

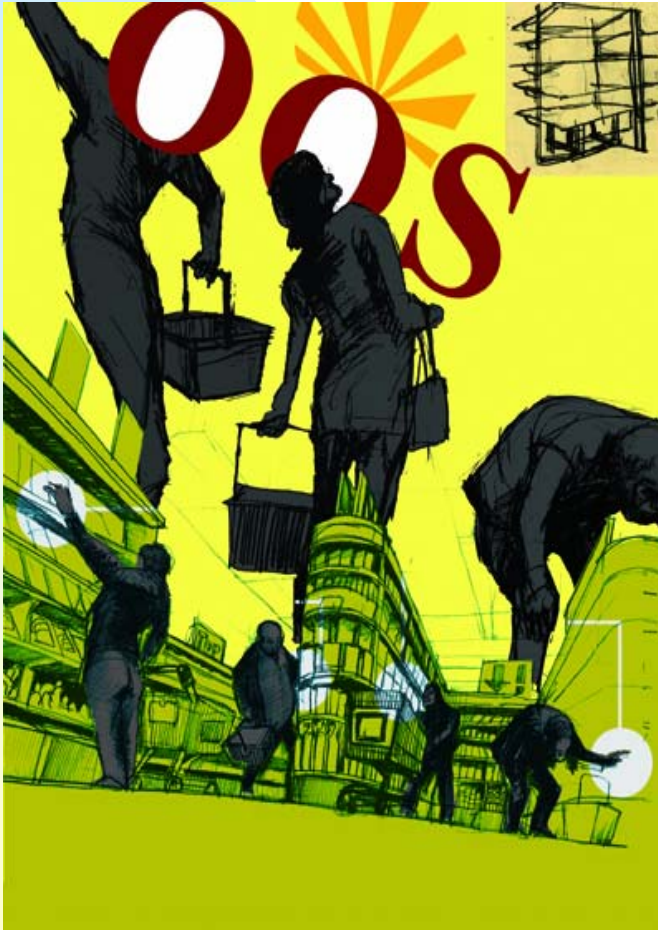


**A Presentation
To The
4th International
ECR Research
Symposium
IULM University
Milan, Italy
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A Framework for Improving On-Shelf- Availability

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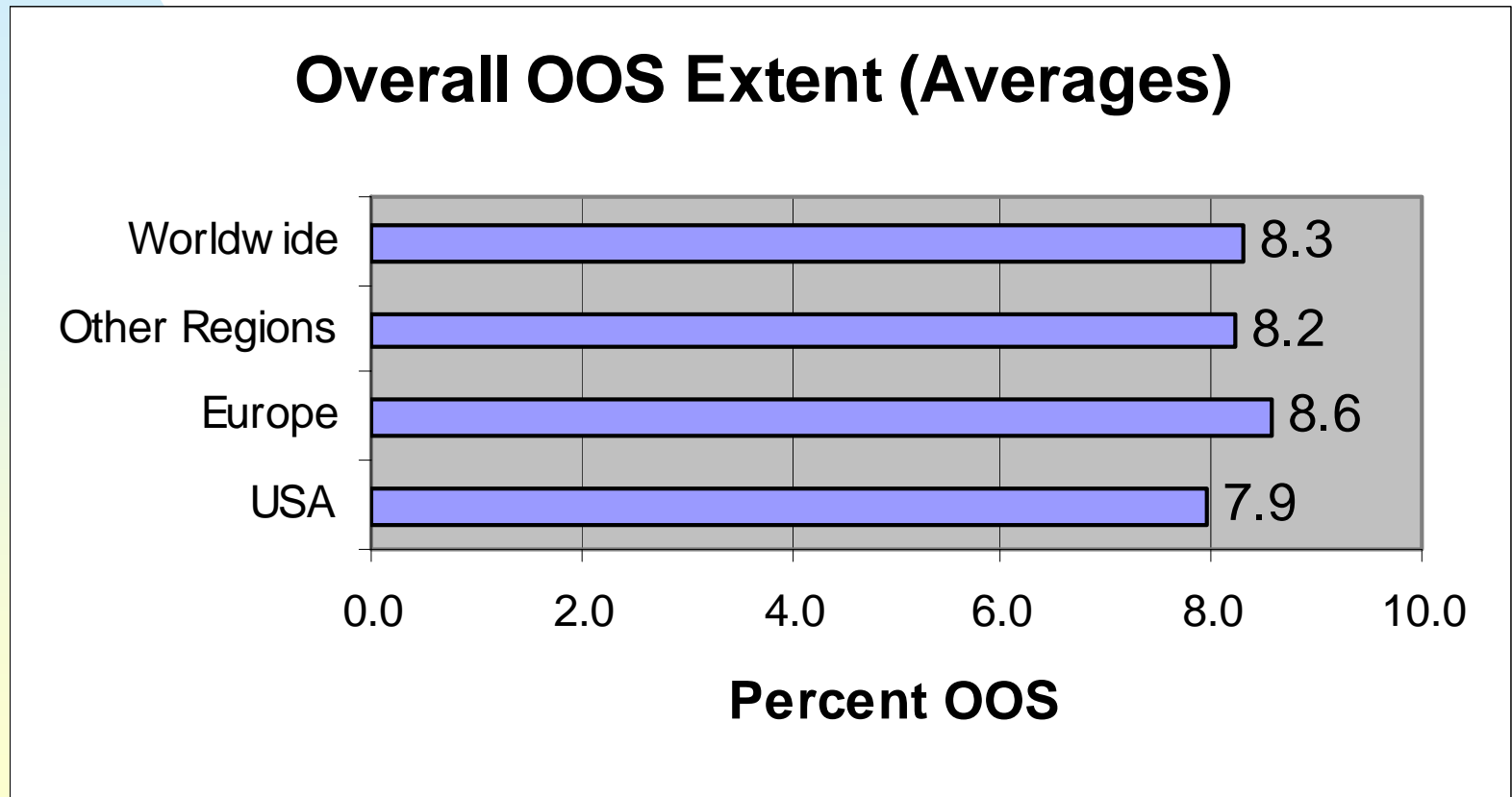
OOS is a BIG problem: How Big?



- The impact of OOS is greater than meets the eye at first glance!
- Addressing OOS will have dramatic effects on customer satisfaction and loyalty!
- Huge volume opportunity!

Briefly: What We Know About OOS

Worldwide Extent > 8%



*Note: Europe includes all Europe including Eastern Europe

Q: HOW MUCH HAVE OOS RATES CHANGED?

- Coca-Cola Research Council 1996 study = 8.2% (USA only)
- Our GMA/FMI/CIES 2002 study = 8.3% (Worldwide; 7.9% USA)

A: Not Much.

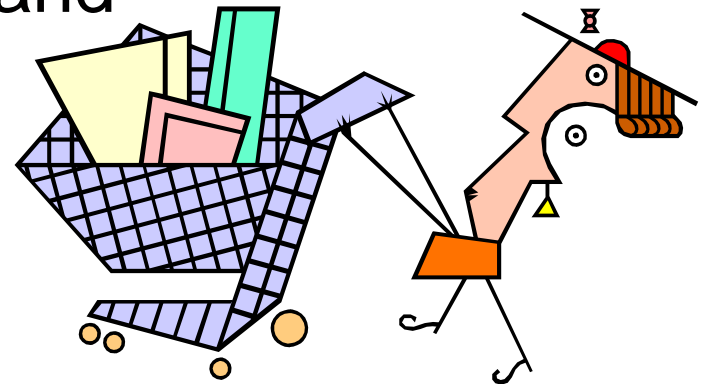
But... there are so many new kinds of technology in scanning systems, databases, computer assisted ordering (CAO) systems, etc...

