RFID: Mining Mega Data for Enhanced Forecast Accuracy

Demand Planning & Forecasting Best Practices
October 2006

www.bostonstrategies.com
(1) (781) 250-8150

This report has been prepared by Boston Strategies International at the request of CLIENT for the purpose of establishing its operating strategies. It may not be appropriate for other purposes or audiences. This report contains forward-looking statements and projections with respect to anticipated future performance of CLIENT, suppliers, customers, and/or general or specific economic conditions and factors that are based on Boston Strategies International's analysis of market trends and external data. Forward-looking statements and projections are not guarantees of future performance and involve significant business, economic and competitive risks, contingencies and uncertainties, which are difficult to predict. Accordingly, these projections and forward-looking statements may not be realized and actual results may vary up or down. This report may not be reproduced or distributed without express written approval from Boston Strategies International.
Summary

• **Background on RFID**
  • RFID has been in use for 65 years
  • Technology – important distinctions
  • Mandates
  • The Wal-Mart experience to date
  • Other RFID implementations
  • Many application areas
  • The vision

• **Implications for forecasting**
  • Benefits of RFID for forecasting
  • Richer basis for forecasts
  • Less forecast error: replenishment
  • Lower forecast error: promotions
  • Lower cost of a wrong forecast

• **Impact on CPG/Retail Relationships**
  • Consumer demand: continuous change
  • New product information will be critical
  • RFID is part of a collaborative strategy
  • Large investments, common benefits
  • The power of alignment

• **What to do**
  • Recalibrate the variability of demand
  • Re-evaluate the level of forecast
  • Consider data-mining possibilities
Background on RFID
RFID Has Been In Use for 65 Years

- 1940s – Friend or foe
- 1960s – Electronic Article Surveillance (EAS)
- 1970s – Automated toll collection
- 1980s – Automatic Equipment Identification
- 1990s – Keyless entry, 1990s – Speedpass™
- 2000s – EPC, Smart cards, and more
Technology – Important Distinctions

- Active vs. passive
  - Sensors: Temperature, Light, Humidity, Pressure, Vibration, Sound, Acceleration, Existence, Draw, Motion, Air exchange, Explosives, Location, Radioactivity
- Read vs. read-write
- Finite vs. rechargeable battery
- Continuous vs. intermittent transmission
- Middleware vs. Object Naming Service
Mandates

- 1981: Military (LOGMARS barcode standard)
- 2003: Consumer Goods (EPC standard)
  - Albertson’s
  - Best Buy
  - Coca-Cola
  - Department of Defense
  - Gillette
  - Target
  - Wal-Mart
The Wal-Mart Experience to Date

- 500 stores (→1000)
- Top 200 suppliers (→500)
- 12 DCs (2004/2005)
- 23,753 tagged pallets
- 663,912 tagged cases
- 5 million tag reads
  - > 90% for cases on carts
  - 95% on conveyors in DCs
  - 66% on cases in pallets
- RFID data available to suppliers within 30 minutes via extranet

- Some top Wal-Mart suppliers
  - Gillette/P&G
  - HP
  - Johnson & Johnson
  - Kimberly-Clark
  - Kraft Foods
  - Nestle
  - Purina
  - Unilever
Other RFID Implementations

- Tesco
- Marks & Spencer
- TNT Logistics
- Port of Long Beach
- Las Vegas airport
- Hong Kong airport
- Purdue Pharmaceutical
- MasterCard

- Shanghai Masters Cup
- UPS
- Passports
- Drivers licenses
- Hospitals
- Danish bus terminal
- Automobiles
- Cellphones
Many Application Areas

<table>
<thead>
<tr>
<th>Application</th>
<th>Benefit</th>
<th>Financial Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Track Equipment</td>
<td>Utilization</td>
<td>ROA ↑</td>
</tr>
<tr>
<td>Track Inventory</td>
<td>Turns ↑</td>
<td>Working Capital ↑</td>
</tr>
<tr>
<td>Deploy Labor</td>
<td>Productivity</td>
<td>Profits ↑</td>
</tr>
<tr>
<td>Track Production</td>
<td>Cycle time ↓</td>
<td>Revenues ↑</td>
</tr>
<tr>
<td>Track Devices</td>
<td>Availability</td>
<td>Performance ↑</td>
</tr>
<tr>
<td>Monitor Access</td>
<td>Violations ↓</td>
<td>Claims/damages ↓</td>
</tr>
<tr>
<td>Speed X-Actions</td>
<td>Throughput ↑</td>
<td>Revenues ↑</td>
</tr>
<tr>
<td>Inter-Operate</td>
<td>Applications</td>
<td>Revenues ↑</td>
</tr>
</tbody>
</table>
The Vision

- Innovation from outside
- Collaborative selling
- Supply networks
- Standardized subassemblies

“We’re moving towards a world where operations are network-centric. There used to be vertical silos, [but in the future we’ll] have horizontal businesses that can integrate with each other.”

