USING ANALYTICS TO IMPROVE SUPPLY CHAIN PERFORMANCE

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HIPPO

“If we have data, let’s look at data. If all we have are opinions, let’s go with mine.”

- Jim Barksdale, former Netscape CEO
EMERGING DECISION APPROACH: DATA-DRIVEN

• Why now? Data has become extremely inexpensive to capture and store

• Exciting shift in business: less decision making based on HIPPO, more data-driven (LinkedIn, Google, etc.)
DATA: “THE NEW OIL”
DO YOU HAVE THE RIGHT DATA?
COLLECTING FIELD DATA

• Analysis of bullet holes in WWII planes after an enemy encounter
  • Analyze the damage – this can help us determine where to put additional armor.

Final decision – holes indicate areas where armor is less urgently needed. Why?
DO YOU HAVE THE RIGHT DATA?
SURVEY DATA

• Ask lots of questions about how the data was collected!
  • People who read email differ from people who do not read email.
  • People with land lines differ from those without.
DO YOU HAVE THE RIGHT DATA?

IS IT CLEAN?

Data exploration before modeling begins is critical:

- Why were some customers active for 31 days in February, but none were active for more than 28 days in January?
  - System bug – month codes were swapped
- Why were so many customers born in 1911? Are they really that old?
  - Birth date required, and holding down the “1” key is easy for data entry personnel
- Why are there negative numbers in the sales price field?
  - Product returns
DATA ANALYTICS: A DOUBLE-EDGED SWORD?

(CONSUMERS HAVE A LOT MORE DATA NOW ALSO...)
THREE BROAD CATEGORIES OF ANALYTICS

1. Descriptive Analytics – what has happened

- gathering, summarizing, and visualizing large datasets to reveal new business insights. In SCM:
  - Real-time data sources – GPS, RFID
  - Supply chain mapping (free.sourcemap.com)
  - cutting-edge visualization tools (Tableau)
THREE BROAD CATEGORIES OF ANALYTICS

2. Predictive Analytics – what is likely to happen
   • using historical data to predict future outcomes; can use either statistical or machine learning (computer science) methods. In SCM:
     • Demand forecasting at all echelons
     • Emerging approach: combine multiple databases – sales histories, weather data, etc.
THREE BROAD CATEGORIES OF ANALYTICS

3. Prescriptive Analytics – what should happen
   - using operations research tools to determine which decisions will lead to the best outcomes. In SCM:
     - Optimization and/or simulation modeling
DESCRIPTIVE ANALYTICS IN SCM: SENSORS AND RFID

• Manufacturing stores more data than any other sector – **sensors** on plant equipment or sold products
  • Sensors enable a product to “phone home” its usage patterns, etc. Manage defects, service needs, NPD, upselling

• Projected growth in **RFID** tags from 2011 to 2021:
  • From 12 million to 209 billion (~17,400x)
  • “Performance transparency” – real-time monitoring of performance at a granular level
DESCRIPTIVE ANALYTICS IN SCM: GPS

- US DOT – in the US, trucking makes up 80% of total transportation costs, delivering 54 million tons per day, representing tens of billions of dollars.

- Rapid adoption of GPS vehicle tracking devices (currently 6 million in use):
  - Usage monitoring – eliminate personal use and improve driving (“like having a manager in every vehicle” -LiveView GPS). Incentivize desired driver behavior.
  - Delivery monitoring, which can also identify profitable backhaul opportunities in real time
  - Recovery of stolen assets
  - Predictive application – preventive maintenance
PREDICTIVE ANALYTICS IN SCM: SUPERVISED PREDICTION

Time Series  Regression  Decision Trees  Neural Networks
THE POWER OF PREDICTIVE MODELING

• Early application of big data to predictive modeling: consumer behavior

• Predicting missing a credit card payment
  • Very likely to miss: anyone who buys...
    • cheap, generic motor oil
    • chrome skull car accessories
  • Very UNLIKELY to miss: anyone who buys...
    • Felt pads for chair legs
    • Carbon monoxide monitors
    • Premium birdseed

• Kroger is realizing revenue of over $100 million per year selling its shopper data to consumer goods companies
PREDICTIVE ANALYTICS IN SCM

- Demand forecasting
- Google Trends
- Emerging approach – leverage social media
PRESCRIPTIVE ANALYTICS IN SCM

- **Optimization**
  - Staffing
  - Real-time vehicle routing (further leverages GPS)
  - Billions $ of time and fuel are wasted each year sitting in traffic
    - Waste Management vehicle routing - $44M annual savings

- **Simulation**
  - R&D - leverage data from multiple systems (CAD, production, etc.) to drive simulation models. Toyota now claims to have eliminated 80% of product defects before the first physical prototype is built.
  - Manufacturing - create a “digital factory” (McKinsey), a very detailed model of the entire production facility - machines, people, equipment - that enables extensive what-if analysis in a virtual environment (automotive, steel, semiconductor, industries)

- **Emerging Idea: Open innovation**
  - Crowdsourced new ideas - from logos to product design features
SOFTWARE PROVIDERS

Source: Forrester Research
THANK YOU FOR YOUR TIME!

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