WHY HAVEN'T OOS RATES CHANGED?

- Technology improvements have been offset by process complexity
 - ◆ SKU proliferation
 - ◆ Promotional proliferation
 - ◆ Store level assortment
 - ◆ Store level planogramming
- Many Retailers in the industry have reduced their labor force dramatically

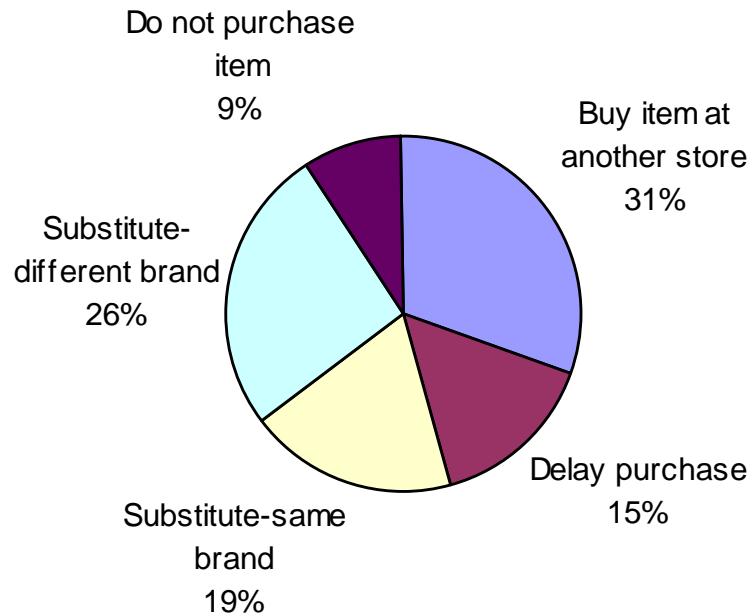
CONSUMER RESPONSE: THERE ARE 5 SHOPPER REACTIONS WHEN FACED WITH AN OOS:

1. Do not purchase
2. Purchase elsewhere
3. Substitute – same brand
4. Substitute – different brand
5. Delay purchase



HOW DO CONSUMERS RESPOND TO OOS?

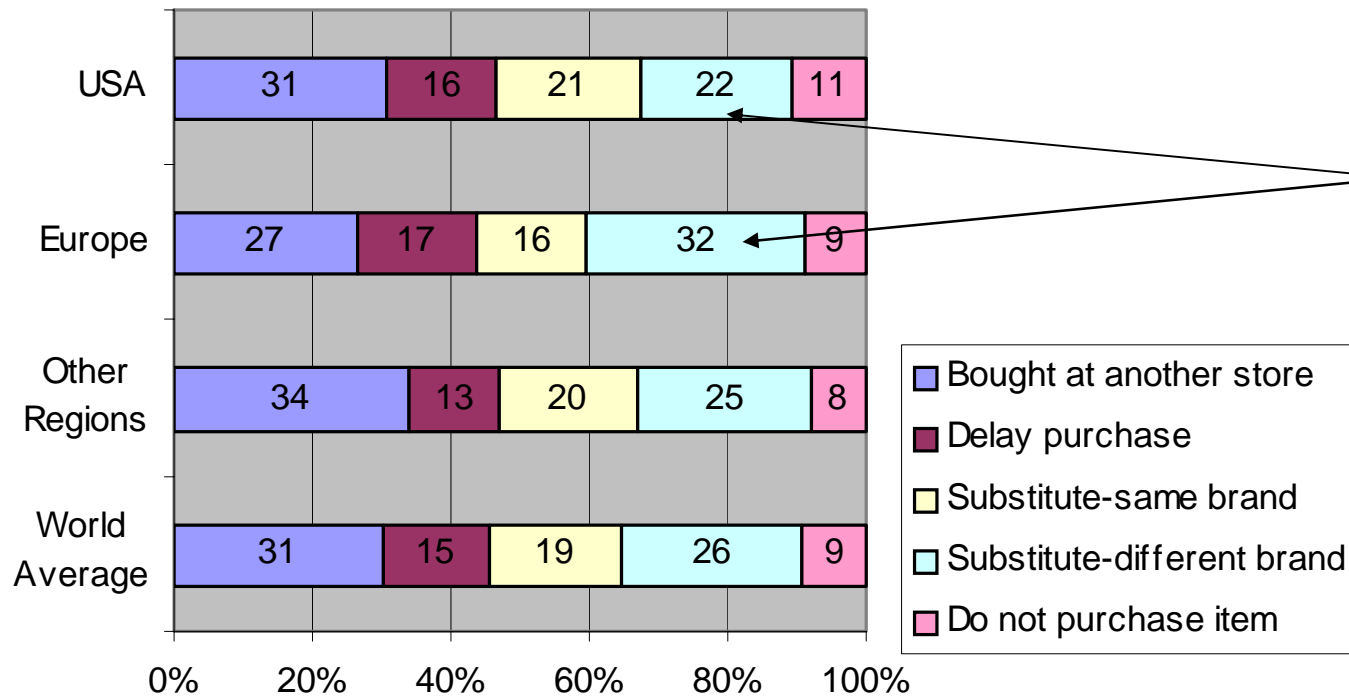
**Worldwide Consumer Responses to OOS
(Average across 8 categories)**



The consumer studies show that **retailers are likely to lose almost one-half of the intended purchases** when a consumer confronts an out-of-stock.

