line (profit)

• Closed-loop supply chains: aligning business and environmental goals (profit/planet)
• Risk and Disruptions: a safer world (profit/people)
• Humanitarian logistics: a more humane world (planet and people)
• Business-humanitarian partnerships: a sustainable world (profit/planet/people)
EPILOG: BETTER FOR WHOM?

OR and Sustainable Operations
SUSTAINABLE BUSINESS OPERATIONS

• Manage complexity on a global scale
• Manage uncertainty and risk
• Manage multiple stakeholders
• Manage Profit, Planet and People
• Now and in the future
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Can help you make the case and truly contribute to better for business, planet and people

BETTER: FOR A SUSTAINABLE FUTURE
That means a better future also for him
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“Tout ce qui brille n’est pas de l’OR”

(D. de Werra)
“THAT’S ALL FOLKS”

(Bugs Bunny)