- Stephen Miles, MIT
Implications for Forecasting
Benefits of RFID for Forecasting

- Richer basis for forecasts
  - Event history
  - Item level tagging
- Possibility for less forecast error
  - More reliable execution → fewer stockouts → smoother demand → less forecast error
  - More timely replenishment
  - More accurate promotion execution
- Lower cost of a wrong forecast
  - Dynamic allocation of resources → less safety stock
  - Less transportation equipment, containers etc.
Richer Basis for Forecasts

- Volumes more data
  - Association of product, supplier, customer data
  - Tactile condition (movement, light, etc.)
  - Event history
- Far more precise event history
  - Pallet level
  - Case level
  - Item level
- Potential for post-sale tracking
Less Forecast Error: Replenishment

- Company: Retailer
- Problem: Out-of-stocks
- Solution and Cost: $190M
  - Benefit: $78M
  - Based on fewer out-of-stocks
- ROI: 14% (3 years)

- Rapid stock redeployment reduces stock-outs
- Smoother consumption patterns can reduce forecast error
- Less forecast error can reduce safety stock requirements
Lower Forecast Error: Promotions

- Company: Consumer goods manufacturer
- Problem: Stock-outs of promotional items
- Solution: Event management using RFID
- Benefits
  - More accurate and timely deployment
  - Fewer stock-outs of promotion items
  - Fewer stock-outs of displays and merchandise
  - More accurate promo sales forecasts
  - Less obsolete inventory
Lower Cost of a Wrong Forecast

- Problem:
  - Misplaced medical equipment inflates rental costs
- Solution and Cost: $560,000
- Benefit: $1.1 million
  - 5% reduction in 30-day leases @ $4,500 each
- ROI: 101% (3 years)

- Less equipment needed
- More consistent equipment rental patterns
- Higher-level forecasts
Impact on CPG/Retail Relationships
Consumer Demand: Continuous Change

Biggest Changes Next 5 Years

- How your company interacts with its customers
- How your company innovates
- How your company manages suppliers
- Which product lines revenue will come from
- How your company is managed
- How your company uses IT
- Which regions revenue will come from
- Skill sets you need in your employees
- How people work

“Those who develop an intimate relationship with the customer will be the winners of tomorrow”
–Gerard Gallo, President, Echangeur/Galeries Lafayette

- Changing lifestyles and tastes
- Aggregate point-of-sale data
- Analytical tools

Source: EIU Business 2010 study
New Product Introduction Will Be Critical

- **Repeatability**
  - Rapid launch
  - Efficient
- **Incrementalism**
  - Variations
  - Extensions
- **Low-risk**
  - Calculated
  - Quick response

### Case Study in New Product Introduction

- $1.6 billion US-based decorative and fragrance products distributor
- Four synergistic key processes: Research, Development, Sourcing, Logistics
- Satellite sales and operations staff in Asia
- Rapid response supply chain to affluent markets
- Continuous and rapid new product introductions
- Revenue growth 32x in 15 years
RFID is Part of a Collaborative Strategy

- Just-in-time replenishment
- In-transit visibility
- Product lifecycle management

Which technologies will be most crucial to your firm’s business goals?

Percent of Respondents Selecting Solution as One of Top Two Choices

- Supply-chain management solutions: 40%
- CRM solutions: 38%
- Product lifecycle management solutions: 24%

Source: Economist Intelligence Unit
## Large Investments, Common Benefits

<table>
<thead>
<tr>
<th>Investment Components</th>
<th>Potential Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tags</td>
<td>Fewer out-of-stocks</td>
</tr>
<tr>
<td>Readers</td>
<td>Labor savings</td>
</tr>
<tr>
<td>Systems integration</td>
<td>Less equipment needed</td>
</tr>
<tr>
<td>Power systems</td>
<td>Inventory reduction</td>
</tr>
<tr>
<td>Installation</td>
<td>Increased revenues</td>
</tr>
<tr>
<td>Education</td>
<td>Greater customer loyalty</td>
</tr>
<tr>
<td>Leadership</td>
<td>Fewer claims and damages</td>
</tr>
<tr>
<td></td>
<td>Synergies (pooled inventory, reduced congestion, etc.)</td>
</tr>
</tbody>
</table>
The Power of Alignment

- Innovation from outside
- Collaborative selling
- Supply networks
What to Do
Re-Calibrate the Variability of Demand

- Adjust the standard deviation of demand based on pilot results

### Normal Distribution

![Normal Distribution Graph](image)

### Safety Factors

<table>
<thead>
<tr>
<th>Service Level %</th>
<th>Safety Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>0.00</td>
</tr>
<tr>
<td>90%</td>
<td>1.28</td>
</tr>
<tr>
<td>94%</td>
<td>1.56</td>
</tr>
<tr>
<td>95%</td>
<td>1.65</td>
</tr>
<tr>
<td>99%</td>
<td>2.33</td>
</tr>
<tr>
<td>99.86%</td>
<td>3.00</td>
</tr>
<tr>
<td>99.99%</td>
<td>4.00</td>
</tr>
</tbody>
</table>

Source: Arnold & Chapman, Introduction to Materials Management
Re-Evaluate the Level of the Forecast

- Scope may change
  - Time horizon
  - Level of detail
  - Type of SKUs
- Items may change, based on changes in:
  - Mean standard error
  - Cost of unavailability
Consider Data Mining Possibilities

- Item-level analysis
- Event history
- Customer-specific data
Global Supply Chain Economists™

Boston Strategies International helps supply chain executives make critical supply chain decisions that involve investment and risk by forecasting the evolution of supply markets and technologies. Our mission is to help our clients develop globally competitive supply networks that maximize Supply Chain Value™. Our products and services include:

• **Industry Research** that helps investors and policy makers identify emerging issues that affect their supply chains, and quantify the impact that they will have

• **Cost and Pricing Analysis** that helps financial and operational managers plan and budget by providing benchmark, best practice, and forecast data tailored to their companies' supply chains

• **Strategy Consulting** that helps supply chain leaders make high-stakes decisions related to mergers & acquisitions, market entry, capital investments, outsourcing, off-shoring, and make-or-buy

David Jacoby: djacoby@bostonstrategies.com

**Boston, MA, USA**
445 Washington St
Wellesley, MA 02482
USA

**Dubai, UAE**
Executive Suite
P.O. Box 121601
Sharjah, United Arab Emirates (U.A.E.)

**Shanghai, China**
31F Jin Mao Tower
88 Shi Ji Avenue
Shanghai 200120, China