CONSUMER RESPONSES: REGIONS

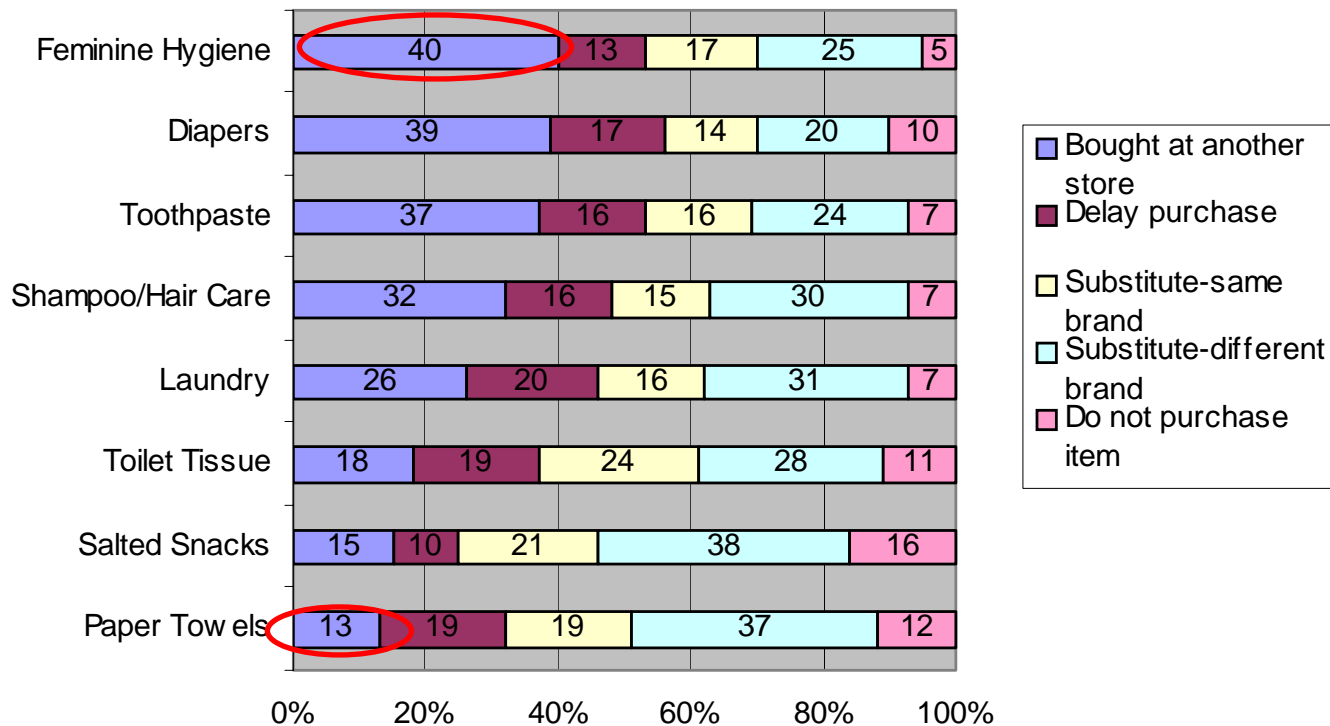
Average Consumer Responses by Region
(comparisons across 8 common categories)



Note differences in brand substitution between USA and European consumers!

HOW DOES CONSUMER RESPONSE VARY BY CATEGORY?

Average Worldwide Consumer Responses by Category



Range of store switch varies from 13% to 40%

Fem Hygiene buys at another store 3 times more than Towels

RESPONSES AFFECT CHANNEL MEMBERS DIFFERENTLY:

Retailer

- Do not Purchase
- Purchase Elsewhere
- Substitute – same brand
- Substitute – different brand
- Delay Purchase

Manufacturer

- Do not Purchase
- Purchase Elsewhere
- Substitute – same brand
- Substitute – different brand
- Delay Purchase

plus...

- Shoppers shop down when substituting
- Shoppers switch stores permanently

CONSUMER RESPONSE TO MULTIPLE OOS

These are responses for a single OOS occurrence...

Consider what happens when shoppers face multiple OOS on one trip or OOS on repeat trips...

QUIZ QUESTION: EFFECT OF MULTIPLE OOS IN A SINGLE TRIP

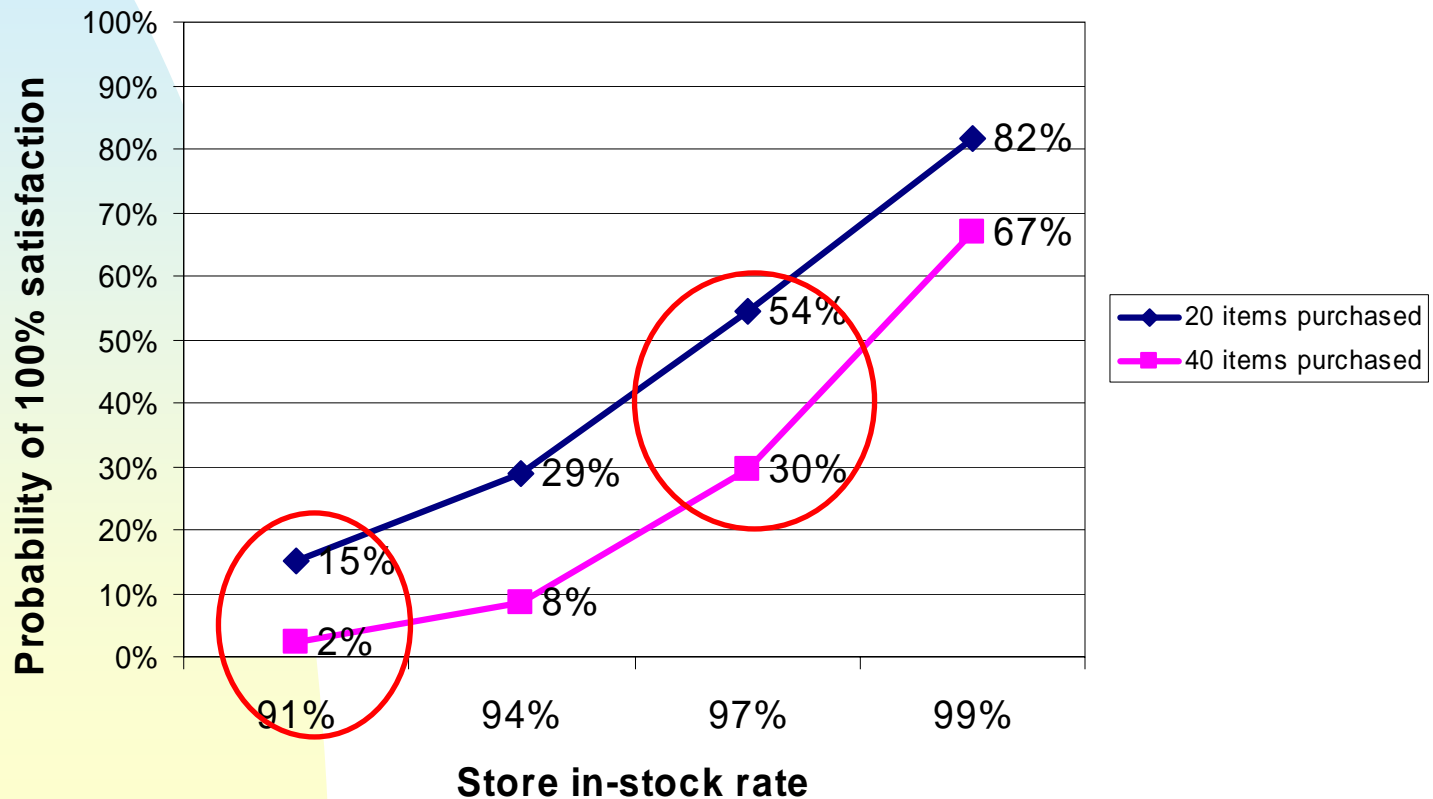
- With an average OOS level (8%) and a shopper purchasing 40 items – statistically what % of trips will he/she be completely satisfied (i.e. no OOS)?
 - A. 4%
 - B. 24%
 - C. 44%
 - D. 64%
 - E. Can't tell from the information given

Probability of Shopper Being 100% Satisfied					
	# Items to Purchase				
% Availability	10	20	30	40	50
99%	90%	82%	74%	67%	61%
98%	82%	67%	55%	45%	36%
97%	74%	54%	40%	30%	22%
96%	66%	44%	29%	20%	13%
95%	60%	36%	21%	13%	8%
94%	54%	29%	16%	8%	5%
93%	48%	23%	11%	5%	3%
92%	43%	19%	8%	4%	2%
91%	39%	15%	6%	2%	1%
90%	35%	12%	4%	1%	1%
89%	31%	10%	3%	1%	0%
88%	28%	8%	2%	1%	0%
87%	25%	6%	2%	0%	0%
86%	22%	5%	1%	0%	0%
85%	20%	4%	1%	0%	0%

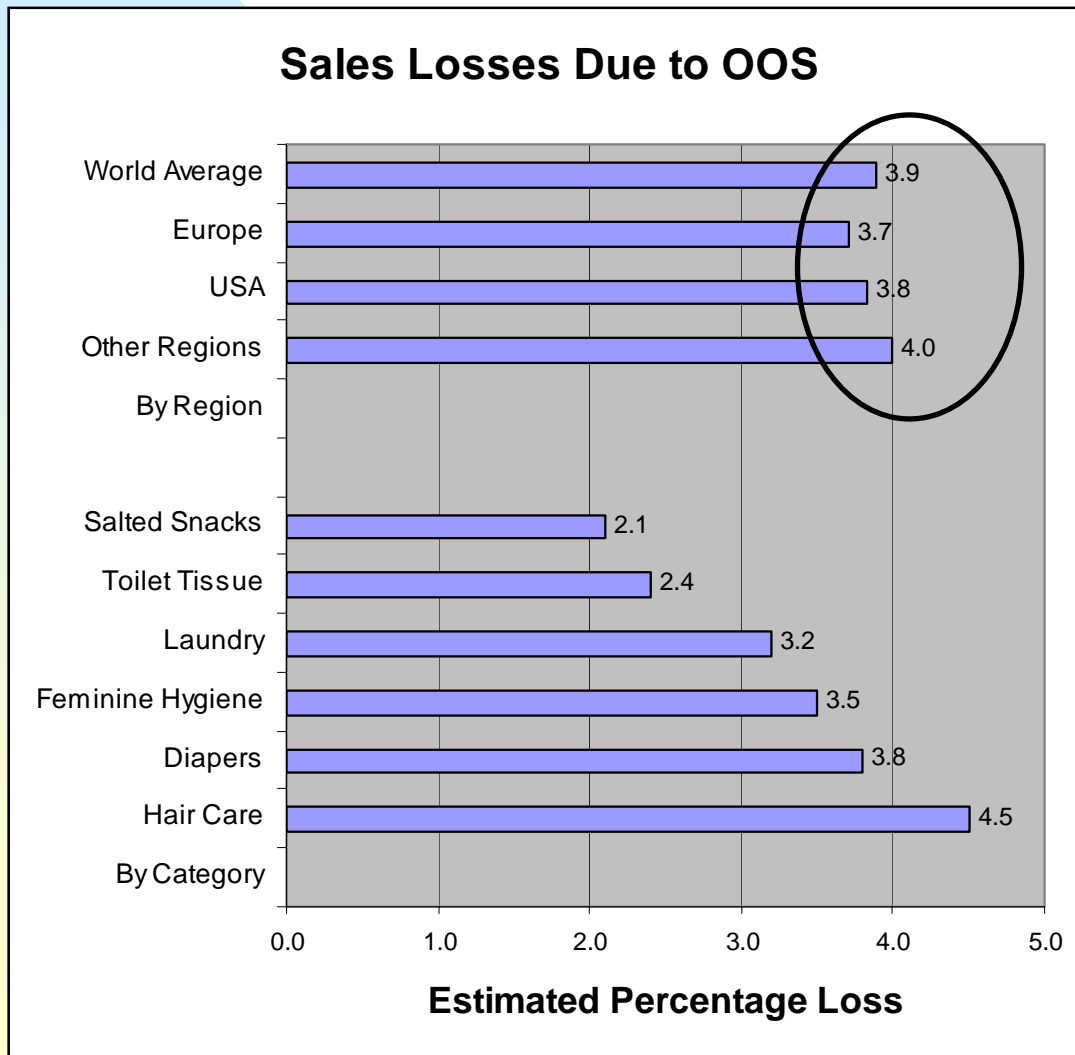
From Appendix E, p. 65

LIKELIHOOD OF 100% CUSTOMER SATISFACTION

If a retailer can cut the OOS rate in half, the potential for 100% satisfaction skyrockets!



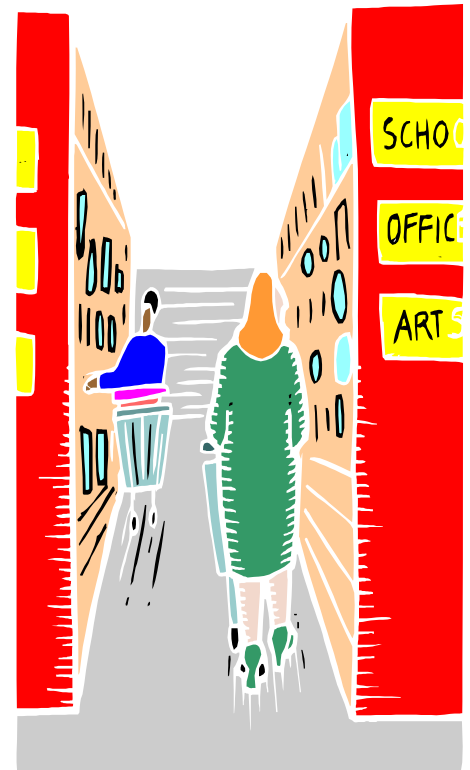
IMPLICATIONS: RETAILER SALES LOSSES DUE TO OOS ARE ABOUT 4 PERCENT



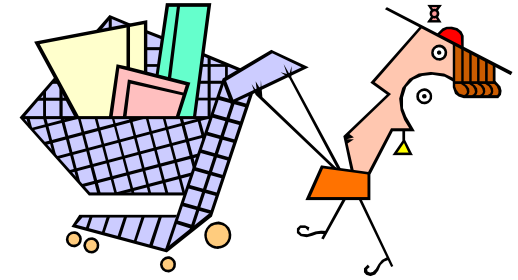
Sales Losses are similar worldwide, but vary greatly among categories

FINDINGS: IMPLICATIONS

- ***The implications of our findings suggest that the cost of out-of-stocks to retailers is greater than what has been reported in previous studies.***
- Our findings show that ***a typical retailer loses about 4 percent of sales*** due to having items out-of-stock. A loss of sales of 4 percent translates into a ***earnings per share loss of about \$0.012 (1.2 cents)*** for the average firm in the grocery retailing sector where the average earnings per share is about \$0.25 (25 cents) per year.



Calculating your company's lost sales from OOS:



$$\begin{aligned} &\text{OOS Rate} \quad \underline{\hspace{2cm}}\% \\ &\quad \times \\ &\text{Category Avg} \\ &\text{Lost Sales} \quad \underline{\hspace{2cm}}\% \\ &\quad \times \\ &\text{Total Category/} \\ &\text{Organization Sales} \ \$ \underline{\hspace{2cm}} \\ &\quad = \\ &\text{Sales Lost to OOS} \ \$ \underline{\hspace{2cm}} \end{aligned}$$

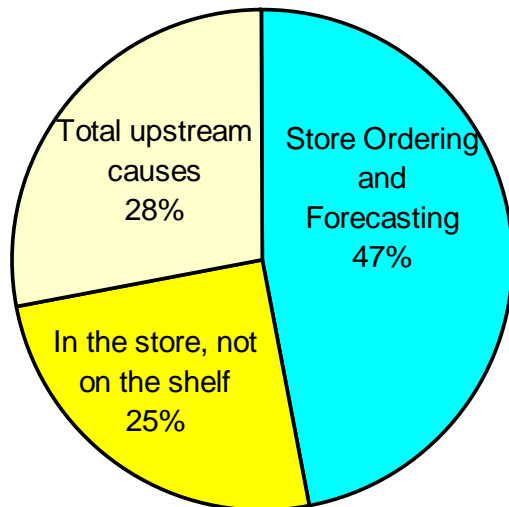
Example:

$$\begin{aligned} &\text{Avg OOS rate} \quad \quad 8\% \\ &\quad \times \\ &\text{MFR Avg Loss} \quad \quad 30\% \\ &\quad \times \\ &\text{Category Sales} \quad \quad \$1\text{B} \\ &\quad = \\ &\text{Lost sales} \quad \$24,000,000 \end{aligned}$$

Typical MFR Sales Loss/\$1B total sales is about \$24 million!

SINCE IT IS A BIG PROBLEM, WHAT ARE THE CAUSES OF OOS?

**OOS Causes
Worldwide Averages**



- Retail store ordering and forecasting causes (about $\frac{1}{2}$ of OOS)
- Retail store shelving and replenishment practices where the product is at the store but not on the shelf (about $\frac{1}{4}$ of OOS)
- Combined upstream causes (about $\frac{1}{4}$ of OOS).

70-75 percent of out-of-stocks are a direct result of retail store practices

LET'S SUMMARIZE THE CAUSES: (USA Percentages)

Store Forecasting – 33%

- *Ineffective algorithms*
- *Long forecasting cycles*

Store Ordering – 18%

- *Late order / no order*
- *Inappropriate replenishment intervals*

Store Stocking – 22%

- *Inadequate or poorly allocated shelf space*
- *Shelf stocking frequency*
- *Congested backroom*

Warehousing – 11%

- *Poor ordering policies*
- *Data accuracy issues*

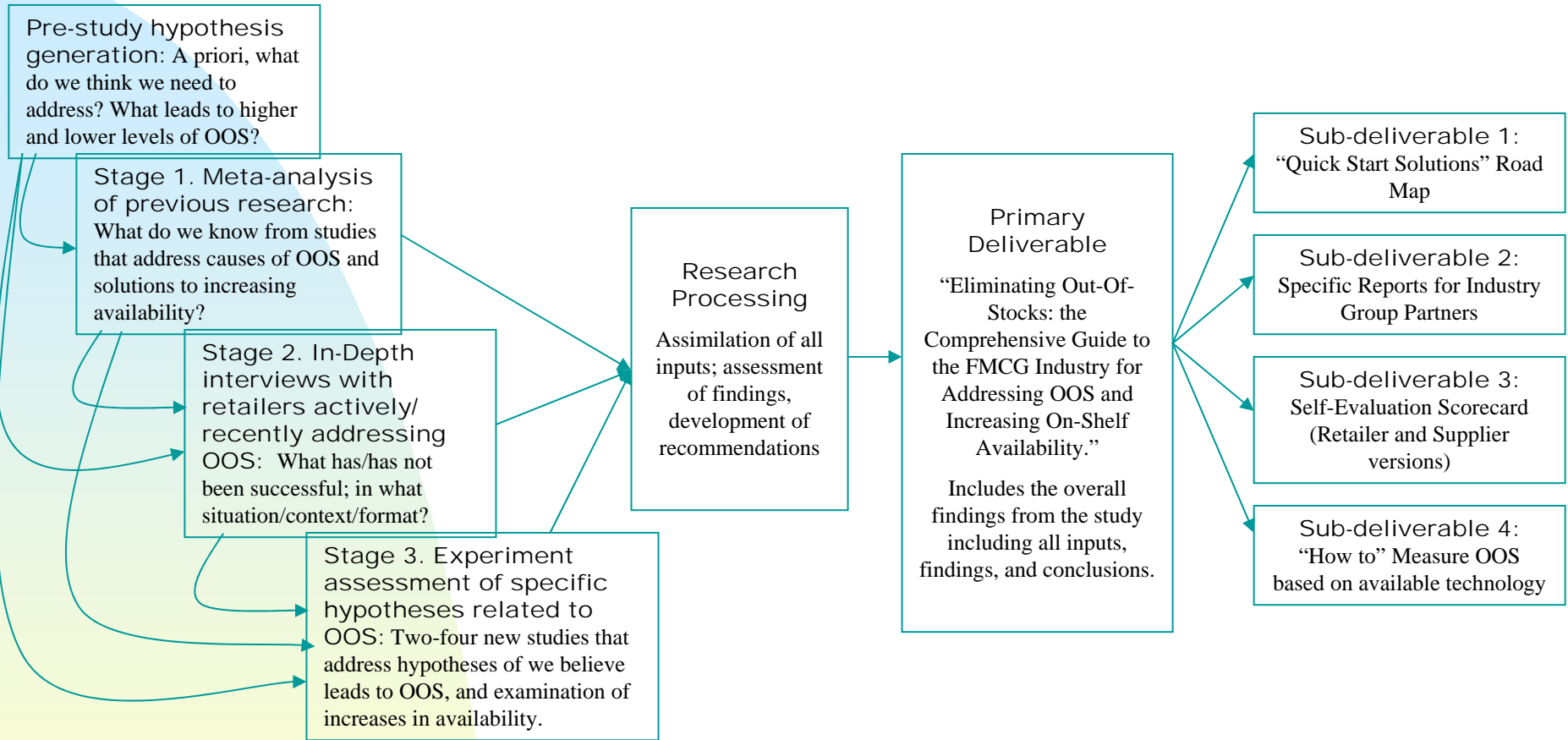
Management Errors – 13%

- *Last-minute price / promotion decisions*
- *Inaccurate or obsolete product information*

Manufacturer Availability – 3%

- *Packaging, raw material or ingredient allocation*
- *Capacity issues*

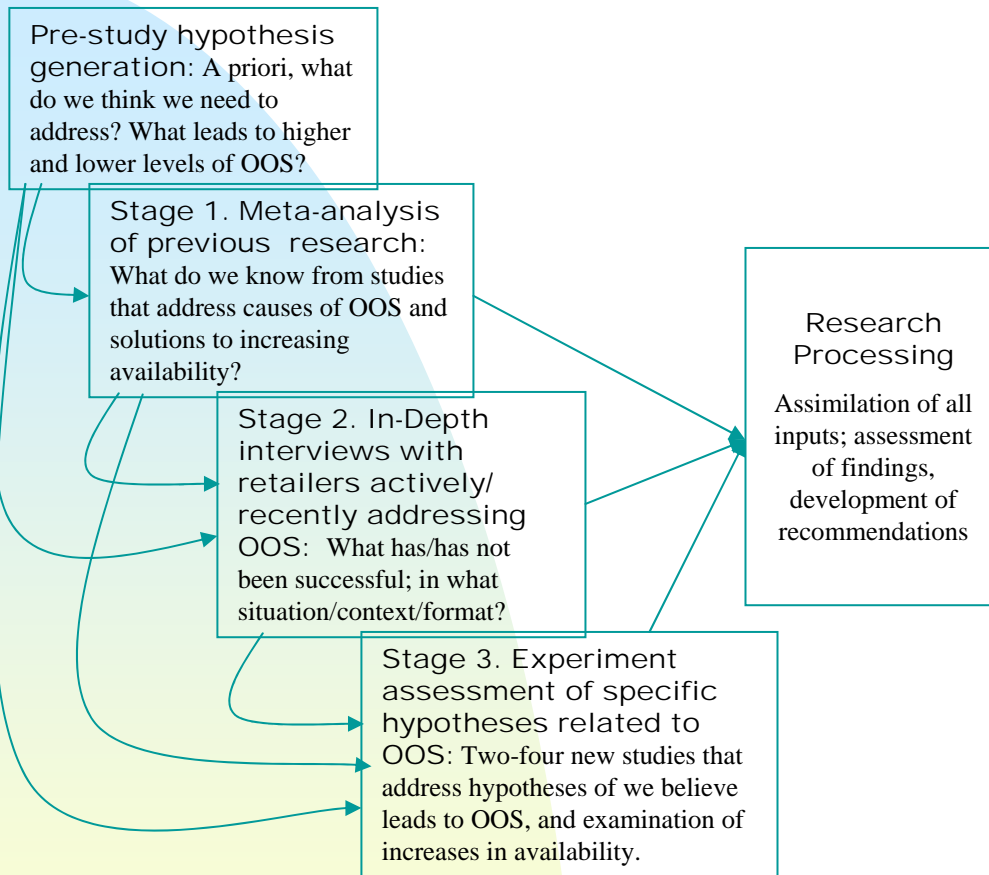
Out-of-Stock Attenuation: Linking the Root Causes of Retail Out-of Stocks to Sustainable Solutions That Increase On-Shelf Availability of Fast-Moving Consumer Goods



Inputs: Prior knowledge, completed research, new research

Outputs: Directions to FMCG industry to lower OOS:

Study Inputs and Sequence



Pre-study:

- Form a set of a priori hypotheses of factors that lead to OOS, and an appropriate set of measures associated with each will be developed.
- Inputs: researchers' 2002 OOS study; general experience of the P&G team

Stage 1 Meta-Analysis:

- Make a comprehensive review of previous work that addresses OOS, with the specific focus squarely on the root causes of OOS as well as factors and practices that lead to consistently lower OOS levels.
- Inputs: Any previous/existing P&G studies; Data Ventures studies; ECR, consultant's, trade organizations, and any other available studies.

Stage 2 In-Depth interviews:

- Conduct qualitative interviews with companies that have made recent efforts to address OOS find out what measures they have implemented and with what results.
- Inputs: Companies to be identified by researchers, P&G, or industry organization partners. Also includes analyses of data from existing projects by Data Ventures, or other cooperating firms, such as IRI.

Stage 3 Field Experiments:

- Initiate or review experiments with three or four representative retailers from different countries. The focus of these studies will be on innovative technology, process, and people solutions that provide the basis for a permanent improvement of OOS rather than ad-hoc measures
- Inputs: Companies to be identified by P&G; researchers to work directly with retailer and with a data tracking company (such as Data Ventures and/or IRI) to track experiments.

Study Outputs and Deliverables

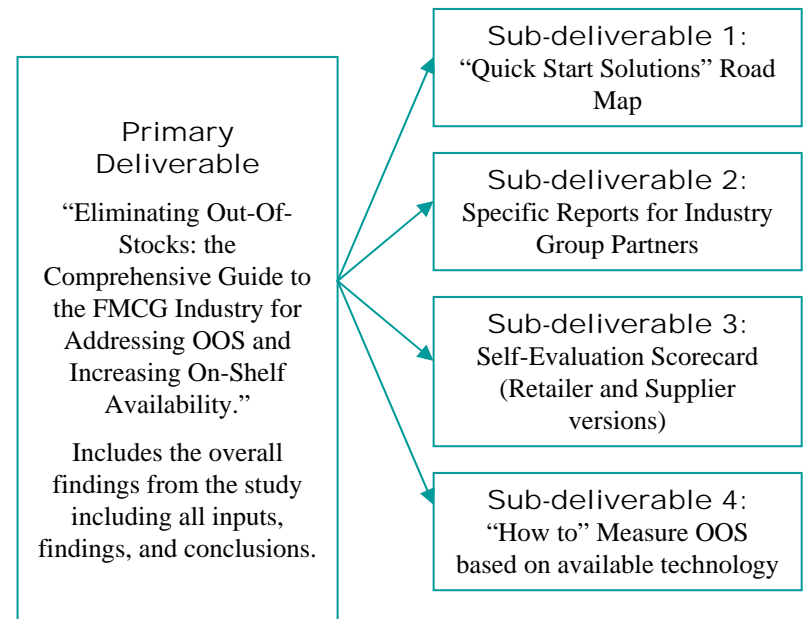
Primary Deliverable: “Eliminating Out-Of-Stocks: the Comprehensive Guide to the FMCG Industry for Addressing OOS and Increasing On-Shelf Availability.”

Subsidiary Deliverable 1: Focus on the “quick start” solutions to lowering levels of OOS, and to provide a practical road map of the best steps an organization can take to address OOS.

Subsidiary Deliverable 2: Similar to the primary deliverable, but tailored specifically to cooperating industry groups (i.e., the groups can take the report to their membership and endorse the recommended processes). The goal is to give these industry groups a book that they can use to make OOS one of their key agenda items.

Subsidiary Deliverable 3: An easy-to-use self-evaluation format; something that shows the key scorecard items that need to be addressed regarding OOS, as well as some sort of scoring plan. The user should be able to create a single score that they can take at different times and record their progress. This will include new measures that we discover to have an impact on OOS (e.g., backroom inventory as a % of sales), relevant KPIs, and will also cover both the manufacturer and the retailer side of the equation.

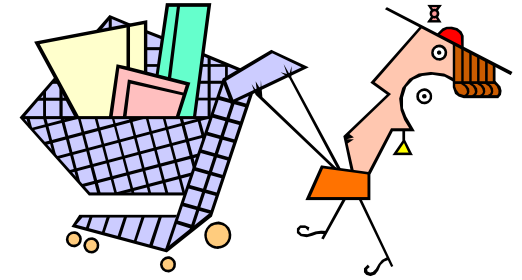
Subsidiary Deliverable 4: This addresses the issue of proper measurement of OOS, so that all parties can enhance their ability to effectively measure OOS. For example, if measurement is being done by a technology such as with Data Ventures, recommend the proper way to measure and record OOS. Alternatively, since many firms will not use signaling technology, but rather depend on physical audits, recommend the most appropriate way to conduct an audit.



Hypotheses and Associated Measures

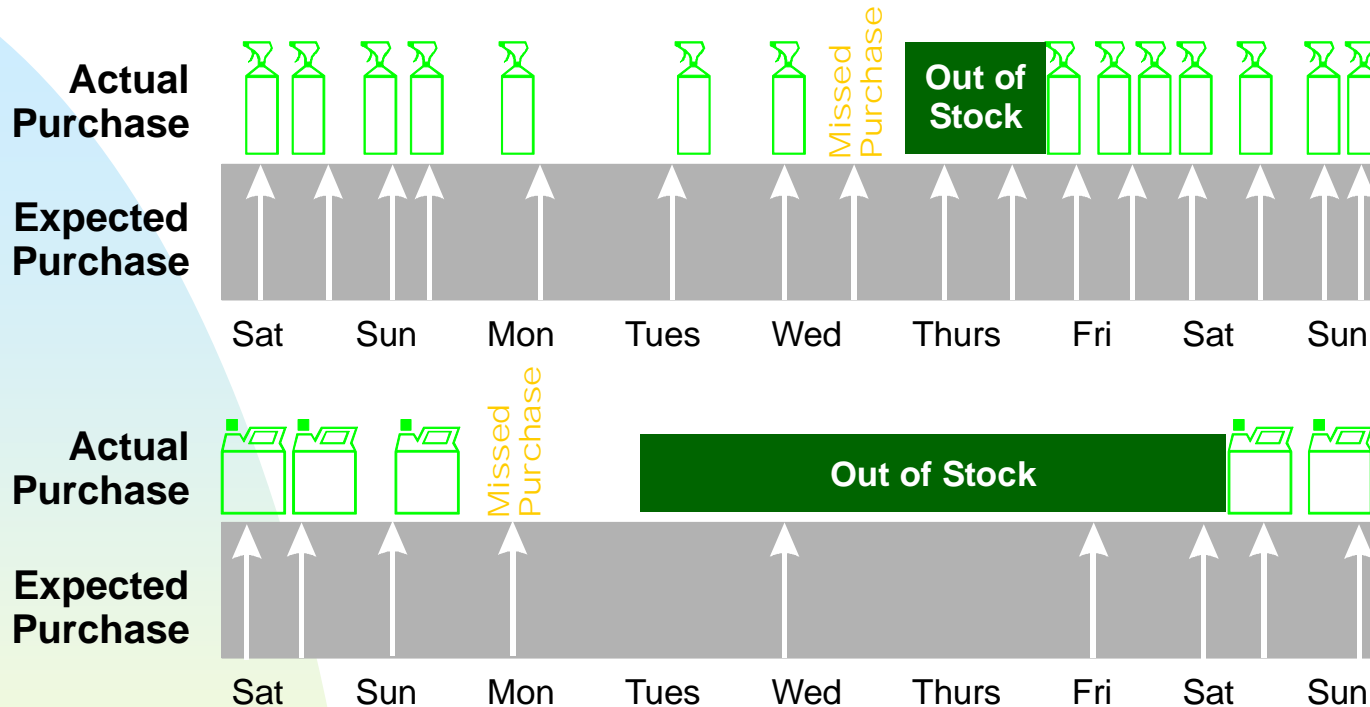
- **Planning: Promotion**
 1. “The greater the forecasting accuracy, the lower the OOS level,” measure: sell-through as a % of forecast.
 2. “The greater the inventory accuracy, the lower the OOS level,” measure: the % of items in inventory that have accurate counts.
 3. “The greater the accuracy of required labor capacity, the lower the OOS level,” measures examine the time allocated vs. used for displays and pricing
 4. “The higher the level of shelf-tag accuracy, the lower the OOS level,” measure: % tags correct (by category if category is level of OOS measurement).
- **Planning: Everyday**
 5. “The more the shelf-space is allocated for highest daily supply variance, the lower the OOS level,” measures include days supply variance; % items minimum case packout.
 6. “The greater the consistency and accuracy of item data, the lower the OOS level,” measure: % of items correct/complete.
 7. “The greater the assortment per space allocated towards the category, the higher the OOS level” (links to category management practices), measures include SKUs per pack size, days supply variance, and % items min case packout.
- **Ordering: Manual**
 8. Repeat H4, include additional measure of % OOS items not ordered.
 9. “The greater the (a) number of OOS “holes” covered with other product, (b) the number of SKUs with product hidden behind, and (c) the number of SKUs with limited visibility, the higher the level of OOS,” measure: % OOS covered, % SKUs with hidden product or limited visibility.
- **Ordering: Computer Assisted**
 10. Repeat H2
- **Replenishing: Delivery and Receiving**
 11. “The longer the leadtime promotional items are delivered, the lower the level of OOS,” measure: average hours delivered prior to start of promotion.
 12. “The more timely deliveries according to schedule, the lower the level of OOS,” measure: on-time %.
 13. “The more frequent the number of deliveries, the lower the level of OOS,” measure: delivery frequency.
 14. “The greater the accuracy of receiving, the lower the level of OOS,” measure: % receiving errors.
- **Replenishing: Backroom Management**
 15. “Beyond a minimum level, the greater the backroom inventory, the higher the level of OOS,” measure: backroom inventory as a % of store inventory.
 16. “The lower the number of back-stock items, the lower the level of OOS,” measure: % of back-stock items.
- **Replenishing: Stocking Method**
 17. “The type of stocking method (test for category, aisle or other type as the best) is correlated with lower OOS,” measures include the type of stocking method, and the cases stocked per hour.
- **Replenishing: Planogram Compliance**
 18. “The greater the availability of POG and the greater the compliance to POG, the lower the level of OOS,” measures include POG availability and compliance.
 19. “The lower the number of discontinued items on the shelf, the lower the overall level of OOS,” measure: % SKUs on the shelf that are discontinued.
- **Replenishing: New Item Process**
 20. “The better the new item communication and placement instructions, the lower the level of OOS,” measures include the % of new items with prior communication and % of new items with instructions.
 21. Repeat H2 and H4, but for new items.

POTENTIAL "FIXES" FOR OOS



- Increased safety stocks ➤ Leads to more OOS!
- Increased manpower ➤ Too expensive
- CPFR ➤ Good for upstream
- Efficient replenishment ➤ Gets to some of the problem
- Category planning and shelf space reallocation ➤ Begins to get to the root of the issue
- Use of signaling technology ➤ Looks promising, let's see how one works...

How does DataVentures signaling technology work?



- The algorithm determines each item's velocity
- Item expected velocity varies as the store velocity varies and price of the item varies
- When an item's purchase cycle (expected velocity) is interrupted, that item is deemed "Out-of-Stock"

How Accurate Is Signaling?

85%+ accuracy rate!

- Physical audits were done at four different retailers to compare identified Out-of-Stocks with actual shelf conditions.

False positive conditions include:

- Product out of date
- Physical obstruction – shipper or floor display in the way
- Product in the wrong place on the shelf or with wrong shelf tag
- Stockers “filled in” empty places on the shelf so manager thought product was in stock
- Cleaning the shelves
- The false positive conditions above create an “effectual” Out-of-Stock

DataVentures Signaling Key Benefits

Allows:

- Identify items which are habitually Out-of-Stock
- Identify stores with Out-of-Stock problems
- Determine the day of week and the time of day when Out-of-Stocks are most likely to occur
- Quantify the cost of Out-of-Stocks
- Measure success in implementing change

Leads to action:

- Determine which items need adjustment to increase shelf space at everyday price
- Identify items which need additional display space when promoted
- Optimize store delivery schedules to reduce Out-of-Stock rates
- Optimize store staffing schedules to provide the man-power needed on peak days or times
- Assess the performance of store operations staff and measure improvements to stock-out rates over time
- Measure the success of operation implementation programs that relate to Out-of-Stock
- Identify Direct Store Delivery (DSD) service issues so they can be resolved

OOS by Retailer Geography



Retail Operations Package

4 Week Summary

4 Weeks Ending 9/24/2002

	Latest 4 Weeks							Last Week						
	OOS Rate	# OOS Events	Avg Duration of OOS (days)	Lost Item Units	Lost Dollar Sales	% OOS on Price Red	OOS % of Total Sales	OOS Rate	# OOS Events	Avg Duration of OOS (days)	Lost Item Units	Lost Dollar Sales	% OOS on Price Red	OOS % of Total Sales
Total Chain	10.1%	870,038	5.1	8,402,486	\$10,563,222	17.9%	6.4%	9.7%	207,152	5.4	2,000,592	\$2,576,396	24.7%	1.4%
Northern District	7.9%	158,135	5.5	2,949,192	\$3,395,267	18.3%	5.8%	8.4%	41,614	4.9	867,409	\$893,491	56.4%	1.4%
Eastern District	12.3%	169,023	4.2	1,828,369	\$2,348,115	14.2%	6.0%	11.4%	41,225	5.9	445,914	\$572,711	12.6%	1.5%
Southern District	8.3%	93,821	4.3	812,441	\$1,080,474	23.9%	6.5%	8.1%	22,338	4.1	223,338	\$257,711	18.6%	1.4%
Western District	7.9%	265,098	5.2	1,254,815	\$1,668,058	14.1%	6.7%	7.8%	61,651	4.1	616,515	\$787,711	12.7%	1.3%

Take Action!
 The Northern District represents the greatest opportunity!
 The OOS Gap represents \$3million in lost sales!

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Report 1

This report helps:

- Quantify the dollar impact of Out-of-Stocks for the Total Chain, or District.
- Identify districts with the greatest problem to know where to focus.
- Begin to identify root causes.

OOS Rate by Store by Day



Retail Operations Package

Day of Week Store Trends - OOS Rate Only

4 Week Ending 9/24/2002

Store #	Location	% OOS \$ on Price Red	OOS Rate by Day of the Week						
			Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Northern District									
567	Springfield	25.6%	8.7%	8.2%	8.4%	9.2%	12.7%	10.6%	9.7%
245	Greenville	34.5%	6.8%	6.4%	6.7%	6.7%	6.9%	7.6%	7.7%
875	Cold Springs	56.7%	7.7%	7.6%	7.7%	7.5%	7.4%	7.5%	7.7%
Eastern District									
788	Smithfield	22.6%	13.7%	13.6%	12.9%	12.8%	13.5%	13.7%	13.8%
247	Eastland	18.7%	12.4%	12.6%	12.7%	19.2%	18.7%	13.0%	13.0%
987	Portsmouth	64.2%	9.7%	9.9%	9.8%	10.2%	10.4%	10.4%	10.4%
547	Riverbend	21.7%	7.2%	7.4%	7.6%	7.4%	9.3%	9.3%	9.3%

Take Action!
 The Eastland store's worst day for Out-of-Stocks is Thursday. Adjust staff and work schedules in this store to remedy the situation.

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Report 4

This report helps:

- Determine which days of the week pose the most problem.
- Identify specific stores which may have problems on an unexpected day.

Top 100 OOS Items by Store



Retail Operations Package

Top 100 Out of Stock Items by Store

1 Week Ending 9/24/2002

Store	Item Code	Category	Description	Item was OOS on Last Week's Report	OOS Rate	# of OOS Events	Avg Duration of OOS (days)	Expected Sales Velocity Used in Determining OOS Events	Lost Item Units	Lost Dollar Sales	% of Total OOS Dollars Lost	% OOS \$ on Price Red	Date When Item Went OOS	Time of Day When Item First Went OOS	Date When Item Lost the Most	Time of Day When Item Lost the Most
													9/19/02	8:37 PM	9/20/02	4:09 PM
0134	00000000000	Milk	P Label Gallon Milk	Repeat OOS	38.1%	2	1.74	:26	183	\$494	30.3%	0.0%	9/19/02	8:37 PM	9/20/02	4:09 PM
0134	00000000000	Bath Tissue	Reliable 4 Roll Tissue		33.0%	2	1.75	1:09	70	\$485	29.7%	100.0%	9/19/02	6:09 PM	9/20/02	8:59 PM
0134	00000000000	Condiments	Picnic Catsup		16.3%	1	1.95	:59	43	\$37	2.3%	100.0%	9/20/02	7:29 PM	9/20/02	7:29 PM
0134	00000000000	Snacks	Party Hearty Potato Chips	Repeat OOS	7.7%	1	0.86	1:27	14	\$29	1.7%	100.0%	9/18/02	2:21 PM	9/18/02	2:21 PM
0134	00000000000	Carbonated Beverage	Mr Fizzy Diet Cola 2 liter	Repeat OOS	81.3%	4	0.45	7:24	23	\$23	1.4%	0.0%	9/17/02	4:58 PM	9/17/02	4:58 PM
0134	00000000000	Ice Cream	Sinfulicious Ice Cream Vanilla Gal		83.0%	1	6.28	15:03	10	\$19	1.2%	100.0%	9/19/02	10:32 AM	9/20/02	10:32 AM
0134	00000000000	Carbonated Beverage	Mr Fizzy Cola 2 liter	Repeat OOS	61.2%	5	0.32	6:19	19	\$19	1.1%	0.0%	9/17/02	5:22 PM	9/17/02	5:22 PM
0134	00000000000	Fresh Bread & Rolls	P Label Hot Dog Buns	Repeat OOS	20.0%	1	1.35	1:54	18	\$17	1.1%	0.0%	9/20/02	10:39 AM	9/20/02	10:39 AM

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Report 5

Take Action!
 Frequent, short OOS on Mr Fizzy Soft Drinks that are at everyday price indicate that there may be a need to modify the DSD delivery schedule for these items.

This report helps:

- Identify items with consistent Out-of-Stocks.
- Identify day and time of OOS Events.
- Understand the extent that promotional activity drives Out-of-Stocks.
- Identify items that need modification of delivery schedules.

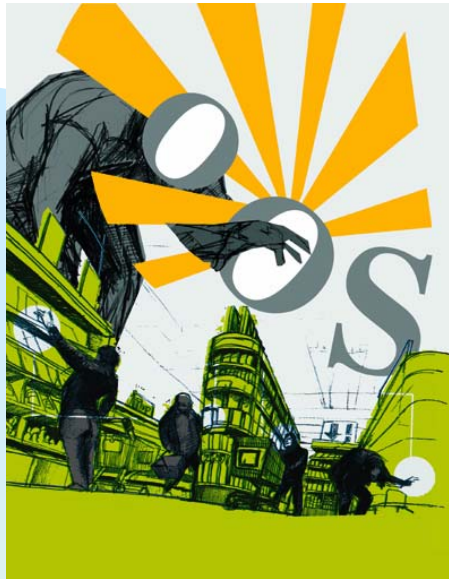
Signaling Data Requirements and Summary

Data

- Daily data or Transaction Log data (T-Log preferred)
- Initial set of at least 26 weeks of data (52 weeks preferred) to train algorithm
- UPC segmentation file
- Store segmentation file

Summary

- As part of a rigorous study, systems like this can help deliver findings that will lead to consistently lower OOS industry wide.



QUESTIONS???

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For a PDF copy of the study, you can download directly from: <http://www.uccs.edu/tgruen>